

Washington Place Mixed Use Transit Oriented Redevelopment

Newton, Massachusetts

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Executive Summary

VHB, Inc. has completed a detailed traffic assessment to evaluate the potential impacts associated with the mixed use transit oriented redevelopment know as Washington Place to be located at northwest corner of the intersections of Washington Street and Walnut Street in the Newtonville section of Newton, Massachusetts. Washington Place will be constructed on approximately 2.85 acres of land and will replace the aging commercial/residential buildings and poorly maintained parking lots which exist at the site today. The entire site is currently developed and all existing building and structures will be demolished and new buildings be constructed. The project will include approximately 39,745 square feet of ground level commercial space with entrances along both Walnut Street and Washington Street. Above the commercial space will be 171 residential units comprising approximately 196,300 square feet on four levels, for a total of five stories. Included in the residential floors will be approximately 2,030 square feet of community space with its own dedicated entrance and elevator. The project will provide 110 parking spaces at grade level for the commercial and restaurant patron and a single level of below-grade parking garage with 236 spaces and storage for over 180 bikes for the residential tenants.

After the removal of traffic from all the existing facilities on site which includes retail/restaurant/residential/ballet school/Sunoco Gas Station, and assessing the future condition (change) in traffic based on standard practice outlined in the Institute of Transportation Engineers *Trip Generation, 9th Edition*, the proposed development is projected to generate approximately 89 new vehicles trips during the weekday morning peak hour and the no new trips during the weekday evening peak hour period. The traffic volumes projected to be generated by the proposed development will have minimal effect on traffic operations within the study area yet the proponent is proposing a number of mitigative actions to address existing infrastructure issues and the enhance the vehicular and pedestrian environment in the vicinity of the site as outlined below:

- **Site Access:** The site currently is served by six (6) access driveways, four along Washington Street and two on Walnut Street. Under the redevelopment plan, there is an opportunity to consolidate the six access driveway to two access driveways, one at the existing Washington Terrace private way and the other along Walnut Street. Under existing conditions, the four site access driveways (which includes Washington Terrace) along Washington Street are located within a 450 feet section of roadway (close spacing) between Walnut Street and Washington Terrace. The redevelopment plan would eliminate all four curb cuts along this section, thereby providing substantial access

management with significantly less conflict points from that which exists today. Also, the proposed access driveway along Walnut Street would be located at the north end of the property, thereby being located as far away as possible from the existing Washington Street at Walnut Street intersection. The redevelopment access plan is a substantial enhancement along this corridor

- **Washington/Walnut Street Intersection:** The intersection of Washington Street at Walnut Street currently operates poorly and as outlined in the City of Newton traffic signal inventory report, there are a number of short term and long-term improvement needs that have been identified but not implemented by the City. As part of the redevelopment project, this intersection and the traffic signal will be upgraded to meet modern standards. Improvements will include:
 - Modern Traffic Signal (adaptive system will be considered).
 - Curb-bump outs on the northeast and northwest corners of the intersection.
 - ADA compliant cross-walks with audible and visual count down indicators
 - Update pavement striping to include a second lane on along the Walnut Street southbound approach to the intersection
 - Implement coordination to adjacent traffic signal if there is benefit to doing so.
- **Washington/Lowell Street Intersection;** To bolster existing operations at this intersection, the Proponent will optimize the timing and phasing plan at this location as part of the redevelopment project. Implement coordination to adjacent traffic signal if there is benefit to doing so.
- **Washington Terrace;** The Proponent will reconstruct and widen Washington Terrace to improve the conditions of the roadway. At this time we believe that this would include grinding existing asphalt and resurfacing the street.
- **On-site Transportation Demand Management (TDM) program:** To promote alternative modes of transportation and reduce traffic and parking demands for the site. Site plan includes bike racks, and there will be protected bike parking for 180 bikes with the residential space being proposed. The project has direct access to MBTA bus and train service and information on scheduling will be available in the residential building foyer on a regular basis.

Overall, the study finds that the redevelopment project will not have a significant effect on traffic operations within the study area. In addition the access consolidation offered by the project will reduce conflict points and have a positive effect on operations and safety in this area.

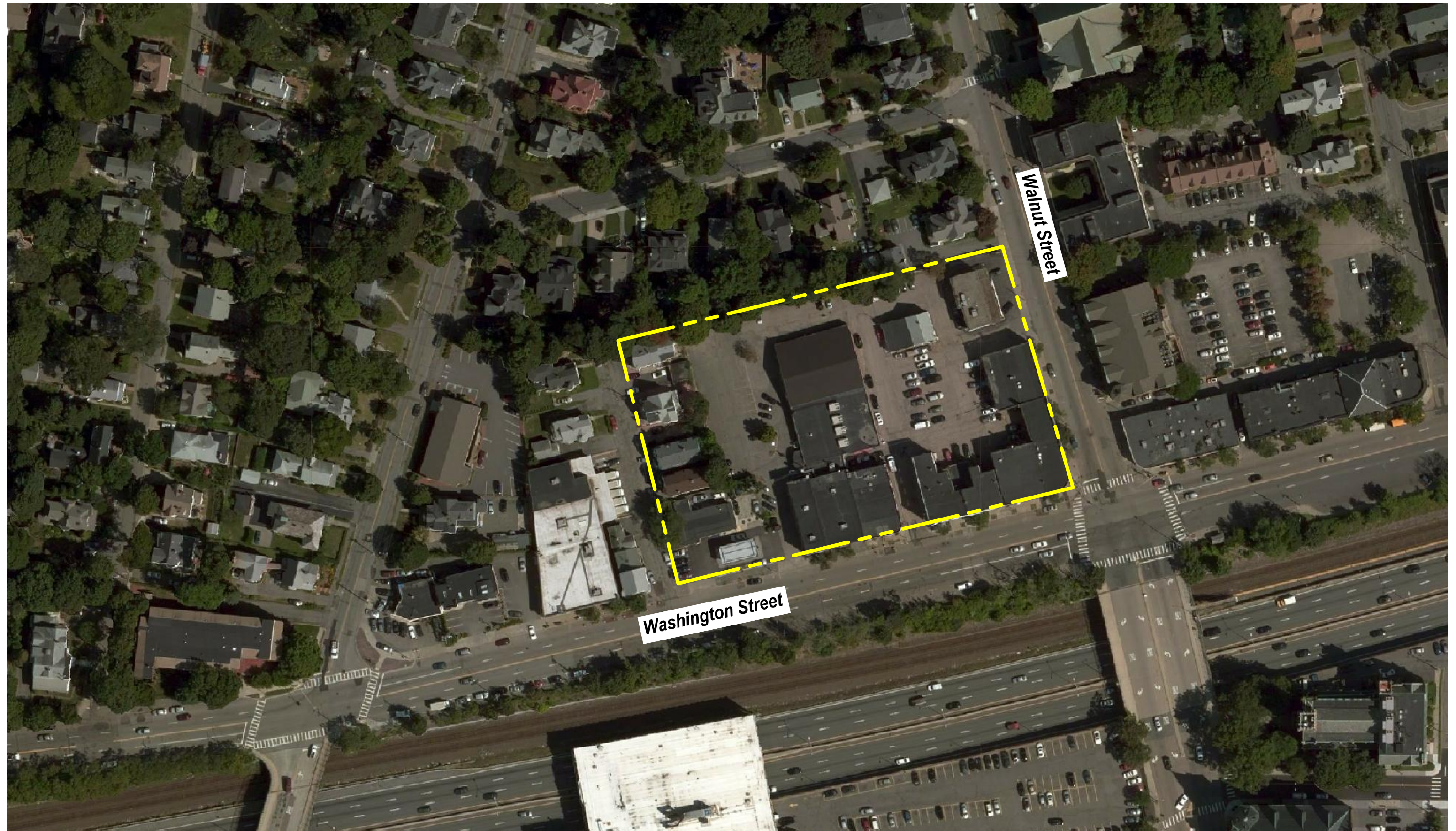
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Introduction

Vanasse Hangen Brustlin, Inc. (VHB) has conducted a traffic impact and access study for a proposed the mixed use transit oriented redevelopment know as Washington Place to be located at northwest corner of the intersections of Washington Street and Walnut Street in the Newtonville section of Newton, Massachusetts. This study quantifies existing and projected future traffic conditions, and identifies potential improvements within the study area.

Project Description

Washington Place is a mixed use transit oriented redevelopment to be located at northwest corner of the intersections of Washington Street and Walnut Street in the Newtonville section of Newton, Massachusetts. Washington Place will be constructed on approximately 2.85 acres of land and will replace the aging commercial/residential buildings and poorly maintained parking lots which exist at the site today. The entire site is currently developed and all existing building and structures will be demolished and new buildings be constructed. The project will include approximately 39,745 square feet of ground level commercial space with entrances along both Walnut Street and Washington Street. Above the commercial space will be 171 residential units comprising approximately 196,300 square feet on four levels, for a total of five stories. Included in the residential floors will be approximately 2,030 square feet of community space with its own dedicated entrance and elevator. The project will provide 110 parking spaces at grade level for the commercial and restaurant patron and a single level of below-grade parking garage with 236 spaces and storage for over 180 bikes for the residential tenants. The existing site plan is shown in Figure 1.



Existing Site

Mixed Use Development
Newton, Massachusetts

Figure 1

May 2016

Study Area

The key roadways in the study area are Washington Street and Walnut Street. The transportation study area is based on an understanding of traffic conditions in this area and includes the following ten (10) intersections identified in Figure 2:

- Washington Street at Lowell Avenue – *signalized*;
- Washington Street at Washington Terrace – *unsignalized*;
- Washington Street at Sunoco Driveway West – *unsignalized*;
- Washington Street at Bailey Place West/Sunoco Driveway East – *unsignalized*;
- Washington Street at Bailey Place East – *unsignalized*;
- Washington Street at Walnut Street – *signalized*;
- Washington Street at Central Avenue – *unsignalized*;
- Walnut Street at Site Driveway/ 246 Walnut Street Driveway – *unsignalized*;
- Walnut Street at Alley Driveway – *unsignalized*; and
- Walnut Street at Foster Street – *unsignalized*

Study Methodology

This traffic assessment has been conducted in three stages. The first stage involved an assessment of existing traffic conditions within the project area, including an inventory of existing roadway geometry, observations of traffic flow, daily and peak period traffic counts, and a review of traffic safety in the area.

The second stage of the study established the framework for evaluating the transportation impacts of the proposed project. Specific travel demand forecasts for the project were assessed along with future traffic demands on the study area roadways due to projected background traffic growth and other proposed area development that may occur independent of the proposed development. The year 2023 (a seven-year time horizon) was selected as the design year for analysis for the preparation of this traffic impact and access assessment, consistent with typical traffic impact studies prepared for the City of Newton and MassDOT. Analysis of area traffic operations in the year 2023 would fully reflect the effects of the proposed development as well as background traffic independent of the proposed development. The traffic analysis conducted in the second stage identified both existing and projected future roadway capacities and demands.



Figure 1

May 2016



Site Location Map and
Study Area Intersections
Mixed Use Development
Newton, Massachusetts

The third and final stage of the study discusses possible measures to improve existing and future traffic operations in the area.

2

Existing Conditions

Evaluation of the transportation impacts associated with the proposed project requires a thorough understanding of the existing transportation system in the project study area. A complete inventory and evaluation of the existing transportation system in the project study area was conducted. The analysis of existing transportation conditions is based on the existing roadway network, roadway/intersection geometry, traffic control, existing daily and peak hour traffic volumes, traffic safety conditions, and existing public transportation. A description of existing conditions within the study area is presented below.

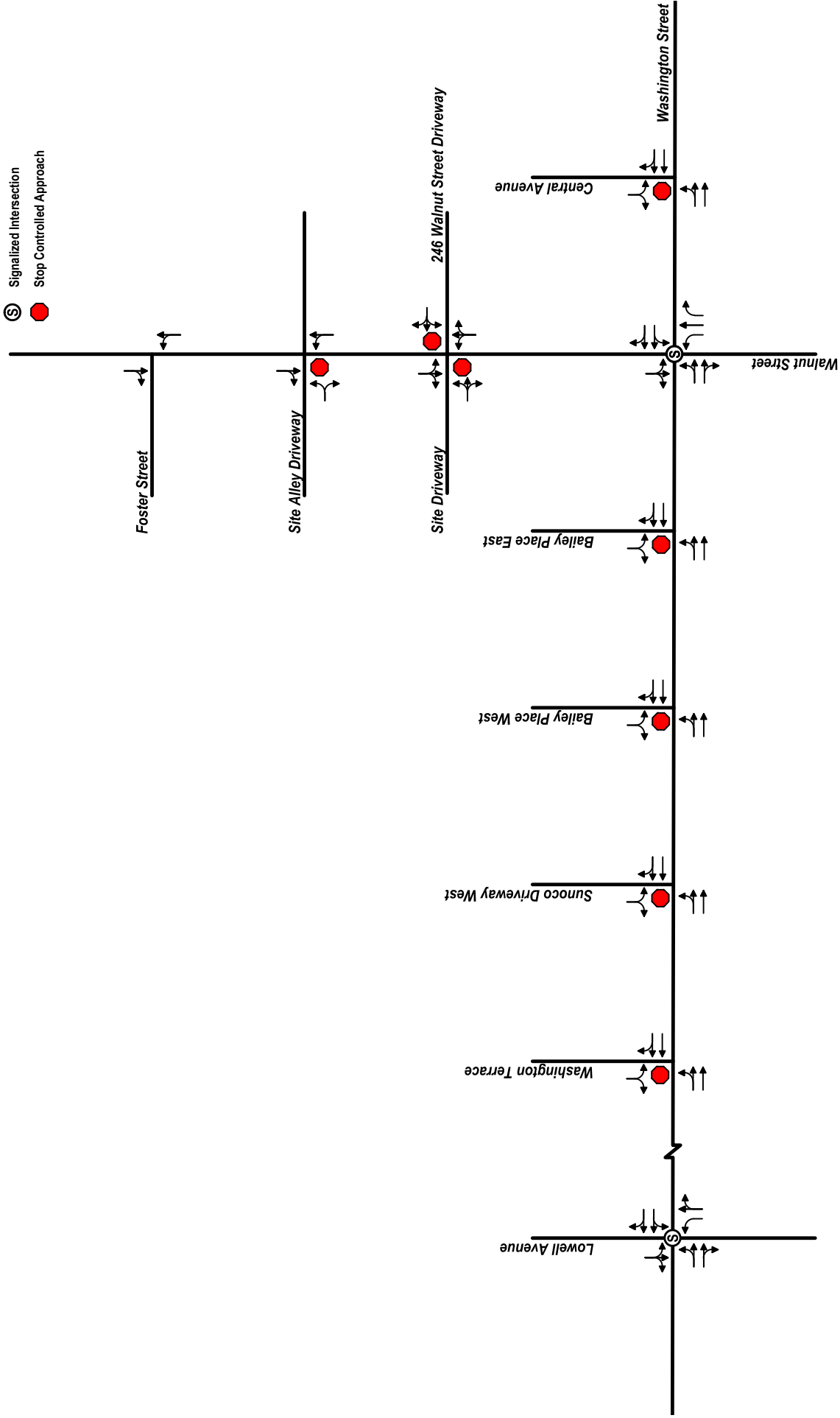
Study Area Roadways and Intersections

The following description of the major roadways and study area intersections includes the physical characteristics, geometric conditions, traffic control, and adjacent land uses. Figure 3 presents the existing intersection lane geometry and traffic control at each of the study area intersections.

Roadways

Washington Street

Washington Street is an east/west urban arterial roadway under City of Newton jurisdiction in the vicinity of the project site. Washington Street is a four-lane roadway (two lanes in each direction) with a posted speed limit of 35 mph. Sidewalks are present along both sides of the road within the vicinity of the site. Parallel on-street parking is provided on both the northerly and southerly sides of Washington Street. Land use along Washington Street consists of a mix of commercial and residential uses in this area.



Not to Scale



Plane geometry and traffic control

Figure 3

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Walnut Street

Walnut Street adjacent to the site is a north/south urban arterial roadway under City of Newton jurisdiction in the vicinity of the project site. Walnut Street is a two-lane roadway (one lanes in each direction) with a posted speed limit of 25 mph. Sidewalks are present along both sides of the road within the vicinity of the site. Parallel on-street parking is provided on both the northerly and southerly sides of Walnut Street. Land use along Washington Street consists of a mix of commercial and residential uses in this area.

Intersections

Washington Street at Lowell Avenue

Lowell Avenue intersects Washington Street from the north and south forming a four-legged signalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The northbound Lowell Avenue approach consists of a left-turn lane and a shared through/right-turn lane. The southbound Lowell Avenue approach consists of one general purpose lane. Sidewalks exist on all corners of the intersection, and there are crosswalks across all four approaches. There is on-street parking on the north and south side of Washington Street to the east and west of the intersections. Land use near the intersection is a mix of residential and commercial.

Washington Street at Washington Terrace

Washington Terrace intersects Washington Street from the north to form this three-legged unsignalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The southbound Washington Terrace approach consists of one general purpose lane and is under STOP control. Sidewalks exist on both sides of Washington Street. There are no crosswalks present. There is on-street parking on the north and south side of Washington Street. Land use near the intersection is a mix of residential and commercial, and the US Post Office is located to the west of the intersection.

Washington Street at Sunoco Driveway West

The Sunoco Driveway West Driveway intersects Washington Street from the north to form this three-legged unsignalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The

southbound Sunoco Driveway West approach consists of one general purpose lane and is under STOP control. Sidewalks exist on both sides of Washington Street. There are no crosswalks present. There is on-street parking on the north and south side of Washington Street. Land use near the intersection is primarily commercial.

Washington Street at Bailey Place West

Bailey Place West intersects Washington Street from the north to form this three-legged unsignalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The southbound Bailey Place West approach consists of one general purpose lane and is under STOP control. Additionally, the Sunoco's east driveway merges with Bailey Place West just north of the intersection, but has been treated as one combined approach. Sidewalks exist on both sides of Washington Street. There are no crosswalks present. There is on-street parking on the north and south side of Washington Street. Land use near the intersection is primarily commercial.

Washington Street at Bailey Place East

Bailey Place East intersects Washington Street from the north to form this three-legged unsignalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The southbound Bailey Place East approach consists of one general purpose lane and is under STOP control. Sidewalks exist on both sides of Washington Street. There are no crosswalks present. There is on-street parking on the north and south side of Washington Street. Land use near the intersection is a mix of residential and commercial.

Washington Street at Walnut Street

Walnut Street intersects Washington Street from the north and south to form a four-legged signalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The northbound Walnut Street approach consists of a left-turn lane, a through lane and a right-turn lane. The southbound Walnut Street approach consists of one wide general purpose lane. Sidewalks exist on all corners of the intersection, and there are crosswalks across all four approaches. There is on-street parking on the north and south side of Washington Street to the east and west of the intersections. Land use near the intersection is a mix of residential and commercial.

Washington Street at Central Avenue

Central Avenue intersects Washington Street from the north to form this three-legged unsignalized intersection. The eastbound and westbound Washington Street approaches each consist of two general purpose lanes. The southbound Central Avenue approach consists of one general purpose lane and is under STOP control. Sidewalks exist on both sides of Washington Street. There are no crosswalks present. There is on-street parking on the north and south side of Washington Street. Land use near the intersection is a mix of residential and commercial.

Walnut Street at Foster Street

Foster Street intersects Walnut Street from the west to form this three-legged unsignalized intersection. The north and southbound Walnut Street approaches each consist of single general purpose lane. The eastbound Foster Street approach consists of one general purpose lane and is under STOP control. Sidewalks exist on both sides of Walnut Street and Foster Street. There are no crosswalks present. There is a crosswalk on the north side of the intersection across Walnut Street. Land use near the intersection is primarily residential.

Existing Traffic Volumes

Daily traffic volumes were collected on Washington Street west of Walnut Street and on Walnut Street north of Washington Street over a 24-hour period on Thursday, November 19, 2015 using automatic traffic recorders (ATR). This date represents a typical weekday for traffic count purposes (non-holidays) while schools were in session. The volumes are summarized in Table 1 and included in the Appendix to this document.

Table 1 Existing Traffic Volume Summary

Location	ADT ^a	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		Volume	K Factor ^b	Dir. Dist. ^c	Volume	K Factor	Dir. Dist.
Washington Street, west of Walnut Street	12,300	1,010	8.2%	58% EB	1,140	9.2%	54% WB
Walnut Street, north of Washington Street	10,000	760	7.6%	53% NB	765	7.6%	52% NB

Source: VHB based on automatic traffic recorder counts conducted on November 19, 2015.

Note: Peak hours do not necessarily coincide with the peak hours of turning movement counts.

- a. Average Daily Traffic volume expressed in vehicles per day.
- b. Represents the percent of daily traffic that occurs during the peak hour.
- c. Directional distribution of peak hour traffic.

As shown in Table 1 Washington Street west of Walnut Street carries approximately 12,300 vehicles on a typical weekday with the peak hours accounting for 8.2 percent (morning peak hour) and 9.2 percent (evening peak hour) of the weekday daily traffic flow. Traffic flow along Washington Street is heavier in the eastbound direction during the weekday morning peak hour and heavier in the westbound direction during the weekday evening peak hour.

Walnut Street north of Washington Street carries approximately 10,000 vehicles on a typical weekday with the peak hours accounting for 7.6 percent (morning and evening peak hours) of the weekday daily traffic flow. Traffic flow along Walnut Street is heavier in the northbound direction during both the weekday morning and weekday evening peak hours.

Concurrent with the ATR counts, turning movement counts (TMCs) were conducted at the study area intersections in November 2015 during the weekday morning peak period from 7:00 AM to 9:00 AM and the weekday evening peak period from 4:00 PM to 6:00 PM. The TMC data indicates that, within the study area, the weekday morning peak hour generally occurs between 7:45 AM and 8:45 AM and the weekday evening peak hour occurs between 5:00 PM and 6:00 PM.

Seasonal Variation

MassDOT historical traffic counts were reviewed to understand the seasonality of traffic count data collected in the month of November. The statewide data for seasonal variation of traffic volumes indicate that traffic counts in November are generally higher than the average month. Since the count data were found to be higher than annual average conditions, no further seasonal adjustment factors were

applied to the data. The MassDOT seasonal factors are included in the Appendix to this document.

Growth of 2015 Count Data

Traffic studies conducted in the City of Newton and historic count data were reviewed to establish a rate at which traffic volumes can be expected to grow. A review of recent traffic studies showed a 0.5-percent per year growth rate has been utilized. Historical count data available from MassDOT within the vicinity of the project show fluctuations in traffic volumes over the last five years, with no consistent increase or decrease in traffic volumes.

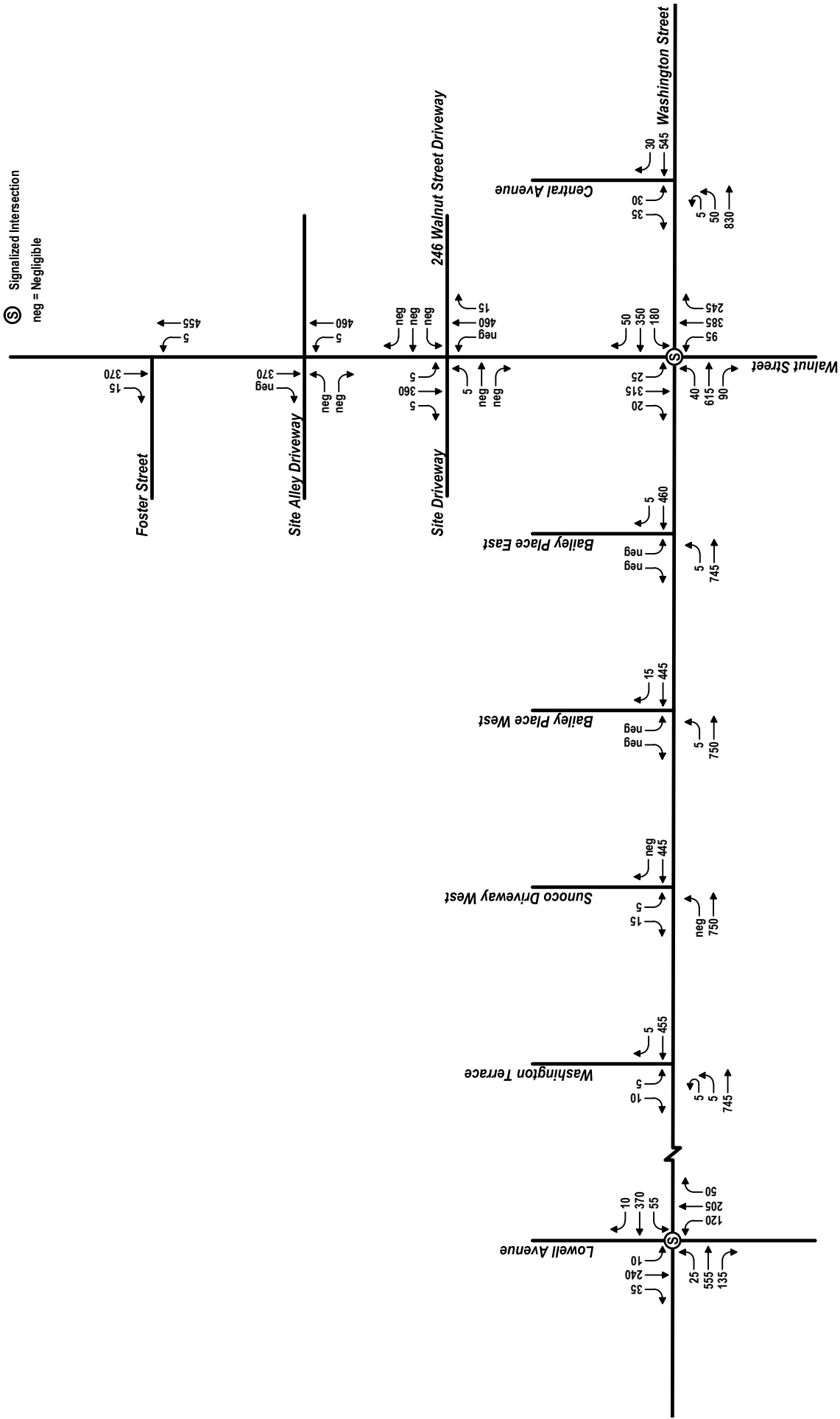
Based on a review of available data, and to account for the one-year time lapse since the collection of the 2015 traffic volume data, the study area traffic volumes counted in 2015 were increased by a factor of 0.5-percent per year for one year to represent the 2016 traffic volumes used in the detailed traffic analysis. Where appropriate, traffic volumes were balanced between the intersections. Figures 4 and 5 illustrate the resulting 2016 Existing conditions weekday morning and weekday evening peak hour traffic volumes, respectively.

Crash History

To identify motor vehicle crash trends in the project study area, the most current crash data for the study area intersections was obtained from MassDOT for the five-year period from 2009 through 2013. A summary of the vehicular crash data is presented in Table 2 and included in the Appendix to this document.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection on a daily basis. MassDOT average crash rates for District 6 (the MassDOT district designation for Newton) are 0.70 and 0.53 for signalized and unsignalized intersections, respectively. In other words, on average, 0.70 crashes occurred per million vehicles entering signalized intersections, and 0.53 crashes occurred per million vehicles entering unsignalized intersections throughout District 6. The crash rate worksheets for the study area intersections are included in the Appendix to this document.

As shown in Table 2, nearly all of the ten study area intersections experienced crashes over the five-year period, except for the intersection of Walnut Street at Alley Driveway. The calculated crash rates at all of the intersections are below the average crash rates for District 6. The majority of the crashes were angle, sideswipe, and rear-end collisions resulting in property damage only. The following intersections experienced crashes involving non-motorists (bike, pedestrian): Washington Street at



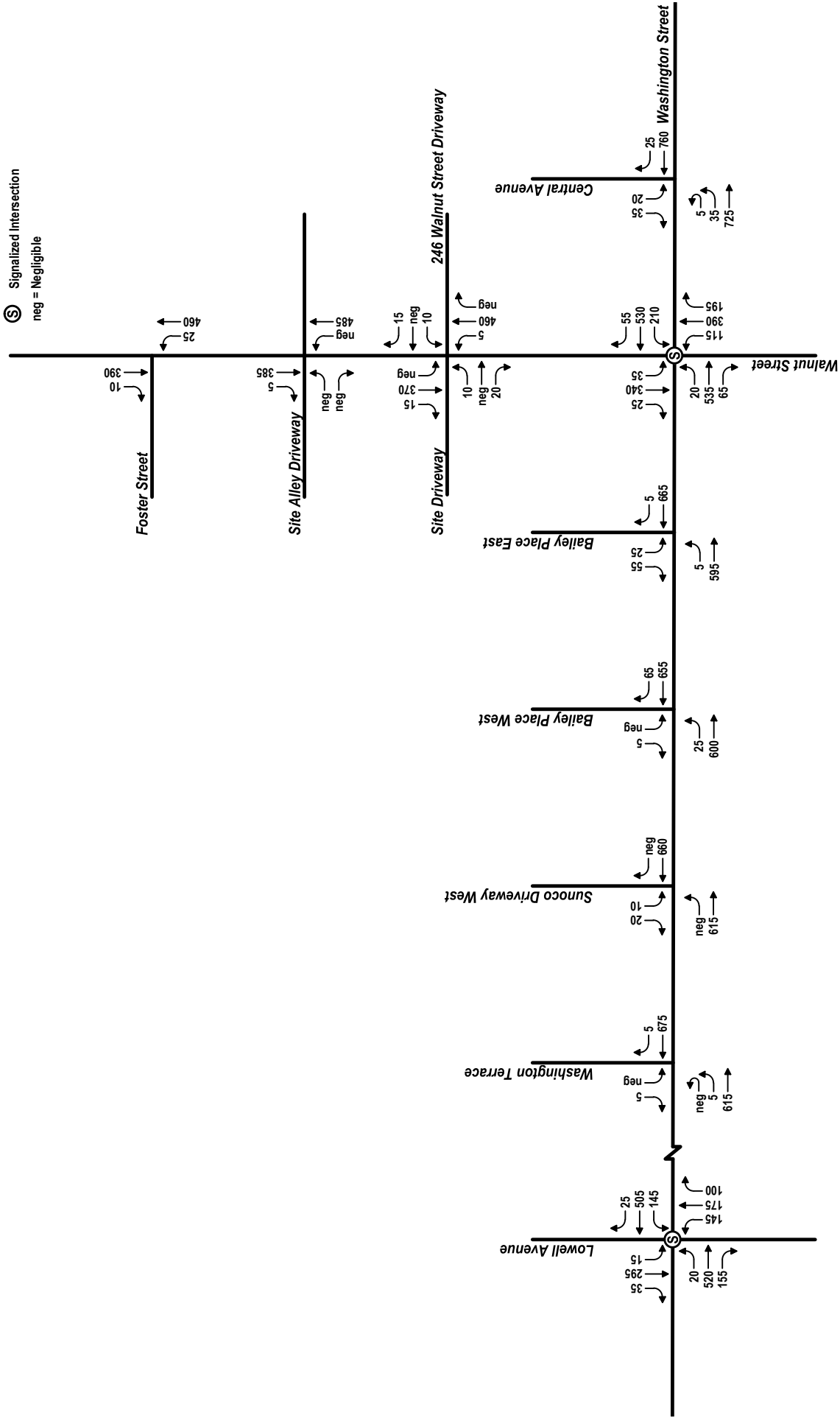
Not to Scale



2016 Existing ☐onditions
☐ee ☐day Morning ☐ea ☐our
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Figure 4

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Not to Scale



2016 Existing ☐ Conditions
☐ ee ☐ day Evening ☐ ea ☐ our
Mixed Use Development
Newton, Massachusetts

Figure 5

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Lowell Street, Washington Street at Sunoco Driveway, Washington Street at Walnut Street and Washington Street at Central Avenue. No fatal crashes were reported at any of the study area intersections. The Proponent is proposing significant pedestrian enhancements at the Washington Street and Walnut Street intersection that will address the safety concerns identified. In addition, as part of the redevelopment project, the Sunoco Station and its driveways are removed from the program so the safety concern at this location will also be eliminated.

Table 2 Vehicular Crash Summary (2009 – 2013)

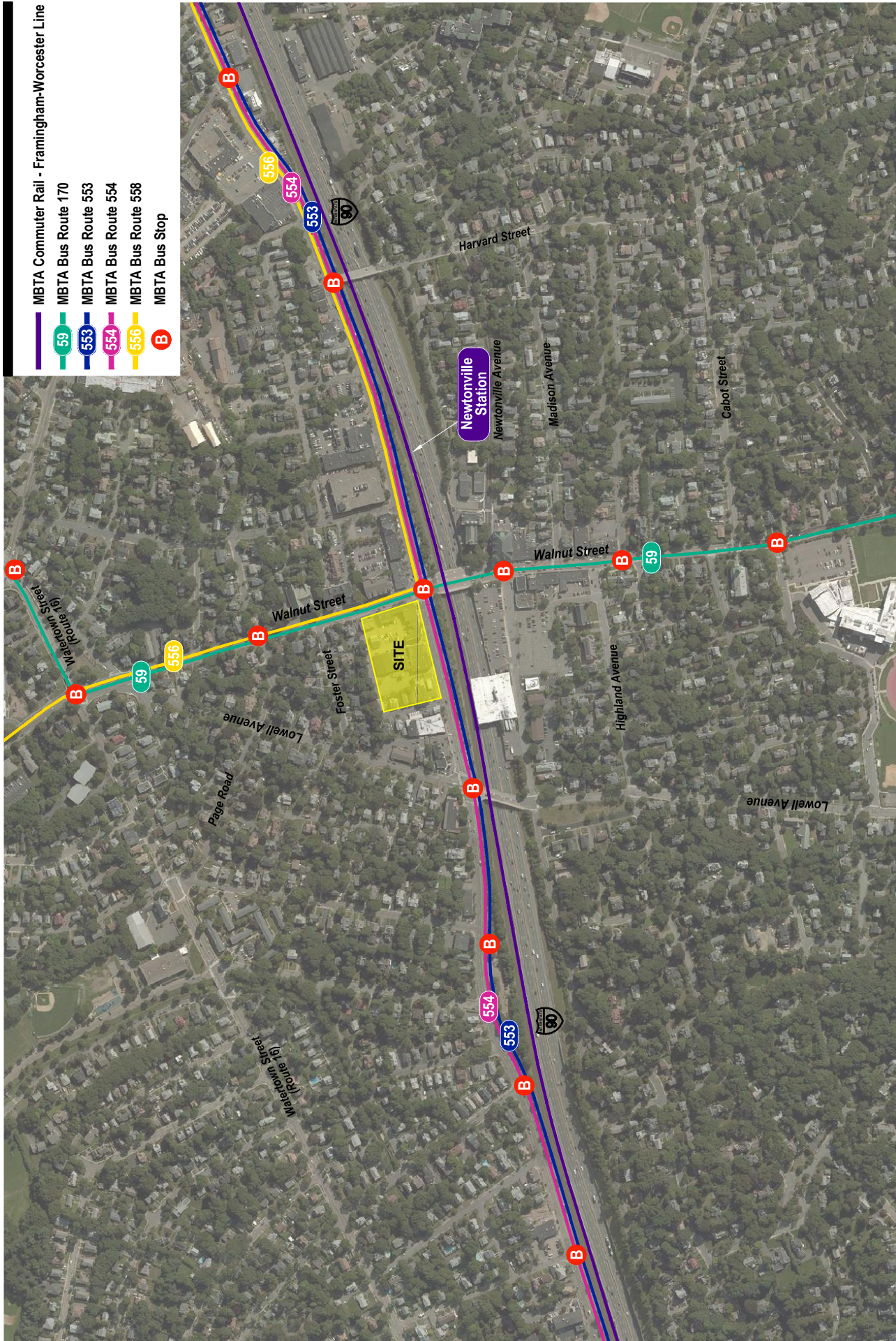
	Washington Street at:					Walnut Street at:				
	Lowell Street	Washington Terrace	Sunoco Driveway	Bailey West	Bailey East	Walnut Street	Central Avenue	Site Driveway	Alley	Foster Street
Signalized?	Yes	No	No	No	No	Yes	No	No	No	No
MassDOT Average Crash Rate	0.70	0.53	0.53	0.53	0.53	0.70	0.53	0.53	0.53	0.53
Calculated Crash Rate	0.35	0.04	0.04	0.07	0.04	0.56	0.28	0.23	0.00	0.23
Exceeds Average?	No	No	No	No	No	No	No	No	No	No
Year										
2009	4	0	0	2	0	6	3	0	0	0
2010	3	1	0	0	0	4	2	0	0	2
2011	2	0	0	0	0	7	0	1	0	0
2012	4	0	1	0	0	5	1	1	0	1
<u>2013</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>6</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>1</u>
Total	15	1	1	2	1	28	9	4	0	4
Collision Type										
Angle	5	0	0	1	1	10	4	1	0	1
Head-on	2	0	0	0	0	2	0	0	0	0
Rear-end	1	0	0	0	0	6	1	1	0	1
Sideswipe, opposite direction	0	0	0	0	0	0	1	0	0	0
Sideswipe, same direction	5	1	0	1	0	5	2	1	0	1
Single Vehicle Crash	1	0	1	0	0	2	1	0	0	0
Unknown/Not Reported	1	0	0	0	0	3	0	1	0	1
Severity										
Fatal Injury	0	0	0	0	0	0	0	0	0	0
Non-Fatal Injury	3	1	1	0	0	12	1	0	0	1
Property Damage Only	10	0	0	1	1	14	8	4	0	1
Unknown/Not Reported	2	0	0	1	0	2	0	0	2	7
Time of day										
Weekday ,7:00 AM - 9:00 AM	2	0	0	0	0	4	0	0	0	0
Weekday, 4:00 – 6:00 PM	6	0	0	1	0	3	2	1	0	1
Saturday 11:00 AM – 2:00 PM	3	0	0	1	0	0	0	0	0	0
Weekday, other time	3	1	1	0	1	15	5	3	0	0
Weekend, other time	1	0	0	0	0	6	2	0	0	3
Pavement Conditions										
Dry	10	1	1	2	1	18	8	2	0	3
Wet	2	0	0	0	0	6	0	2	0	1
Snow	2	0	0	0	0	1	1	0	0	0
Ice	0	0	0	0	0	0	0	0	0	0
Unkown/Not Reported	1	0	0	0	0	3	0	0	0	0
Non-Motorist (Bike, Pedestrian)	3	0	1	0	0	3	1	0	0	0

Source: Crash data was obtained from MassDOT.

Public Transportation

Public transportation is readily available in proximity to the site by the Massachusetts Bay Transportation Authority (MBTA) via the Commuter Rail Framingham/Worcester Line and the Route 59, 553, 554, and 556 buses. Details on current transit opportunities are provided below and the transit routes and stops are shown in Figure 6:

- **Commuter Rail Framingham/Worcester Line:** The Framingham/Worcester Line's Newtonville station is located adjacent to Washington Street, between Walnut Street and Harvard Street. The approximate walk time is 4 minutes to the Newtonville station. Weekday headways are approximately 15 to 30 minutes during peak periods. Weekend headways are approximately two hours. Daily and peak period capacity information is not readily available for the commuter rail lines. The Framingham/Worcester Line carries approximately 16,300 passengers on a typical weekday and approximately 3,000 passengers on a typical Saturday or Sunday. Scheduled service provides access to Back Bay in approximately 15 minutes and South Station in approximately 20 minutes.
- **Route 59:** Runs from the Needham Junction Commuter Rail station to Watertown Square and travels along Highland Avenue in Newton and Highland Avenue in Needham. There are seven bus stops within a half mile radius of the site. Weekday headways are approximately 25 to 35 minutes during peak periods. During the weekday morning peak period, the peak trip in the peak direction (outbound) is at approximately 65 percent capacity. During the weekday evening peak period, the peak trip in the peak direction (inbound) is at approximately 59 percent capacity. Weekend headways are approximately 90 minutes.
- **Route 553 (Express Bus):** Runs from Brandeis-Roberts Commuter Rail Station in Waltham to Downtown Boston and travels along Elm Street and Washington Street within the study area. There are four bus stops within a half mile radius of the site. Service is provided on weekdays and Saturdays. Weekday headways are approximately one hour, with approximately 30 minute headways during the morning peak period. During the weekday morning peak period, the peak trip in the peak direction (inbound) is at approximately 80 percent capacity. During the weekday evening peak period, the peak trip in the peak direction (outbound) is at approximately 59 percent capacity. Saturday headways are approximately 45 minutes.
- **Route 554 (Express Bus):** Runs from Waverly Square to Downtown Boston and travels along Elm Street and Washington Street within the study area. There are four bus stops within a half mile radius of the site. Service is provided on weekdays. Headways are approximately one hour, with approximately 30 minute headways during peak periods. During the weekday morning peak period, the



Public Transportation Routes

Figure 6

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Mixed Use Development
Newton, Massachusetts

peak trip in the peak direction (inbound) is at approximately 78 percent capacity. During the weekday evening peak period, the peak trip in the peak direction (outbound) is at approximately 54 percent capacity

- **Route 556 (Express Bus):** Runs from Summit Street in Waltham to Downtown Boston and travels along Walnut Street and Washington Street within the study area. There are five bus stops within a half mile radius of the site. Service is provided on weekdays. Headways are approximately one hour with additional service during peak periods. During the weekday morning peak period, the peak trip in the peak direction (inbound) is at approximately 91 percent capacity. During the weekday evening peak period, the peak trip in the peak direction (outbound) is at approximately 80 percent capacity

Sidewalks are provided throughout the study area along the routes to transit stops and stations, and crosswalks exist at the signalized intersections and major unsignalized intersections. The route maps and schedules for all public transportation services within the study area are provided in the Appendix to this document. As demonstrated above the proposed redevelopment project has substantial access to public transportation which will be attractive to potential residents and employees/customers of the commercial space.

3

Future Conditions

To determine future roadway operations, traffic volumes in the study area were projected to the year 2023 to reflect a seven-year planning horizon from the Existing conditions consistent with City of Newton and MassDOT guidelines.

Traffic volumes on the roadway network under future conditions without the project (No-Build) are assumed to include all existing traffic, any new traffic due to regional and area background traffic growth, and traffic related to any specific nearby development projects expected to be completed by the 2023 horizon year. Roadway improvements proposed within the boundaries of the study area were also considered and incorporated where appropriate. The anticipated traffic volumes from the proposed development were added to the No-Build traffic volumes to reflect future conditions with the project in place (Build).

No-Build Conditions

No-Build traffic volumes were determined by considering existing traffic volumes and adding regional traffic growth and traffic from other nearby developments. Traffic growth is a function of expected new development, changes in demographics, and changes in auto usage and ownership in the region. Regional traffic growth is projected by examining historic traffic growth trends.

Regional Traffic Growth

Traffic studies conducted in the City of Newton and historic count data were reviewed to establish a rate at which traffic volumes can be expected to grow. A review of recent traffic studies showed a 0.5-percent per year growth rate has been utilized. Historical count data available from MassDOT within the vicinity of the project show fluctuations in traffic volumes over the last five years, with no consistent increase or

decrease in traffic volumes. Based on this research, informed by the information available and to present a conservative analysis, a growth rate 0.5-percent per year has been assumed for this study.

Planned/Approved Developments

In addition to accounting for background growth, the traffic associated with other planned/approved developments near the site was also considered. Based on discussions with the City of Newton, it was determined that there is one planned development project within the vicinity of the study area and was considered as part of the background development.

- **Garden Remedies:** The approved Garden Remedies facility is located at 697 Washington Street. The redevelopment project will include the reconfiguration of an existing 945 square foot office portion of the building into a medical marijuana dispensing facility that will operate under an appointment only protocol when a customer has obtained a DPH (Department of Public Health) registration card. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.
- **75-83 Court Street:** A proposed residential development includes the construction of 36 condominium units with a total of 77 off-street parking spaces. Traffic volumes generated by the project were obtained from MDM Transportation Consultants, Inc., who is in the process of completing a traffic study for the project; the volumes are included in the Appendix.
- **28 Austin Street:** The development proposes a mixed-use building that will be comprised of 68 residential units, 3,500 sf of retail, and 1,500 sf of shared offices. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.

In addition to the projects listed above, additional developments within Newton were identified, including Riverside, Turtle Lane and Rowe Street. Upon review of the location of these proposed developments and projected trip generation networks, their site related trips are not expected to affect our study area.

Washington Street Priority Roadway Study

The Boston Region Metropolitan Planning Organization (MPO) conducted a corridor study of the section of Washington Street between Chestnut Street and Church Street in January 2015. The study analyzed Washington Street to address safety, mobility, and access in January 2015. The study looked at existing condition operations, on-

street parking opportunities, a crash analysis, and public transportation options in the area. The study identified existing issues and concerns, and proposed a “road-diet” reduced cross-section to introduce along the majority of the Washington Street corridor, generally reducing the four lane cross-section to three, and introducing bicycle lanes in both directions.

The study assessed existing operations and crash data and trends at the major Washington street intersections including Washington Street at Lowell Street and Washington Street at Walnut Street. The intersection of Washington Street at Lowell Street did not have a noticeable trend in crashes. The intersection of Washington Street at Walnut Street experienced a high number of crashes, especially left-turn collisions, and four collisions related to parking maneuvers near the intersection. Segment crash analyses were conducted for all Washington Street segments. In general the following trends were discovered among segment crashes:

- 25-percent of the total crashes involved a parked or parking vehicle
- 20-percent of the total crashes were related to vehicles’ going to and from commercial developments
- Two midblock-crossing pedestrian crashes occurred, one near the post office and one near Newtonville Station
- Three bicycle crashes occurred, two involved a turning vehicle

Under existing conditions within the study, both of our study area intersections were found to operate at acceptable levels of service (LOS D or better) during the weekday morning and evening peak periods. However, signal timing changes were recommended for the Lowell Street intersection to increase the pedestrian clearance times to be MUTCD compliant.

With the proposed future long-term recommendations, the section of roadway between Lowell Street and Walnut Street is proposed to be a three-lane cross-section with a 12-foot center median (or left-turn lane approaching driveways), two 11-foot travel lanes, two 6-foot bicycle lanes and a 7-foot parking lane on each side. While this “road diet” addresses safety and operational concerns of pedestrians, cyclists, and vehicles; the intersection is projected to slightly degrade in LOS during the weekday morning peak hour. Additional long-term enhancements within our study area include reducing the curb turning radii to slow down vehicles and reduce pedestrian crossing distances, adding sidewalk extensions (bump-outs), and changing the corridor’s posted speed limit from 35 mph to 30 mph.

Additionally, the study recommended some short-term improvements in the interim that would enhance safety for pedestrians and cyclists and moderately improve traffic operations. These include installing traffic signal backplates with reflective lights,

repairing street lights as needed, and repainting faded crosswalks markings at intersections. Additionally, signal timing changes are proposed at a few intersections, including Washington Street at Lowell Avenue, and enforcement of no-parking regulations were recommended.

The City of Newton does not currently have plans for any of the recommended improvements detailed above; however, proposed mitigation efforts detailed in Chapter 5 have taken the recommendations from the MPO study into consideration where appropriate. Improvements proposed by the Proponent as part of this project at the Washington Street and Walnut Street intersection include a new modern traffic signal capable of multiple timing and phasing plans, upgraded ADA compliant crosswalks, bump-outs on 3 of the four corners of the intersection to enhance the pedestrian environment and shorten the crossing distance. Details of the improvements are outlined in the mitigation section of this report..

No-Build Traffic Volumes

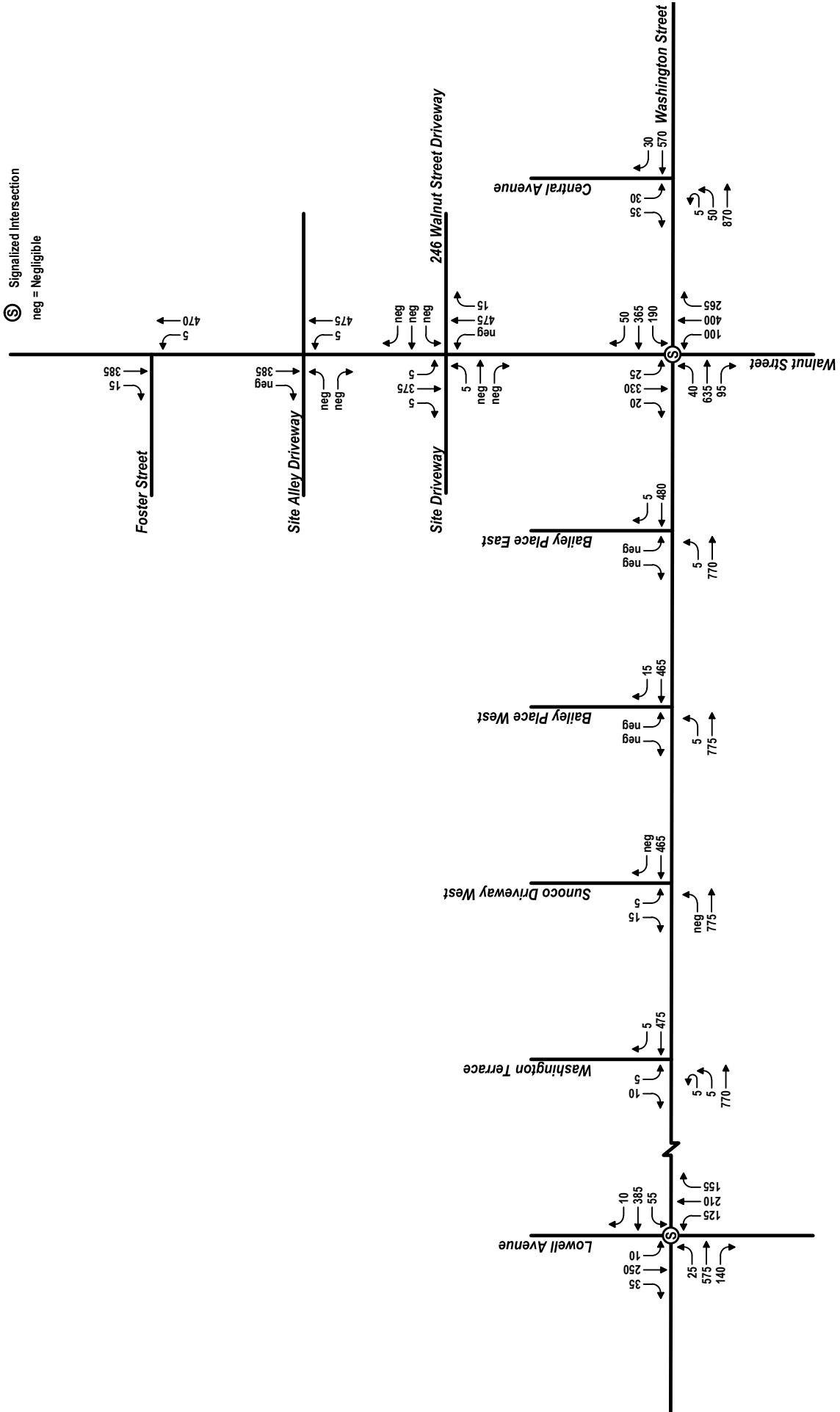
The year 2023 No-Build traffic volume networks were developed by applying the 0.5-percent annual growth rate over the seven-year study horizon to the existing volume networks and adding the traffic volumes associated with the background development described above. Figures 7 and 8 show the resulting 2023 No-Build peak hour traffic volume networks for the weekday morning and weekday evening peak hours, respectively.

Future Roadway Conditions

In assessing future traffic conditions, proposed roadway improvements within the study area were considered. Based on discussions with the City of Newton and information available from MassDOT, no roadway improvement projects located within the vicinity of the site were identified.

Build Conditions

Build traffic volumes were determined by estimating site-generated traffic volumes and distributing these volumes over the study area roadways. The site generated traffic volumes include new trips that are likely to be generated by the proposed development of the property.



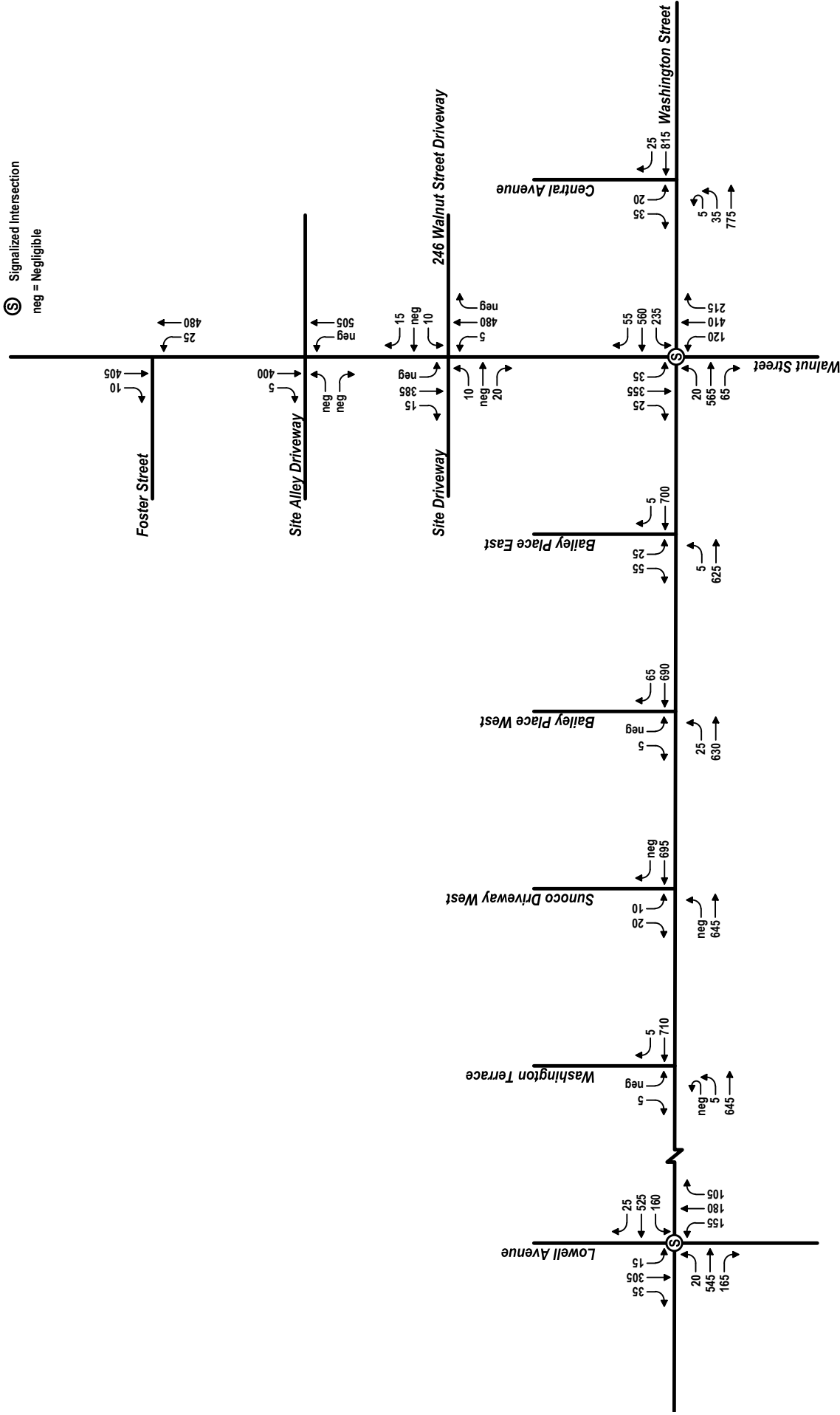
Not to Scale



202 ☐ No ☐ Build ☐ Conditions
☐ See ☐ Day Morning ☐ Evening ☐ Our
Mixed Use Development
Newton, Massachusetts

Figure 7

May 2016



Not to Scale



202 ☐ No ☐ Build ☐ Conditions
☐ See ☐ Day Evening ☐ See ☐ Our
Mixed Use Development
Newton, Massachusetts

Figure 8

May 2016

Site-Generated Traffic Volumes

The rate at which any development generates traffic is dependent upon a number of factors such as size, location, and concentration of surrounding developments. As previously discussed, the proposed redevelopment plan consists of the removal of the existing commercial and residential space and the Sunoco Gas Station and construction of new residential and commercial space comprised of 171 residential units and approximately 39,743 sf of retail space and approximately 4,242 sf of backroom and loading areas. For the purposes of traffic projections the retail area and back room/loading have been included in the traffic projections (43,985 sf). Traffic credits for the removal of the existing use have been assessed along with the proposed development by traffic counts conducted at all site access points during peak hour traffic conditions. . Trip generation estimates for the proposed uses were projected using trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation, 9th Edition*¹. The number of vehicle-trips generated by the existing and proposed uses were estimated based on ITE LUC 220 (Apartment) and ITE LUC 820 (Shopping Center) which represents a conservative approach to traffic generation.

Table 3 summarizes the projected trip generation associated with the proposed development.

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¹ Trip Generation, 9th Edition, Institute of Transportation Engineers, Washington D.C., 2012.

Table 3 Project Trip Generation Summary

Time Period	Existing Observed Trips ^a	Proposed Residential Trips ^b	Proposed Retail Trips ^c	Internal Capture Trips ^d	Pass-By Trips ^e	Net New Trips
Weekday Morning Peak Hour						
Enter	40	18	59	1	12	24
Exit	<u>27</u>	<u>69</u>	<u>36</u>	<u>1</u>	<u>12</u>	<u>65</u>
Total	67	87	95	2	24	89
Weekday Evening Peak Hour						
Enter	121	73	166	50	50	18
Exit	<u>139</u>	<u>39</u>	<u>180</u>	<u>50</u>	<u>50</u>	<u>-20</u>
Total	260	112	346	100	100	-2

a. Based on existing driveway counts.

b. Trip Generation estimate based ITE LUC 220 (Apartment) for 171 units.

c. Trip Generation estimate based ITE LUC 820 (Shopping Center) for 43,985 sf (includes community center space and commercial loading areas).

d. Internal capture based on NCHRP rates.

e. Pass-by based on ITE rates for LUC 820 (Shopping Center).

As shown in Table 3, the proposed development is estimated to generate approximately new 89 site-generated trips (24 entering/65 exiting) during the weekday morning peak hour and approximately 2 fewer trips (+18 entering/-20 exiting) during the weekday evening peak hour. It should be understood that the proposed redevelopment is a Transit Oriented Development (TOD) and as such access to the site will be readily available without the need for motor vehicle. Traffic generation for TOD developments often take substantial credit for this fact. However, for providing the City of Newton with a highly conservative assessment of project traffic and potential impacts, no credit (adjustment) for transit has been made. Therefor the results of this analysis should be considered highly conservative. The trip generation worksheets are included in the Appendix to this document.

Trip Distribution

The directional distribution of the traffic approaching and departing the site is a function of population densities, the location of employment opportunities, existing travel patterns, and the efficiency of the roadway system. Trips made from and to the proposed residential development during the peak hours are expected to be predominantly home-to-work and work-to-home trips in the morning and evening peak hours, respectively. Accordingly, the trip distribution for the residential portion of the proposed development has been derived based on Journey-to-Work data for the City of Newton updated with the 2010 U.S. Census data. The trip distribution for the retail portion of the proposed development has been based on existing travel

patterns on the adjacent roadway network. Table 4 and Figure 9 illustrate the trip distribution. Detailed trip distribution calculations are provided in the Appendix to this document.

Table 4 Trip Distribution Summary

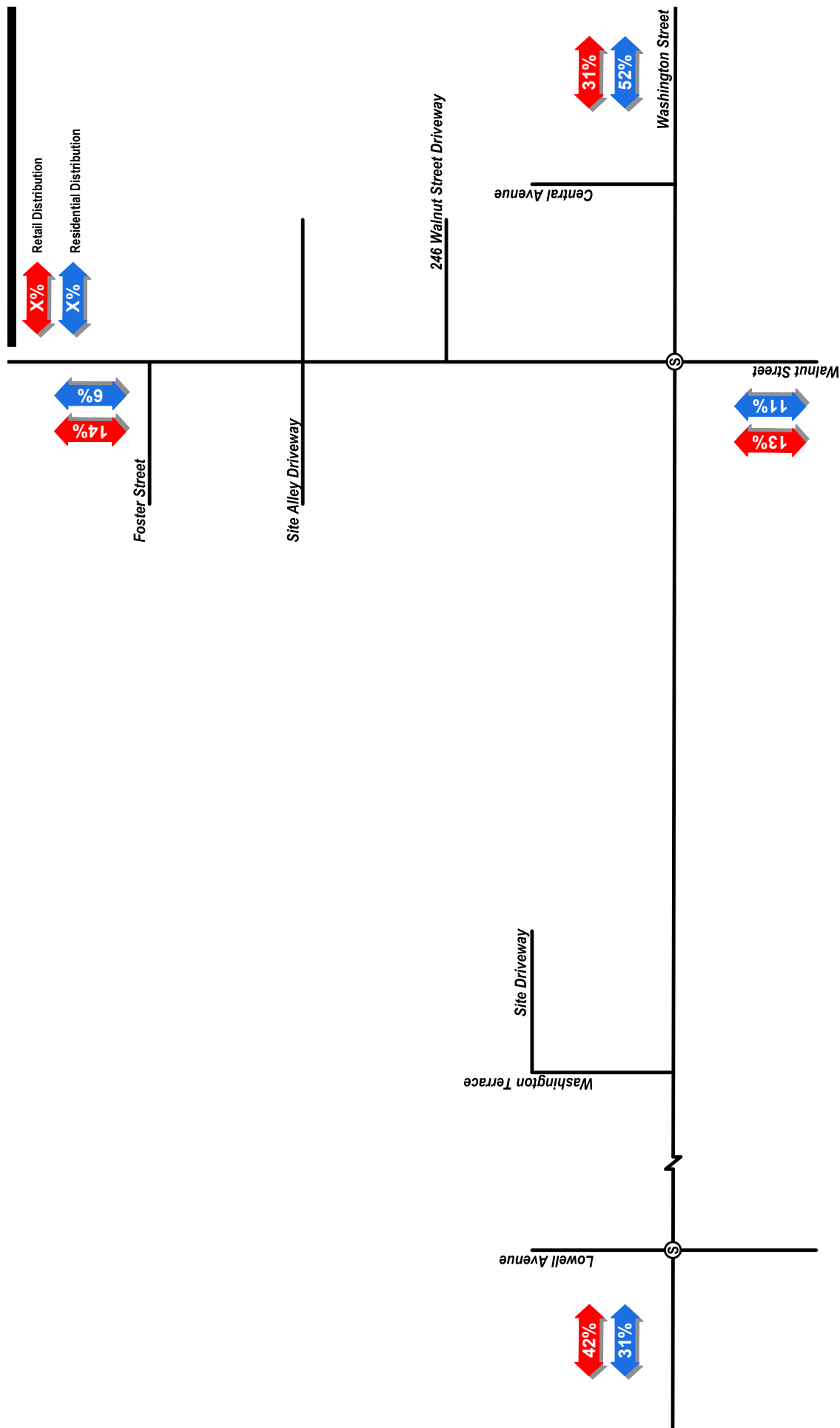
Travel Route	Direction (to/from)	Percent of Retail Site-Generated Traffic Assigned to Route	Percent of Residential Site-Generated Traffic Assigned to Route
Washington Street	East	31%	52%
Washington Street	West	42%	31%
Walnut Street	North	14%	6%
Walnut Street	South	13%	11%
Total		100%	100%

Build Traffic Volumes

The site-generated traffic volumes were assigned to the roadway network according to the distribution and travel patterns described above, and added to the No-Build traffic volumes to develop the peak hour Build traffic volume networks. Figures 10 and 11 present the resulting 2023 Build traffic volumes for the weekday morning and weekday evening peak hours, respectively.

Site Access

The site currently is served by six (6) access driveways along the two major streets surrounding the site, four along Washington Street and two on Walnut Street. Under existing condition, pavement conditions at each site access driveway is poor, there is little if any delineation and signage sparse. Under the redevelopment plan, there is an opportunity to consolidate the six access driveway along the major streets one access driveway that would connect to Walnut Street. In addition, there would be two access driveways on Washington Terrace (dead end minor-street) driveways that connects to Washington Street. . Under existing conditions, the four site access driveways along Washington Street are located within a 450 feet section of roadway (close spacing) between Walnut Street and Washington Terrace. The redevelopment plan would eliminate all three of the four curb cuts along this section, thereby providing substantial access management with significantly less conflict points from that which exists today. Also, the proposed access driveway along Walnut Street would be located at the north end of the property, thereby being located as far away as possible from the existing



179-16

Figure 9

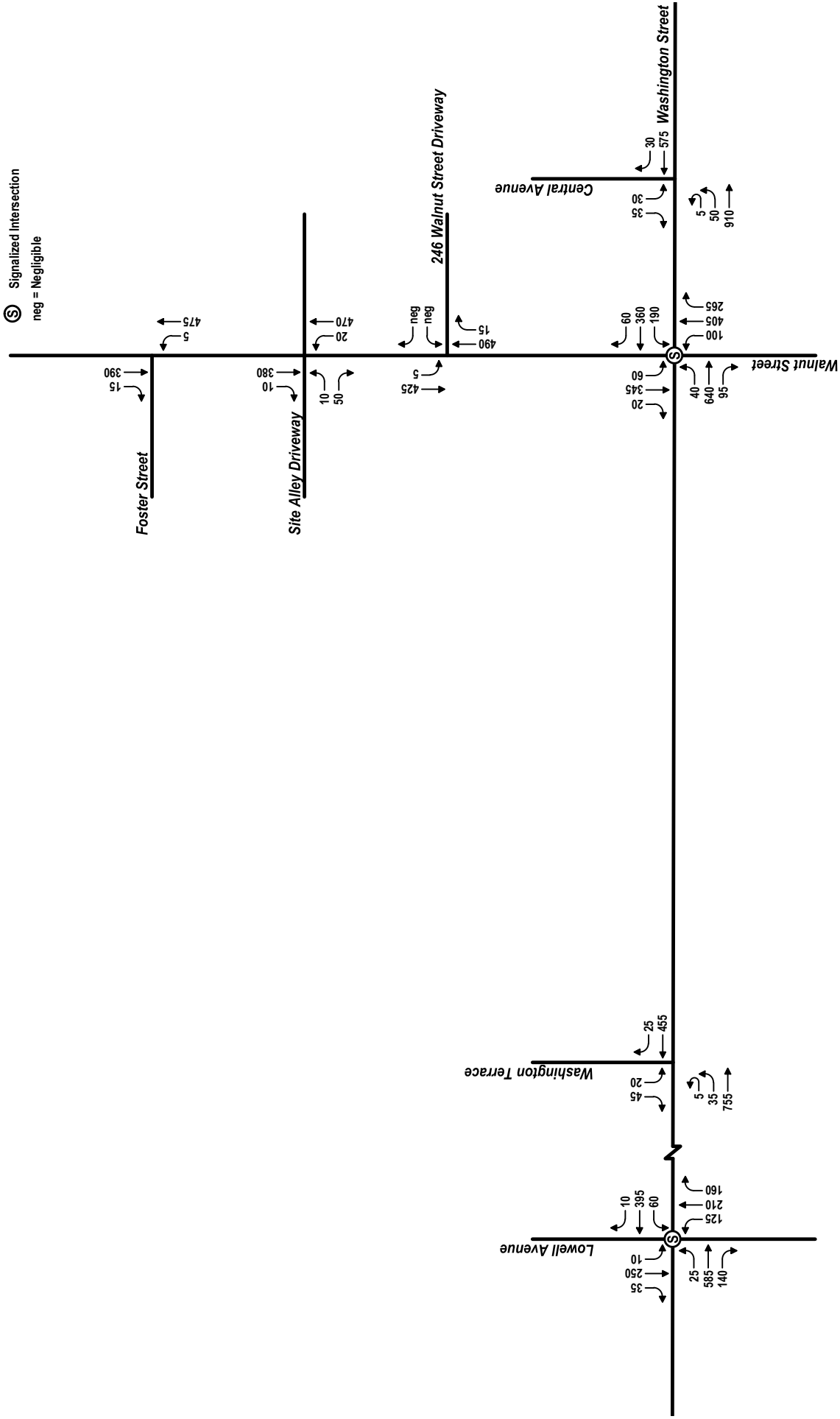
May 2016



Mixed Use Development
Newton, Massachusetts

Not to Scale





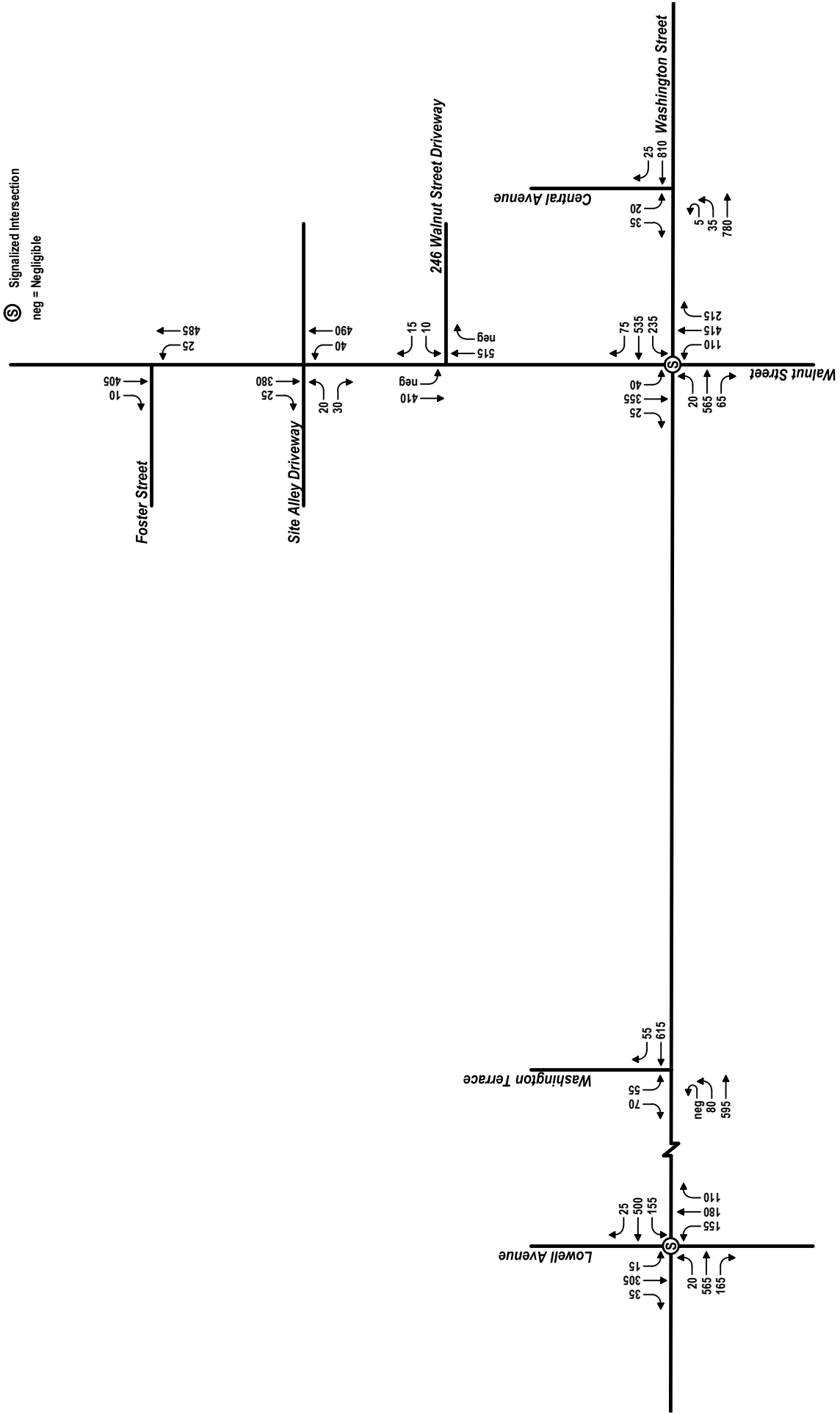
Not to Scale



202 ☐ Build ☐ Conditions
☐ See Day Morning ☐ Evening
Mixed Use Development
Newton, Massachusetts

Figure 10

May 2016



Not to Scale



2022 Build Conditions
See Day Evening Peak Hour
Mixed Use Development
Newton, Massachusetts

Figure 11

May 2016

Washington Street at Walnut Street intersection. The redevelopment access plan is a substantial enhancement along this corridor

Sight Distance

Sight distance analysis, in conformance with guidelines of the American Association of State Highway and Transportation Officials (AASHTO)² was performed for the Walnut Street site driveway and at Washington Terrace/Washington Street intersection which will be a an access point to the site. Speed observations recorded during the data collection phase (85th percentile speed of approximately 26 mph in the northbound direction and 28 mph in the southbound direction in the vicinity of the site driveway) were used to calculate the required stopping sight distance (SSD) for traffic approaching the site driveway and intersection sight distance (ISD) for traffic exiting the site driveway.

SSD is the distance required for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop before colliding with an object in the road, in this case a vehicle exiting from a driveway. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.

ISD, on the other hand, is based on the time required for perception, reaction and completion of the desired critical exiting maneuver (typically, a left turn) once the driver on a minor street approach (or a driveway) decides to execute the maneuver. Calculation for the critical ISD includes the time to (1) turn left, and to clear the near half of the intersection without conflicting with the vehicles approaching from the left; and (2) upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a desirable visibility criterion for the safe operation of an unsignalized intersection. Table 5 summarizes the sight distance analysis. The sight distance worksheet is included in the Appendix to this document.



² A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2013

Table 5 Sight Distance Summary

Location	Stopping Sight Distance (feet)			Intersection Sight Distance (feet)		
	Traveling	Required ^a	Measured ^b	Looking	Desirable ^a	Measured ^b
Washington Terrace at Washington Street	EB	140	400	Left	340	35
	WB	200	> 500	Right	295	120
Walnut Street at Site Driveway	NB	165	300	Left	290	60
	SB	145	> 500	Right	230	80

a. Based on standards established in A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2013. Based on 85th percentile speed of 23 mph eastbound and 30 mph westbound on Washington Street and 85th percentile speed of 26 mph northbound and 24 mph southbound on Walnut Street. All measurements taken in November 2015.

b. Based on field measurements taken by VHB.

As shown in Table 5, the required SSD is exceeded in both directions at the Washington Terrace intersection with Washington Street. The desirable ISD is not met looking in either direction due to on-street parking. .

As shown in Table 5, the required SSD is exceeded in both directions at the proposed site driveway on Walnut Street. The desirable ISD is not met looking in either direction due to on-street parking.

Although it is desirable to meet both ISD and SSD requirements where ever possible, meeting or exceeding the SSD is considered to be the minimum requirement for adequate sight distance. As indicated in the table, the SSD available exceeds the minimum at both site access driveways. .

Washington Terrace

Washington Terrace is a short dead end private way (approximately 270 feet long) that provides access to several residential properties and the Newtonville Post Office. Currently Washington Terrace is approximately 20 feet wide (pavement) and cars are often seen parallel parking on both side of the roadway in certain sections further narrowing the roadway. Pavement conditions are poor and there is no delineation or signage in the area to enforce traffic operations. The Washington Place Redevelopment project will eliminate 3 active curb-cuts located in close proximity along Washington Street and consolidate site traffic access to Washington Terrace in this area. In addition, as noted below the proponent will reconstruct Washington Terrace, widen it to approximately 26 feet, provide on-street parking, and add delineation and signage which will improve operations and movement

Post Office Activity Assessment

The Newtonville Post Office is located on the northwest corner of the intersection of Washington Street at Washington Terrace. The main entrance to the Post Office is located on Washington Street and the loading dock is accessed along the Washington Terrace frontage. Trucks accessing the loading dock must use Washington Terrace to back into position. A focused evaluation of existing operations along Washington Terrace has been conducted. Field observations made on typical weekdays indicate that a number of patrons park on the south side of Washington Street and then cross the street in the vicinity of the Post Office. To understand the level to which that is currently happening peak period pedestrian counts were conducted on Washington Street/Washington Terrace on a typical weekday. To verify potential conflicts between site traffic and Post Office delivery vehicles on Washington Terrace, field observations were conducted on the same day. Field observations were conducted on Wednesday, April 13, 2016 to fully understand the Post Office's activity and typical operations on Washington Terrace. The following observations were noted:

Washington Terrace Circulation

- Residents of Washington Terrace currently parallel park on both sides of the street, primarily on the east side.
- Post Office trucks were observed to need the entire width of Washington Terrace to back into the loading bays. Trucks need approximately 10-15 seconds to complete the maneuver to back in.
- While the majority of the Post Office trucks were observed to fit entirely within the loading bays without encroaching onto Washington Terrace, two very large trucks were observed to require additional width from Washington Terrace while parked at the loading docks. These two trucks were observed to arrive between 7:00 and 8:00 AM and again at 5:00 PM.

Volume of Trucks

- During the morning peak period (7:00 to 9:00 AM), four (4) trucks/vans were observed entering and five (5) trucks/vans were observed exiting the locating bays.
- During the evening peak period (4:00 to 6:00 PM), seven (7) trucks/vans were observed entering and six (6) trucks/vans were observed exiting the locating bays.
- Early morning observations indicated that three (3) trucks are parked in the loading bays overnight.

Washington Street Post Office Parking

- Up to nine (9) Post Office employees were observed parking on the south side of Washington Street. Post Office employees have placards placed in their vehicle window allowing them to park on Washington Street at meters.
- Early morning observations indicated that nine Post Office trucks/vans are parking on Washington Street overnight.

As outlined in this report, the Proponent is proposing to reconstruct and widen Washington Terrace at part of the proposed project. With this improvement, the operations and movement along Washington Terrace will be improved.

Pedestrian Counts

Pedestrian counts were collected along a section of Washington Street from just west of the Post Office to the Sunoco Gas Station over a 13-hour period on Wednesday, April 13, 2016 using video turning movement counters (TMC). This date represents a typical weekday for traffic count purposes (non-holidays) while schools were in session. The pedestrian volumes are summarized in Table 6 and included in the Appendix to this document.

Table 6 Existing Pedestrian Volume Summary

Location	Washington Street Crossings		
	North to South	South to North	Total Crossings
6:00 – 7:00 AM	1	2	3
7:00 – 8:00 AM	2	1	3
8:00 – 9:00 AM	7	2	9
9:00 – 10:00 AM	11	8	19
10:00 – 11:00 AM	12	8	20
11:00 AM – 12:00 PM	14	12	26
12:00 – 1:00 PM	9	12	21
1:00 – 2:00 PM	14	15	29
2:00 – 3:00 PM	6	5	11
3:00 – 4:00 PM	14	14	28
4:00 – 5:00 PM	17	17	34
5:00 – 6:00 PM	13	16	29
<u>6:00 – 7:00 PM</u>	<u>5</u>	<u>4</u>	<u>9</u>
Total	125	116	241

Source: VHB based on automatic traffic recorder counts conducted on April 13, 2016.

As shown in Table 6, Washington Street, in the vicinity of Washington Terrace experiences between 3 and 34 pedestrian crossings over the course of an hour. The peak pedestrian activity occurred from 4:00 to 5:00 PM with 34 crossings (17 northbound/ 17 southbound).

As part of the proposed project, Washington Terrace will be reconstructed as outlined in the mitigation section of this document. The

Traffic Signal Warrant Analysis

With site access and the post office operations in mind, consideration of a potential traffic/pedestrian signal has been given to the intersection of Washington Street at

Washington Terrace. The Manual on Uniform Traffic Control Devices (MUTCD)³ lists specific criteria, or warrants, for the consideration of installation of a traffic signal at an intersection. The MUTCD also notes that, “the satisfaction of a traffic signal warrant or warrants shall not, in itself, require the installation of a traffic control signal.” The traffic signal warrant analysis provides guidance as to locations where signals would not be appropriate and locations where they could be considered further. VHB performed a traffic signal warrant analysis at the unsignalized intersection of Washington Street at Washington Terrace for the following warrants:

- Warrant 3, Peak Hour Vehicular Volume
- Warrant 4 Pedestrian Volume

Vehicular Volume Warrants

A traffic signal warrant analysis was performed of the volume-based peak hour warrant (Warrant 3) using proposed 2023 Build volumes for the weekday morning and evening peak hours. The location does not meet the traffic signal warrants based on proposed vehicular volumes, as shown in Table 7. The signal warrant analyses are included in the Appendix to this document.

**Table 7 Vehicular Traffic Signal Warrant Analysis
Washington Street at Washington Terrace**

Type of Warrant	Major Roadway	Minor Roadway	
	Actual Volume ²	Required Volume ¹	Actual Volume ²
AM Peak Hour Volume	1,275	198	65
PM Peak Hour Volume	1,345	178	125

Note: All volumes are two-way volumes.

1 Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition, Federal Highway Administration

2 Traffic volume based on proposed 2023 peak hour volumes.

Pedestrian Volume Warrants

A traffic signal warrant analysis was performed for the pedestrian volume-based peak hour warrant (Warrant 4) for the 2016 existing hourly vehicular and pedestrian volumes. The location does not meet the traffic signal warrants based on pedestrian volumes, as shown in Table 8. The signal warrant analyses are included in the Appendix to this document.



³ MUTCD, Part 4 – Highway Traffic Signals, USDOT/FHWA, December 2009.

**Table 8 Pedestrian Traffic Signal Warrant Analysis
Washington Street at Washington Terrace**

Type of Warrant	Required Volumes ¹		Actual Volumes ²	
	Vehicles	Pedestrians	Vehicles	Pedestrians
Pedestrian Four-Hour Volume ³	1,100	107	971	26
Pedestrian One-Hour Volume	1,500	133	993	34

Note: All volumes are two-way volumes.

- 1 Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition, Federal Highway Administration
- 2 Traffic volume counts taken on November 19, 2015 and pedestrian counts taken on April 13, 2016.
- 3 Average volume per hour over four hours

4

Traffic Operations Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analyses were conducted with respect to Existing conditions and projected No-Build and Build traffic volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed on them. Calculated levels of service classify roadway operating conditions.

Level of Service Criteria

Level of service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

For signalized intersections, the evaluation criteria used to analyze study area intersections are based on the percentile-delay method (Synchro results). For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The level of service is only determined for left-turns from the main street and all movements from the minor street. The evaluation

criteria used to analyze unsignalized intersections are based on the *2010 Highway Capacity Manual* (HCM)⁴.

It should be noted that the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters such as high critical gaps. Actual field observations indicate that drivers on minor streets generally accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The net effect of these procedural limitations of the analysis software is the over-estimation of calculated delays at unsignalized intersections. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

Intersection Capacity Analysis

Intersection capacity analyses were conducted at all intersections in the study area. Analyses were conducted for the 2016 Existing, 2023 No-Build and 2023 Build conditions. Tables 9 and 10 summarize the capacity analyses for signalized and unsignalized intersections, respectively. The capacity analyses results are included in the Appendix to this document.

As shown in Table 9, operations at the signalized intersection of Washington Street at Lowell Street are expected to be minimally impacted by the proposed project traffic and the intersection is expected to operate at acceptable levels of service under all future 2023 No-Build and 2023 Build conditions during both peak hours. The intersection of Washington Street at Walnut Street currently operates at LOS E during the weekday morning peak hour and LOS F during the weekday evening peak hour. The intersection is expected to degrade from LOS E to LOS F between 2023 No-Build or 2023 Build conditions during the weekday morning peak hour.

As shown in Table 10, all of the unsignalized intersections are expected to operate at acceptable levels of service under all future conditions, with or without the proposed project. Overall, only minimal increases in delay and queues are expected at the majority of the study area intersections. During the weekday evening peak hour, the Washington Terrace approach to Washington Street is expected to degrade from LOS B to LOS D with a 21-second increase in delay.



4 Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2010.

Table 9 Signalized Intersection Capacity Analysis

Location	Movement	2016 Existing Conditions					2023 No-Build Conditions					2023 Build Conditions				
		v/c ^a	Del ^b	LOS ^c	50 Q ^d	95 Q ^e	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Washington Street at Lowell Avenue																
Weekday	EB L/T/R	0.59	25	C	239	303	0.58	25	C	239	307	0.59	26	C	244	313
Morning	WB L/T/R	0.46	25	C	141	187	0.45	24	C	139	191	0.48	25	C	146	201
	NB L	0.70	48	D	92	116	0.55	38	D	74	126	0.57	39	D	74	#127
	NB T/R	1.12	117	F	~430	#445	0.90	63	E	272	#475	0.91	65	E	277	#484
	SB L/T/R	>1.20	>120	F	~364	#524	1.00	94	F	~256	#437	1.06	109	F	~278	#460
	Overall		94	F				43	D				46	D		
Weekday	EB L/T/R	0.56	22	C	150	286	0.55	22	C	146	297	0.56	23	C	152	308
Evening	WB L/T/R	0.83	35	D	178	#400	0.83	36	D	181	#421	0.80	34	C	169	#395
	NB L	0.68	44	D	58	#179	0.73	52	D	63	#210	0.76	52	D	63	#210
	NB T/R	0.65	41	D	136	#309	0.68	42	D	144	#333	0.70	43	D	147	#342
	SB L/T/R	0.82	53	D	190	#449	0.89	61	E	206	#493	0.90	64	E	206	#498
	Overall		35	C				37	D				37	D		
Washington Street at Walnut Street																
Weekday	EB L/T/R	0.94	64	E	354	#484	0.98	71	E	370	#508	0.98	73	E	373	#514
Morning	WB L/T/R	>1.20	>120	F	246	#320	>1.20	57	E	231	#338	>1.20	59	E	232	#345
	NB L	0.58	44	D	69	110	0.55	42	D	67	114	0.53	41	D	67	114
	NB T	0.76	50	D	350	444	0.73	47	D	332	460	0.73	48	D	337	466
	NB R	0.44	6	A	5	55	0.43	6	A	0	65	0.43	6	A	0	65
	SB L/T/R	>1.20	>120	F	~487	#648	1.19	>120	F	~430	#643	>1.20	>120	F	~622	#845
	Overall		79	E				68	E				>120	F		
Weekday	EB L/T/R	0.77	49	D	295	355	0.79	50	D	295	373	0.78	50	D	294	373
Evening	WB L/T/R	>1.20	>120	F	~390	#562	>1.20	>120	F	~495	#671	>1.20	>120	F	~489	#665
	NB L	0.64	48	D	80	132	0.68	51	D	81	#135	0.63	48	D	74	124
	NB T	0.72	48	D	329	454	0.74	49	D	342	471	0.76	50	D	353	485
	NB R	0.34	6	A	0	57	0.37	6	A	2	61	0.37	6	A	5	65
	SB L/T/R	>1.20	>120	F	~481	#693	>1.20	>120	F	~540	#757	>1.20	>120	F	~576	#793
	Overall		90	F				116	F				>120	F		

- a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.
d. 50th percentile queue, in feet.
e. 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
95th percentile volume exceeds capacity, queue may be longer.

Table 10 Unsignalized Intersection Capacity Analysis

Location	Movement	2016 Existing Conditions					2023 No-Build Conditions					2023 Build Conditions				
		D ^a	v/c ^b	Del ^c	LOS ^d	95 Q ^e	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Washington Street at Washington Terrace																
Weekday	EB L	10	0.01	9	A	0	10	0.01	9	A	0	40	0.04	9	A	3
Morning	SB L/R	15	0.05	14	B	5	15	0.04	15	B	3	65	0.19	17	C	18
Weekday	EB L	5	0.01	9	A	0	5	0.01	9	A	0	80	0.10	10	A	8
Evening	SB L/R	5	0.02	11	B	3	5	0.01	11	B	0	125	0.52	32	D	68
Washington Street at Sunoco Driveway West																
Weekday	EB L	Neg.	0.00	8	A	0	Neg.	0.00	9	A	0	Intersection does not exist				
Morning	SB L/R	20	0.06	12	B	5	20	0.04	12	B	3					
Weekday	EB L	Neg.	0.00	9	A	0	Neg.	0.00	9	A	0	Intersection does not exist				
Evening	SB L/R	30	0.13	17	C	10	30	0.09	16	C	8					
Washington Street at Bailey Place West																
Weekday	EB L	5	0.01	8	A	0	5	0.01	9	A	0	Intersection does not exist				
Morning	SB L/R	Neg.	0.01	18	C	0	Neg.	0.01	19	C	0					
Weekday	EB L	25	0.04	10	A	3	25	0.03	10	A	3	Intersection does not exist				
Evening	SB L/R	5	0.03	14	B	3	5	0.02	14	B	0					
Washington Street at Bailey Place East																
Weekday	EB L	5	0.01	9	A	0	5	0.01	9	A	0	Intersection does not exist				
Morning	SB L/R	Neg.	0.01	10	B	0	Neg.	0.00	10	B	0					
Weekday	EB L	5	0.01	10	A	0	5	0.01	9	A	0	Intersection does not exist				
Evening	SB L/R	80	0.29	19	C	30	80	0.24	18	C	23					
Washington Street at Central Avenue																
Weekday	EB L	55	0.07	9	A	5	55	0.07	9	A	5	55	0.07	9	A	5
Morning	SB L/R	65	0.37	29	D	40	65	0.29	26	D	30	65	0.30	27	D	30
Weekday	EB L	40	0.05	10	A	5	40	0.06	10	B	5	40	0.06	10	B	5
Evening	SB L/R	55	0.23	22	C	23	55	0.26	26	D	25	55	0.26	26	D	25

Table 10 Unsignalized Intersection Capacity Analysis (continued)

		2016 Existing Conditions					2023 No-Build Conditions					2023 Build Conditions					
Location	Movement	D ^a	v/c ^b	Del ^c	LOS ^d	95 Q ^e	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q	
Walnut Street at Site Driveway/246 Walnut Street Driveway																	
Weekday	EB L/T/R	5	0.08	20	C	5	5	0.03	20	C	3		Movement does not exist				
Morning	WB L/T/R	Neg.	0.00	0	A	0	Neg.	0.00	0	A	0		Movement does not exist				
	WB L/R		Movement does not exist						Movement does not exist				Neg.	0.00	0	A	0
	NB L	Neg.	0.00	8	A	0	Neg.	0.00	8	A	0		Movement does not exist				
	SBL	5	0.01	9	A	0	5	0.01	9	A	0	5	0.01	9	A	0	
Weekday	EB L/T/R	30	0.11	15	C	10	30	0.09	15	B	8		Movement does not exist				
Evening	WB L/T/R	10	0.10	16	C	8	10	0.08	17	C	8		Movement does not exist				
	WB L/R		Movement does not exist						Movement does not exist				25	0.07	15	C	5
	NB L	5	0.01	8	A	0	5	0.01	8	A	0		Movement does not exist				
	SBL	Neg.	0.00	0	A	0	Neg.	0.00	0	A	0	Neg.	0.00	0	A	0	
Walnut Street at Alley Driveway																	
Weekday	EB L/T/R	Neg.	0.00	0	A	0	Neg.	0.00	0	A	0	60	0.14	14	B	13	
Morning	NB L	5	0.01	8	A	0	5	0.01	8	A	0	20	0.02	8	A	3	
Weekday	EB L/T/R	Neg.	0.01	11	B	0	Neg.	0.00	11	B	0	50	0.15	16	C	13	
Evening	NB L	Neg.	0.00	8	A	0	Neg.	0.00	8	A	0	40	0.04	9	A	3	
Washington Street at Foster Street																	
Weekday	NB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0	
Morning																	
Weekday	NB L	25	0.03	8	A	3	25	0.03	8	A	3	25	0.03	8	A	3	
Evening																	

- Demand of critical movement.
- Volume to capacity ratio.
- Average total delay, in seconds per vehicle.
- Level-of-service.
- 95th percentile queue, in vehicles.

5

Mitigation

As outlined above, the proposed development project is expected to have very minor impacts on traffic conditions in the study area. However, the Proponent proposes to implement Transportation Demand Management (TDM) measures on site and provide signal improvements at the intersections of Washington Street at Lowell Avenue and Walnut Street.

Transportation Demand Management (TDM)

Given the site's proximity to the Newtonville Commuter Rail station, there are strong opportunities to implement Transportation Demand Management (TDM) measures on site to minimize the proposed project's impacts on the surrounding roadways. Implementation of TDM measures will offer alternatives to traveling in single occupancy vehicles, which will reduce traffic and parking demand on the site. As part of the proposed project, the following TDM measures will be implemented on site:

- Display all public transit schedules in a central location within the facility.
- To promote pedestrian safety, a map of the area will be provided for transit users that displays the location of Newtonville station, sidewalks, and crosswalks. This information will be distributed to residents and will also be posted in common areas.
- Provide a secure bicycle storage area on site.

Proposed Intersection Improvements

The proposed improvements to the study area are outlined below and shown in Figure 12.

Washington Street at Walnut Street

The intersection of Washington Street at Walnut Street currently operates poorly and as outlined in the City of Newton traffic signal inventory report, there are a number of short term and long-term improvement needs that have been identified but not implemented by the City. As part of the redevelopment project, this intersection would and the traffic signal will be upgraded to meet modern standards.

Improvements will include:

- Modern Traffic Signal (adaptive system will be considered).
- Curb-bump outs on the northeast and northwest corners of the intersection.
- ADA compliant cross-walks with audible and visual count down indicators
- Update pavement striping to include a second lane on along the Walnut Street southbound approach to the intersection
- Implement coordination to adjacent traffic signal if there is benefit to doing so.

Washington Street at Lowell Avenue

Although the Washington Street at Lowell Street intersection is expected to operate at acceptable levels of service under all future 2023 No-Build and 2023 Build conditions during both peak hours, the intersection could benefit from some timing and phasing changes. The Proponent proposes to remove the exclusive pedestrian phase and provide concurrent pedestrian phases in its place, to be consistent with the proposed changes to the Walnut Street intersection.

Capacity Analysis with Improvements

Table 11 summarizes the capacity analysis results for the signalized intersections with the proposed changes to the intersection of Washington Street at Lowell Street and Washington Street at Walnut Street. Capacity analyses results are included in the Appendix to this document.



Figure 12
Proposed Site

Mixed Use Development
Newton, Massachusetts

Table 11 Signalized Intersection Capacity Analysis with Mitigation

		2023 No-Build Conditions					2023 Build Conditions					2023 Build Conditions with Improvements				
Location	Movement	v/c ^a	Del ^b	LOS ^c	50 Q ^d	95 Q ^e	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Washington Street at Lowell Avenue																
Weekday	EB L/T/R	0.58	25	C	239	307	0.59	26	C	244	313	0.56	18	B	147	241
Morning	WB L/T/R	0.45	24	C	139	191	0.48	25	C	146	201	0.42	17	B	87	153
	NB L	0.55	38	D	74	126	0.57	39	D	74	#127	0.40	18	B	42	76
	NB T/R	0.90	63	E	272	#475	0.91	65	E	277	#484	0.77	34	C	165	264
	SB L/T/R	1.00	94	F	~256	#437	1.06	109	F	~278	#460	0.68	33	C	140	223
	Overall		43	D				46	D				23	C		
Weekday	EB L/T/R	0.55	22	C	146	297	0.56	23	C	152	308	0.52	16	B	155	211
Evening	WB L/T/R	0.83	36	D	181	#421	0.80	34	C	169	#395	0.73	24	C	174	251
	NB L	0.73	52	D	63	#210	0.76	52	D	63	#210	0.59	27	C	59	103
	NB T/R	0.68	42	D	144	#333	0.70	43	D	147	#342	0.68	34	C	140	229
	SB L/T/R	0.89	61	E	206	#493	0.90	64	E	206	#498	0.83	47	D	198	#329
	Overall		37	D				37	D				27	C		
Washington Street at Walnut Avenue																
Weekday	EB L/T/R	0.98	71	E	370	#508	0.98	73	E	373	#514	0.79	30	C	184	312
Morning	WB L/T/R	>1.20	57	E	231	#338	>1.20	59	E	232	#345	0.67	20	B	100	184
	NB L	0.55	42	D	67	114	0.53	41	D	67	114	0.32	18	B	31	74
	NB T	0.73	47	D	332	460	0.73	48	D	337	466	0.63	24	C	158	301
	NB R	0.43	6	A	0	65	0.43	6	A	0	65	0.40	4	A	0	47
	SB L/T/R	1.19	>120	F	~430	#643	>1.20	>120	F	~622	#845	0.59	28	C	98	172
	Overall		68	E				>120	F				23	C		
Weekday	EB L/T/R	0.79	50	D	295	373	0.78	50	D	294	373	0.58	23	C	172	230
Evening	WB L/T/R	>1.20	>120	F	~495	#671	>1.20	>120	F	~489	#665	0.85	27	C	194	#287
	NB L	0.68	51	D	81	#135	0.63	48	D	74	124	0.38	21	C	45	81
	NB T	0.74	49	D	342	471	0.76	50	D	353	485	0.37	28	C	215	318
	NB R	0.37	6	A	2	61	0.37	6	A	5	65	0.37	4	A	0	44
	SB L/T/R	>1.20	>120	F	~540	#757	>1.20	>120	F	~576	#793	0.28	29	C	117	165
	Overall		116	F				>120	F				25	C		

- a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.
d. 50th percentile queue, in feet.
e. 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
95th percentile volume exceeds capacity, queue may be longer.

6

Conclusion

The Washington Place redevelopment project will replace the aging commercial/residential buildings and poorly maintained parking lots which exist at the site today. After the removal of traffic from all the existing facilities on site which includes retail/restaurant/residential/ballet school/Sunoco Gas Station, and assessing the future condition (change) in traffic based on standard practice outlined in the Institute of Transportation Engineers Trip Generation, 9th Edition, the proposed development is projected to generate approximately 89 new vehicles trips during the weekday morning peak hour and the no new trips during the weekday evening peak hour period. The traffic volumes projected to be generated by the proposed development will have minimal effect on traffic operations within the study area yet as operation tables above and with the proposed improvements in place, the project will enhance the vehicular and pedestrian environment in the vicinity of the site. Pending the Proponents ability to obtain all necessary permits and approvals to construct the project, the Proponent will implement the following initiatives.

- **Site Access:** Consolidate the six (6) access driveways, four along Washington Street and two on Walnut Street down to two, one along Walnut Street and the other point of access to the local street system would be from Washington Terrace.
- **Washington/Walnut Street Intersection:** Upgrade this intersection to meet modern standards. Improvements will include:
 - Modern Traffic Signal (adaptive system will be considered).
 - Curb-bump outs on the northeast and northwest corners of the intersection.
 - ADA compliant cross-walks with audible and visual count down indicators

- Update pavement striping to include a second lane on along the Walnut Street southbound approach to the intersection
 - Implement coordination to adjacent traffic signal if there is benefit to doing so.
- **Washington/Lowell Street Intersection;** To bolster existing operations at this intersection, the Proponent will optimize the timing and phasing plan at this location as part of the redevelopment project. Implement coordination to adjacent traffic signal if there is benefit to doing so.
- **Washington Terrace;** The Proponent will reconstruct Washington Terrace to improve the conditions of the roadway. At this time we believe that this would include grinding existing asphalt and resurfacing the street.
- **On-site Transportation Demand Management (TDM) program:** Implement on-site TDM program to promote alternative modes of transportation and reduce traffic and parking demands for the site. Site plan includes bike racks, and there will be protected bike parking for 180 bikes with the residential space being proposed. The project has direct access to MBTA bus and train service and information on scheduling will be available in the residential building foyer on a regular basis.

Overall, the study finds that the redevelopment project will not have a significant effect on traffic operations within the study area. In addition the access consolidation offered by the project along with the infrastructure improvements will result in a net benefit to the community will reduce conflict points and have a positive effect on operations and safety in this area.



Appendix

- Traffic & Pedestrian Volume Counts
- Seasonal Adjustment Factors
- Vehicle Crash Data
- Public Transportation Schedules
- Planned/Approved Developments
- Trip Generation
- Sight Distance Worksheets
- Signal Warrant Analysis
- Intersection Capacity Analysis
- Washington Street Priority Study



Traffic & Pedestrian Volume Counts



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DATA
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Traffic Counts with Precision



Client:
VHB

Engineer:
C. Trearchis

Site Code:
13263.00

Date:
Thursday 11/19/2015

PDI Job Number:
154796

City, State:
Newtonville, MA



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179-16

Washington Street EB
just west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 A EB Class
Site Code: 13263
Date Start: 19-Nov-15

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
5	0	13	1	0	1	0	0	0	0	0	0	0	0	15
01:00	1	5	1	0	1	0	0	0	0	0	0	0	0	8
02:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
04:00	0	16	1	1	1	0	0	0	0	0	0	0	0	19
05:00	1	50	7	2	1	1	0	0	0	0	0	0	0	62
06:00	5	178	17	0	1	3	0	0	0	0	0	0	0	204
07:00	27	382	34	3	2	4	0	1	0	1	0	0	0	454
08:00	27	478	29	5	4	2	0	1	0	0	1	0	1	548
09:00	10	317	35	1	2	0	0	0	0	0	0	0	0	365
10:00	3	292	32	0	2	0	0	1	0	0	0	0	0	330
11:00	8	291	15	2	8	3	0	0	0	0	0	0	0	327
12 PM	7	310	21	1	4	0	0	0	0	0	0	0	0	343
13:00	1	266	17	0	4	0	0	0	0	0	0	0	0	288
14:00	4	321	29	0	4	0	0	0	0	0	0	0	0	358
15:00	7	322	23	2	5	0	0	1	0	0	0	0	0	360
16:00	10	357	31	1	2	0	0	0	0	0	0	0	0	401
17:00	15	461	17	0	1	1	1	0	1	0	0	0	0	497
18:00	20	433	14	1	2	3	0	0	1	0	0	0	1	475
19:00	6	251	12	1	1	0	0	0	0	0	0	0	0	271
20:00	2	204	7	1	0	0	0	0	0	0	0	0	0	214
21:00	2	98	4	1	0	0	0	0	0	0	0	0	0	105
22:00	0	64	5	0	0	0	0	0	0	0	0	0	0	69
23:00	0	33	0	0	0	0	0	0	0	0	0	0	0	33
Total	156	5148	353	22	46	17	1	4	2	1	1	0	2	5753
Percent	2.7%	89.5%	6.1%	0.4%	0.8%	0.3%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	09:00	08:00	11:00	07:00		07:00		07:00	08:00		08:00	08:00
Vol.	27	478	35	5	8	4		1		1	1		1	548
PM Peak	18:00	17:00	16:00	15:00	15:00	18:00	17:00	15:00	17:00				18:00	17:00
Vol.	20	461	31	2	5	3	1	1	1				1	497
Total		5148	353	22	46	17	1	4	2	1	1	0	2	5753



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179-16

Washington Street EB
just west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 A EB Speed
Site Code: 13263
Date Start: 19-Nov-15

EB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/19/ 15	1	5	6	1	2	0	0	0	0	0	0	0	0	15	27	21
01:00	1	5	1	1	0	0	0	0	0	0	0	0	0	8	22	18
02:00	0	0	1	2	0	0	0	0	0	0	0	0	0	3	27	25
03:00	0	1	3	0	0	0	0	0	0	0	0	0	0	4	23	21
04:00	0	5	11	1	2	0	0	0	0	0	0	0	0	19	24	22
05:00	13	23	12	5	8	1	0	0	0	0	0	0	0	62	28	19
06:00	51	45	50	21	24	13	0	0	0	0	0	0	0	204	30	20
07:00	112	116	162	28	27	8	1	0	0	0	0	0	0	454	23	18
08:00	126	168	194	36	16	8	0	0	0	0	0	0	0	548	23	18
09:00	102	79	128	22	25	7	2	0	0	0	0	0	0	365	24	18
10:00	90	93	106	24	11	6	0	0	0	0	0	0	0	330	23	18
11:00	100	85	96	20	20	5	1	0	0	0	0	0	0	327	23	17
12 PM	101	89	117	24	11	1	0	0	0	0	0	0	0	343	23	17
13:00	90	67	112	9	8	0	2	0	0	0	0	0	0	288	22	17
14:00	125	75	112	25	16	5	0	0	0	0	0	0	0	358	23	17
15:00	143	81	103	14	16	2	1	0	0	0	0	0	0	360	22	16
16:00	115	100	138	32	15	1	0	0	0	0	0	0	0	401	23	17
17:00	121	145	182	38	10	1	0	0	0	0	0	0	0	497	23	18
18:00	161	130	146	24	12	2	0	0	0	0	0	0	0	475	22	16
19:00	88	77	77	19	8	1	1	0	0	0	0	0	0	271	23	17
20:00	69	62	48	19	14	2	0	0	0	0	0	0	0	214	24	17
21:00	28	42	15	11	8	1	0	0	0	0	0	0	0	105	25	18
22:00	9	22	11	12	12	3	0	0	0	0	0	0	0	69	30	22
23:00	1	13	15	1	3	0	0	0	0	0	0	0	0	33	23	21
Total	1647	1528	1846	389	268	67	8	0	0	0	0	0	0	5753		
%	28.6%	26.6%	32.1%	6.8%	4.7%	1.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	08:00	07:00	06:00	09:00							08:00		
Vol.	126	168	194	36	27	13	2							548		
Midda y Peak	14:00	12:00	12:00	14:00	11:00	11:00	13:00							14:00		
Vol.	125	89	117	25	20	5	2							358		
PM Peak	18:00	17:00	17:00	17:00	15:00	22:00	15:00							17:00		
Vol.	161	145	182	38	16	3	1							497		
% ile			15th Percentile :			7 MPH										
			50th Percentile :			18 MPH										
			85th Percentile :			23 MPH										
			95th Percentile :			30 MPH										

Stats 10 MPH Pace Speed : 15-24 MPH
 Number in Pace : 3374
 Percent in Pace : 58.6%
 Number of Vehicles > 25 MPH : 654
 Percent of Vehicles > 25 MPH : 11.4%
 Mean Speed(Average) : 18 MPH



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179-16

Washington Street EB
just west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 A EB Volume
Site Code: 13263
Date Start: 19-Nov-15

Start Time	A.M.	EB		P.M.	Thu 19-Nov-15									
12:00	6			80										
12:15	4			91										
12:30	2			94										
12:45	3	15		78	343									
01:00	3			66										
01:15	2			70										
01:30	3			72										
01:45	0	8		80	288									
02:00	0			96										
02:15	0			93										
02:30	2			74										
02:45	1	3		95	358									
03:00	1			82										
03:15	1			81										
03:30	0			99										
03:45	2	4		98	360									
04:00	3			108										
04:15	4			94										
04:30	7			91										
04:45	5	19		108	401									
05:00	7			117										
05:15	9			129										
05:30	19			124										
05:45	27	62		127	497									
06:00	25			148										
06:15	42			114										
06:30	59			133										
06:45	78	204		80	475									
07:00	88			90										
07:15	101			66										
07:30	114			56										
07:45	151	454		59	271									
08:00	116			56										
08:15	157			58										
08:30	159			64										
08:45	116	548		36	214									
09:00	91			31										
09:15	92			27										
09:30	96			31										
09:45	86	365		16	105									
10:00	83			18										
10:15	90			18										
10:30	77			20										
10:45	80	330		13	69									
11:00	84			4										
11:15	74			7										
11:30	88			9										
11:45	81	327		13	33									
Total	2339			3414										
Percent				100.0%	0.0%									
Day Total		5753												
Peak	07:45	-	05:15	-	-	-	-	-	-	-	-	-	-	-
Vol.	583	-	528	-	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.917		0.892											



PRECISION
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INDUSTRIES, LLC

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179-16

Washington Street WB
west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 A WB Class
Site Code: 13263
Date Start: 19-Nov-15

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
5	0	31	3	0	0	0	0	0	0	0	0	0	0	34
01:00	0	9	1	0	1	0	0	0	0	0	0	0	0	11
02:00	0	5	2	0	0	0	0	0	0	0	0	0	0	7
03:00	0	5	2	0	0	2	0	0	0	0	0	0	0	9
04:00	0	7	3	1	1	0	0	0	0	0	0	0	0	12
05:00	0	40	7	0	1	1	0	0	0	0	0	0	0	49
06:00	0	71	18	6	2	1	0	0	0	0	0	0	0	98
07:00	4	295	29	6	9	3	0	3	1	0	0	1	0	351
08:00	2	350	38	5	3	0	0	0	0	0	0	0	0	398
09:00	5	280	34	3	7	2	1	2	0	0	0	0	0	334
10:00	4	288	37	3	8	1	1	0	0	2	0	0	0	344
11:00	0	293	34	5	5	2	0	1	0	0	0	0	0	340
12 PM	0	365	37	3	10	1	0	0	1	0	1	0	0	418
13:00	2	332	44	3	4	0	0	2	0	0	0	0	0	387
14:00	2	387	49	4	4	4	1	4	1	0	0	0	0	456
15:00	6	514	47	1	7	0	0	1	0	2	0	0	0	578
16:00	1	529	52	3	3	1	0	1	0	0	0	1	1	592
17:00	7	591	30	2	6	1	0	2	0	1	0	0	0	640
18:00	0	486	23	2	0	0	0	0	0	1	0	0	0	512
19:00	2	336	17	2	2	0	0	0	0	0	0	0	0	359
20:00	0	296	7	2	1	0	0	0	0	0	0	0	0	306
21:00	0	167	8	0	1	0	0	1	0	0	0	0	0	177
22:00	1	105	5	1	2	1	0	0	0	0	0	0	0	115
23:00	1	44	3	0	0	0	0	0	0	0	0	0	0	48
Total	37	5826	530	52	77	20	3	17	3	6	1	2	1	6575
Percent	0.6%	88.6%	8.1%	0.8%	1.2%	0.3%	0.0%	0.3%	0.0%	0.1%	0.0%	0.0%	0.0%	
AM Peak	09:00	08:00	08:00	06:00	07:00	07:00	09:00	07:00	07:00	10:00		07:00		08:00
Vol.	5	350	38	6	9	3	1	3	1	2		1		398
PM Peak	17:00	17:00	16:00	14:00	12:00	14:00	14:00	14:00	12:00	15:00	12:00	16:00	16:00	17:00
Vol.	7	591	52	4	10	4	1	4	1	2	1	1	1	640
Total		5826	530	52	77	20	3	17	3	6	1	2	1	6575



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179-16

Washington Street WB
west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 A WB Speed
Site Code: 13263
Date Start: 19-Nov-15

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/19/ 15	0	3	3	15	7	6	0	0	0	0	0	0	0	34	34	28
01:00	0	0	4	1	5	1	0	0	0	0	0	0	0	11	33	28
02:00	0	0	0	3	2	2	0	0	0	0	0	0	0	7	36	31
03:00	0	1	2	4	2	0	0	0	0	0	0	0	0	9	30	26
04:00	0	1	1	4	5	1	0	0	0	0	0	0	0	12	33	29
05:00	0	0	8	25	14	2	0	0	0	0	0	0	0	49	32	28
06:00	2	0	15	39	37	5	0	0	0	0	0	0	0	98	32	28
07:00	7	13	66	159	90	14	2	0	0	0	0	0	0	351	31	27
08:00	4	25	78	171	97	21	2	0	0	0	0	0	0	398	32	27
09:00	8	29	62	146	81	8	0	0	0	0	0	0	0	334	31	26
10:00	9	32	84	133	72	13	1	0	0	0	0	0	0	344	31	26
11:00	1	25	85	153	64	11	1	0	0	0	0	0	0	340	30	26
12 PM	6	31	116	185	66	13	1	0	0	0	0	0	0	418	30	26
13:00	7	17	110	165	74	13	1	0	0	0	0	0	0	387	31	26
14:00	13	43	154	176	61	9	0	0	0	0	0	0	0	456	29	25
15:00	21	94	187	200	71	5	0	0	0	0	0	0	0	578	28	24
16:00	22	69	260	189	48	3	1	0	0	0	0	0	0	592	28	23
17:00	16	95	268	215	40	6	0	0	0	0	0	0	0	640	27	23
18:00	13	66	212	168	46	7	0	0	0	0	0	0	0	512	28	24
19:00	3	23	122	146	58	7	0	0	0	0	0	0	0	359	29	26
20:00	6	29	90	124	48	7	2	0	0	0	0	0	0	306	30	25
21:00	0	6	21	89	53	8	0	0	0	0	0	0	0	177	32	28
22:00	0	2	12	51	41	9	0	0	0	0	0	0	0	115	32	29
23:00	0	1	3	17	22	4	1	0	0	0	0	0	0	48	33	30
Total %	138 2.1%	605 9.2%	1963 29.9%	2578 39.2%	1104 16.8%	175 2.7%	12 0.2%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	6575		
AM Peak Vol.	09:00 8	09:00 29	08:00 78	08:00 171	08:00 97	08:00 21	07:00 2							08:00 398		
Midda y Peak Vol.	14:00 13	14:00 43	14:00 154	12:00 185	13:00 74	12:00 13	11:00 1							14:00 456		
PM Peak Vol.	16:00 22	17:00 95	17:00 268	17:00 215	15:00 71	22:00 9	20:00 2							17:00 640		
% ile			15th Percentile :			19 MPH										
			50th Percentile :			25 MPH										
			85th Percentile :			30 MPH										
			95th Percentile :			33 MPH										

Stats 10 MPH Pace Speed : 20-29 MPH
 Number in Pace : 4541
 Percent in Pace : 69.1%
 Number of Vehicles > 25 MPH : 3353
 Percent of Vehicles > 25 MPH : 51.0%
 Mean Speed(Average) : 25 MPH

Washington Street WB
west of Walnut Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis



179-16

154796 A WB Volume
Site Code: 13263
Date Start: 19-Nov-15

Start Time	A.M.	WB		P.M.	Thu 19-Nov-15									
12:00	18			91										
12:15	7			111										
12:30	5			112										
12:45	4	34		104	418									
01:00	2			109										
01:15	8			89										
01:30	1			86										
01:45	0	11		103	387									
02:00	2			117										
02:15	2			92										
02:30	1			117										
02:45	2	7		130	456									
03:00	2			119										
03:15	3			145										
03:30	2			153										
03:45	2	9		161	578									
04:00	4			146										
04:15	1			144										
04:30	1			141										
04:45	6	12		161	592									
05:00	14			182										
05:15	8			153										
05:30	12			150										
05:45	15	49		155	640									
06:00	19			152										
06:15	21			132										
06:30	33			128										
06:45	25	98		100	512									
07:00	59			99										
07:15	80			96										
07:30	92			92										
07:45	120	351		72	359									
08:00	95			76										
08:15	117			68										
08:30	96			93										
08:45	90	398		69	306									
09:00	94			54										
09:15	79			42										
09:30	90			42										
09:45	71	334		39	177									
10:00	76			33										
10:15	80			28										
10:30	98			30										
10:45	90	344		24	115									
11:00	70			14										
11:15	80			12										
11:30	86			10										
11:45	104	340		12	48									
Total	1987			4588										
Percent				100.0%	0.0%									
Day Total				6575										
Peak	07:45	-		04:45	-	-	-	-	-	-	-	-	-	-
Vol.	428	-		646	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.892			0.887										



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179-16

Walnut Street
north of Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 B Class
Site Code: 13263
Date Start: 19-Nov-15

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
5	0	8	0	0	1	0	0	0	0	0	0	0	0	9
01:00	0	6	3	0	0	0	0	0	0	0	0	0	0	9
02:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
03:00	0	5	2	0	1	1	0	0	0	0	0	0	0	9
04:00	1	11	6	0	0	1	0	0	1	0	0	0	0	20
05:00	0	51	6	0	2	0	0	0	0	0	0	0	0	59
06:00	1	128	28	4	4	2	0	0	0	0	0	0	0	167
07:00	3	244	41	3	12	1	0	4	1	0	0	0	0	309
08:00	2	278	61	3	5	6	0	3	0	0	0	0	0	358
09:00	1	242	46	2	11	0	0	1	1	0	0	0	0	304
10:00	4	233	44	3	9	2	0	2	0	0	0	0	0	297
11:00	1	212	37	3	5	2	0	1	0	0	0	0	0	261
12 PM	1	232	53	1	8	4	2	2	0	0	0	0	0	303
13:00	3	226	40	2	8	2	0	1	0	0	0	0	0	282
14:00	1	252	53	1	7	2	0	0	0	0	0	0	0	316
15:00	3	312	33	2	3	0	0	0	0	0	0	0	0	353
16:00	1	274	23	1	6	0	0	2	0	0	0	0	0	307
17:00	1	283	27	1	7	0	0	0	0	0	0	0	0	319
18:00	3	312	33	2	4	4	0	0	0	0	0	0	0	358
19:00	1	224	8	3	3	1	0	0	0	0	0	0	0	240
20:00	0	177	12	1	3	1	0	0	0	0	0	0	0	194
21:00	0	140	19	0	1	2	0	0	0	0	0	0	0	162
22:00	0	68	10	0	0	0	0	0	0	0	0	0	0	78
23:00	0	30	3	0	2	0	0	0	0	0	0	0	0	35
Total	27	3953	589	32	102	31	2	16	3	0	0	0	0	4755
Percent	0.6%	83.1%	12.4%	0.7%	2.1%	0.7%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	08:00	08:00	06:00	07:00	08:00		07:00	04:00					08:00
Vol.	4	278	61	4	12	6		4	1					358
PM Peak	13:00	15:00	12:00	19:00	12:00	12:00	12:00	12:00						18:00
Vol.	3	312	53	3	8	4	2	2						358
Total		3953	589	32	102	31	2	16	3	0	0	0	0	4755



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179-16

Walnut Street
north of Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 B Class
Site Code: 13263
Date Start: 19-Nov-15

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
11/19/1														
5	0	21	0	0	0	0	0	0	0	0	0	0	0	21
01:00	0	9	0	0	0	0	0	0	0	0	0	0	0	9
02:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
03:00	0	2	0	0	1	1	0	0	0	0	0	0	0	4
04:00	0	19	1	0	0	0	0	0	1	0	0	0	0	21
05:00	0	31	3	0	2	1	0	0	0	0	0	0	0	37
06:00	0	139	24	2	2	2	0	0	0	0	0	0	0	169
07:00	2	306	28	2	6	1	1	2	0	0	0	0	0	348
08:00	1	357	29	6	5	1	0	0	1	0	0	0	0	400
09:00	1	261	31	4	5	0	1	4	0	0	0	0	0	307
10:00	1	255	39	3	9	2	0	1	0	0	0	0	0	310
11:00	0	232	32	5	6	2	0	0	0	0	0	0	0	277
12 PM	1	292	23	2	10	3	0	2	0	0	0	0	0	333
13:00	0	277	46	4	7	0	0	2	0	0	0	0	0	336
14:00	0	312	31	2	12	0	0	2	0	0	0	0	0	359
15:00	1	283	20	2	12	0	0	1	0	0	0	0	0	319
16:00	1	325	33	1	5	2	0	0	1	0	0	0	0	368
17:00	0	374	22	3	5	2	0	3	0	0	0	0	0	409
18:00	0	372	11	2	3	1	0	1	0	0	0	0	0	390
19:00	2	311	10	3	1	0	0	0	0	0	0	0	0	327
20:00	3	199	13	1	0	0	0	0	0	0	0	0	0	216
21:00	0	172	7	0	3	0	0	0	0	0	0	0	0	182
22:00	0	70	11	0	1	0	0	0	0	0	0	0	0	82
23:00	0	38	6	0	1	0	0	0	0	0	0	0	0	45
Total	13	4665	420	42	96	18	2	18	3	0	0	0	0	5277
Percent	0.2%	88.4%	8.0%	0.8%	1.8%	0.3%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	10:00	08:00	10:00	06:00	07:00	09:00	04:00					08:00
Vol.	2	357	39	6	9	2	1	4	1					400
PM Peak	20:00	17:00	13:00	13:00	14:00	12:00		17:00	16:00					17:00
Vol.	3	374	46	4	12	3		3	1					409
Total		4665	420	42	96	18	2	18	3	0	0	0	0	5277



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179-16

Walnut Street
north of Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 B Speed
Site Code: 13263
Date Start: 19-Nov-15

SB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/19/																
15	0	0	1	5	2	1	0	0	0	0	0	0	0	9	33	29
01:00	0	0	0	3	6	0	0	0	0	0	0	0	0	9	32	30
02:00	0	0	0	3	2	1	0	0	0	0	0	0	0	6	34	30
03:00	0	0	4	1	3	1	0	0	0	0	0	0	0	9	33	28
04:00	0	2	5	3	7	2	1	0	0	0	0	0	0	20	34	28
05:00	0	0	10	23	20	5	1	0	0	0	0	0	0	59	33	29
06:00	16	17	51	62	19	2	0	0	0	0	0	0	0	167	28	23
07:00	73	67	134	31	4	0	0	0	0	0	0	0	0	309	23	18
08:00	96	102	145	11	4	0	0	0	0	0	0	0	0	358	22	17
09:00	46	68	131	44	14	1	0	0	0	0	0	0	0	304	25	20
10:00	52	81	124	25	15	0	0	0	0	0	0	0	0	297	23	19
11:00	27	50	115	55	14	0	0	0	0	0	0	0	0	261	26	21
12 PM	77	71	121	29	5	0	0	0	0	0	0	0	0	303	23	18
13:00	72	71	104	27	7	1	0	0	0	0	0	0	0	282	23	18
14:00	56	80	137	34	8	1	0	0	0	0	0	0	0	316	23	19
15:00	78	68	197	9	1	0	0	0	0	0	0	0	0	353	22	18
16:00	75	78	132	21	1	0	0	0	0	0	0	0	0	307	23	18
17:00	106	88	123	1	1	0	0	0	0	0	0	0	0	319	22	16
18:00	87	97	148	22	3	1	0	0	0	0	0	0	0	358	23	18
19:00	34	47	92	57	10	0	0	0	0	0	0	0	0	240	26	21
20:00	10	35	83	52	12	1	1	0	0	0	0	0	0	194	27	22
21:00	5	28	66	51	11	1	0	0	0	0	0	0	0	162	27	23
22:00	0	8	24	29	16	1	0	0	0	0	0	0	0	78	30	26
23:00	0	3	6	19	7	0	0	0	0	0	0	0	0	35	30	26
Total	910	1061	1953	617	192	19	3	0	0	0	0	0	0	4755		
%	19.1%	22.3%	41.1%	13.0%	4.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	08:00	08:00	06:00	05:00	05:00	04:00							08:00		
Vol.	96	102	145	62	20	5	1							358		
Midda y Peak	12:00	14:00	14:00	11:00	11:00	13:00								14:00		
Vol.	77	80	137	55	14	1								316		
PM Peak	17:00	18:00	15:00	19:00	22:00	18:00	20:00							18:00		
Vol.	106	97	197	57	16	1	1							358		
% ile			15th Percentile :			10 MPH										
			50th Percentile :			20 MPH										
			85th Percentile :			24 MPH										
			95th Percentile :			28 MPH										

Stats

10 MPH Pace Speed :	15-24 MPH
Number in Pace :	3014
Percent in Pace :	63.4%
Number of Vehicles > 25 MPH :	708
Percent of Vehicles > 25 MPH :	14.9%
Mean Speed(Average) :	19 MPH



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179-16

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154796 B Speed
Site Code: 13263
Date Start: 19-Nov-15

NB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/19/ 15	0	2	4	10	2	1	2	0	0	0	0	0	0	21	33	27
01:00	0	0	0	5	2	2	0	0	0	0	0	0	0	9	35	30
02:00	0	0	1	5	2	0	0	0	0	0	0	0	0	8	31	28
03:00	0	2	0	2	0	0	0	0	0	0	0	0	0	4	27	22
04:00	1	1	1	7	8	3	0	0	0	0	0	0	0	21	33	29
05:00	0	3	5	19	9	1	0	0	0	0	0	0	0	37	31	27
06:00	1	1	52	83	25	7	0	0	0	0	0	0	0	169	30	26
07:00	4	38	188	101	16	1	0	0	0	0	0	0	0	348	27	23
08:00	10	45	242	88	15	0	0	0	0	0	0	0	0	400	26	23
09:00	3	37	151	99	15	1	1	0	0	0	0	0	0	307	27	23
10:00	9	55	142	96	8	0	0	0	0	0	0	0	0	310	26	22
11:00	5	24	125	107	16	0	0	0	0	0	0	0	0	277	27	24
12 PM	14	35	206	70	8	0	0	0	0	0	0	0	0	333	26	22
13:00	12	65	164	91	3	1	0	0	0	0	0	0	0	336	26	22
14:00	14	44	222	74	5	0	0	0	0	0	0	0	0	359	25	22
15:00	14	83	175	44	3	0	0	0	0	0	0	0	0	319	23	21
16:00	12	90	206	55	4	1	0	0	0	0	0	0	0	368	24	21
17:00	28	97	245	36	2	1	0	0	0	0	0	0	0	409	23	20
18:00	23	93	226	45	3	0	0	0	0	0	0	0	0	390	23	21
19:00	16	50	160	85	13	3	0	0	0	0	0	0	0	327	27	22
20:00	6	19	83	89	16	3	0	0	0	0	0	0	0	216	28	24
21:00	2	13	79	74	11	2	1	0	0	0	0	0	0	182	28	24
22:00	0	0	30	37	15	0	0	0	0	0	0	0	0	82	29	26
23:00	0	2	14	18	9	2	0	0	0	0	0	0	0	45	31	26
Total	174	799	2721	1340	210	29	4	0	0	0	0	0	0	5277		
%	3.3%	15.1%	51.6%	25.4%	4.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak Vol.	08:00	08:00	08:00	07:00	06:00	06:00	00:00							08:00		
	10	45	242	101	25	7	2							400		
Midda y Peak Vol.	12:00	13:00	14:00	11:00	11:00	13:00								14:00		
	14	65	222	107	16	1								359		
PM Peak Vol.	17:00	17:00	17:00	20:00	20:00	19:00	21:00							17:00		
	28	97	245	89	16	3	1							409		
% ile			15th Percentile :			17 MPH										
			50th Percentile :			22 MPH										
			85th Percentile :			26 MPH										
			95th Percentile :			28 MPH										

Stats 10 MPH Pace Speed : 20-29 MPH
 Number in Pace : 4061
 Percent in Pace : 77.0%
 Number of Vehicles > 25 MPH : 1315
 Percent of Vehicles > 25 MPH : 24.9%
 Mean Speed(Average) : 23 MPH



PRECISION
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INDUSTRIES, LLC

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179-16

Walnut Street
north of Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

154796 B Volume
Site Code: 13263
Date Start: 19-Nov-15

Start	SB		NB		Combin		19-Nov-15	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Thu	
12:00	6	77	6	97	12	174		
12:15	0	88	4	82	4	170		
12:30	1	65	5	71	6	136		
12:45	2	73	6	83	8	156	636	
01:00	3	72	1	87	4	159		
01:15	2	71	2	83	4	154		
01:30	1	60	4	80	5	140		
01:45	3	79	2	86	5	165	618	
02:00	2	91	3	94	5	185		
02:15	1	68	1	89	2	157		
02:30	0	78	3	86	3	164		
02:45	3	79	1	90	4	169	675	
03:00	2	102	2	54	4	156		
03:15	2	103	0	60	2	163		
03:30	2	78	1	98	3	176		
03:45	3	70	1	107	4	177	672	
04:00	3	81	2	102	5	183		
04:15	4	78	5	78	9	156		
04:30	5	68	5	102	10	170		
04:45	8	80	9	86	17	166	675	
05:00	7	80	2	103	9	183		
05:15	13	75	10	99	23	174		
05:30	15	83	13	100	28	183		
05:45	24	81	12	107	36	188	728	
06:00	23	105	34	93	57	198		
06:15	35	97	27	100	62	197		
06:30	45	76	40	106	85	182		
06:45	64	80	68	91	132	171	748	
07:00	77	67	74	96	151	163		
07:15	93	65	63	101	156	166		
07:30	76	65	103	75	179	140		
07:45	63	43	108	55	171	98	567	
08:00	78	61	104	50	182	111		
08:15	88	43	101	55	189	98		
08:30	91	47	93	65	184	112		
08:45	101	43	102	46	203	89	410	
09:00	79	46	82	45	161	91		
09:15	72	66	82	50	154	116		
09:30	74	32	73	48	147	80		
09:45	79	18	70	39	149	57	344	
10:00	66	24	79	32	145	56		
10:15	79	20	80	23	159	43		
10:30	79	21	65	21	144	42		
10:45	73	13	86	6	159	19	160	
11:00	64	14	78	10	142	24		
11:15	62	6	55	18	117	24		
11:30	73	7	74	10	147	17		
11:45	62	8	70	7	132	15	80	
Total	1808	2947	1911	3366	3719	6313		
Percent	48.6%	46.7%	51.4%	53.3%				
Day Total	4755		5277		10032			
Peak	08:15	-	05:30	-	07:30	-	05:00	-
Vol.	359	-	366	-	416	-	409	-
P.H.F.	0.889	-	0.871	-	0.963	-	0.956	-



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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 A
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	5	66	3	0	1	62	32	0	59	73	14	0	5	86	4	0	410
07:15 AM	0	82	6	0	0	70	32	0	60	65	22	0	12	114	3	0	466
07:30 AM	4	79	8	0	8	48	47	0	53	91	27	0	23	123	13	0	524
07:45 AM	4	54	11	0	8	73	28	0	65	105	38	0	23	168	7	0	584
Total	13	281	28	0	17	253	139	0	237	334	101	0	63	491	27	0	1984
08:00 AM	9	74	2	0	11	76	43	0	70	93	18	0	19	124	12	0	551
08:15 AM	3	83	4	0	13	102	50	0	54	89	17	0	17	153	16	0	601
08:30 AM	6	89	6	0	12	81	58	0	57	85	16	0	30	166	5	0	611
08:45 AM	6	101	11	0	8	79	39	0	50	102	16	0	15	113	5	0	545
Total	24	347	23	0	44	338	190	0	231	369	67	0	81	556	38	0	2308
Grand Total	37	628	51	0	61	591	329	0	468	703	168	0	144	1047	65	0	4292
Apprch %	5.2	87.7	7.1	0	6.2	60.2	33.5	0	35	52.5	12.5	0	11.5	83.4	5.2	0	
Total %	0.9	14.6	1.2	0	1.4	13.8	7.7	0	10.9	16.4	3.9	0	3.4	24.4	1.5	0	
Cars	35	584	43	0	57	558	320	0	454	679	159	0	138	1020	62	0	4109
% Cars	94.6	93	84.3	0	93.4	94.4	97.3	0	97	96.6	94.6	0	95.8	97.4	95.4	0	95.7
Heavy Vehicles	2	44	8	0	4	33	9	0	14	24	9	0	6	27	3	0	183
% Heavy Vehicles	5.4	7	15.7	0	6.6	5.6	2.7	0	3	3.4	5.4	0	4.2	2.6	4.6	0	4.3

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	54	11	0	69	8	73	28	0	109	65	105	38	0	208	23	168	7	0	198	584
08:00 AM	9	74	2	0	85	11	76	43	0	130	70	93	18	0	181	19	124	12	0	155	551
08:15 AM	3	83	4	0	90	13	102	50	0	165	54	89	17	0	160	17	153	16	0	186	601
08:30 AM	6	89	6	0	101	12	81	58	0	151	57	85	16	0	158	30	166	5	0	201	611
Total Volume	22	300	23	0	345	44	332	179	0	555	246	372	89	0	707	89	611	40	0	740	2347
% App. Total	6.4	87	6.7	0		7.9	59.8	32.3	0		34.8	52.6	12.6	0		12	82.6	5.4	0		
PHF	.611	.843	.523	.000	.854	.846	.814	.772	.000	.841	.879	.886	.586	.000	.850	.742	.909	.625	.000	.920	.960
Cars	20	280	19	0	319	42	320	171	0	533	239	360	85	0	684	85	598	38	0	721	2257
% Cars	90.9	93.3	82.6	0	92.5	95.5	96.4	95.5	0	96.0	97.2	96.8	95.5	0	96.7	95.5	97.9	95.0	0	97.4	96.2
Heavy Vehicles	2	20	4	0	26	2	12	8	0	22	7	12	4	0	23	4	13	2	0	19	90
% Heavy Vehicles	9.1	6.7	17.4	0	7.5	4.5	3.6	4.5	0	4.0	2.8	3.2	4.5	0	3.3	4.5	2.1	5.0	0	2.6	3.8



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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 A
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	5	58	2	0	1	58	31	0	59	71	13	0	4	81	4	0	387
07:15 AM	0	75	6	0	0	63	32	0	56	60	21	0	12	111	3	0	439
07:30 AM	4	73	7	0	7	41	47	0	53	89	25	0	22	120	13	0	501
07:45 AM	3	48	9	0	6	70	27	0	62	101	37	0	21	164	6	0	554
Total	12	254	24	0	14	232	137	0	230	321	96	0	59	476	26	0	1881
08:00 AM	8	69	2	0	11	69	41	0	68	90	16	0	18	123	12	0	527
08:15 AM	3	80	3	0	13	101	48	0	53	87	17	0	17	146	16	0	584
08:30 AM	6	83	5	0	12	80	55	0	56	82	15	0	29	165	4	0	592
08:45 AM	6	98	9	0	7	76	39	0	47	99	15	0	15	110	4	0	525
Total	23	330	19	0	43	326	183	0	224	358	63	0	79	544	36	0	2228
Grand Total	35	584	43	0	57	558	320	0	454	679	159	0	138	1020	62	0	4109
Apprch %	5.3	88.2	6.5	0	6.1	59.7	34.2	0	35.1	52.6	12.3	0	11.3	83.6	5.1	0	
Total %	0.9	14.2	1	0	1.4	13.6	7.8	0	11	16.5	3.9	0	3.4	24.8	1.5	0	

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	3	48	9	0	60	6	70	27	0	103	62	101	37	0	200	21	164	6	0	191	554
08:00 AM	8	69	2	0	79	11	69	41	0	121	68	90	16	0	174	18	123	12	0	153	527
08:15 AM	3	80	3	0	86	13	101	48	0	162	53	87	17	0	157	17	146	16	0	179	584
08:30 AM	6	83	5	0	94	12	80	55	0	147	56	82	15	0	153	29	165	4	0	198	592
Total Volume	20	280	19	0	319	42	320	171	0	533	239	360	85	0	684	85	598	38	0	721	2257
% App. Total	6.3	87.8	6	0		7.9	60	32.1	0		34.9	52.6	12.4	0		11.8	82.9	5.3	0		
PHF	.625	.843	.528	.000	.848	.808	.792	.777	.000	.823	.879	.891	.574	.000	.855	.733	.906	.594	.000	.910	.953



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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 A
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	8	1	0	0	4	1	0	0	2	1	0	1	5	0	0	23
07:15 AM	0	7	0	0	0	7	0	0	4	5	1	0	0	3	0	0	27
07:30 AM	0	6	1	0	1	7	0	0	0	2	2	0	1	3	0	0	23
07:45 AM	1	6	2	0	2	3	1	0	3	4	1	0	2	4	1	0	30
Total	1	27	4	0	3	21	2	0	7	13	5	0	4	15	1	0	103
08:00 AM	1	5	0	0	0	7	2	0	2	3	2	0	1	1	0	0	24
08:15 AM	0	3	1	0	0	1	2	0	1	2	0	0	0	7	0	0	17
08:30 AM	0	6	1	0	0	1	3	0	1	3	1	0	1	1	1	0	19
08:45 AM	0	3	2	0	1	3	0	0	3	3	1	0	0	3	1	0	20
Total	1	17	4	0	1	12	7	0	7	11	4	0	2	12	2	0	80
Grand Total	2	44	8	0	4	33	9	0	14	24	9	0	6	27	3	0	183
Apprch %	3.7	81.5	14.8	0	8.7	71.7	19.6	0	29.8	51.1	19.1	0	16.7	75	8.3	0	
Total %	1.1	24	4.4	0	2.2	18	4.9	0	7.7	13.1	4.9	0	3.3	14.8	1.6	0	

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	7	0	0	7	0	7	0	0	7	4	5	1	0	10	0	3	0	0	3	27
07:30 AM	0	6	1	0	7	1	7	0	0	8	0	2	2	0	4	1	3	0	0	4	23
07:45 AM	1	6	2	0	9	2	3	1	0	6	3	4	1	0	8	2	4	1	0	7	30
08:00 AM	1	5	0	0	6	0	7	2	0	9	2	3	2	0	7	1	1	0	0	2	24
Total Volume	2	24	3	0	29	3	24	3	0	30	9	14	6	0	29	4	11	1	0	16	104
% App. Total	6.9	82.8	10.3	0		10	80	10	0		31	48.3	20.7	0		25	68.8	6.2	0		
PHF	.500	.857	.375	.000	.806	.375	.857	.375	.000	.833	.563	.700	.750	.000	.725	.500	.688	.250	.000	.571	.867



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179-16

N/S: Walnut Street
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 A
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	1	1	0	0	0	7	1	0	0	0	0	3	0	0	0	0	0	14
07:15 AM	0	0	0	4	4	0	0	0	11	8	0	0	0	1	0	0	0	0	0	3	31
07:30 AM	0	0	0	2	5	0	0	0	17	21	0	0	0	7	3	0	0	0	2	25	82
07:45 AM	0	0	0	3	4	0	0	0	26	2	1	1	0	0	13	0	0	0	1	7	58
Total	0	1	0	10	14	0	0	0	61	32	1	1	0	8	19	0	0	0	3	35	185
08:00 AM	0	0	0	3	4	0	0	0	5	4	0	0	0	0	0	0	0	0	1	3	20
08:15 AM	0	1	0	3	5	0	0	0	12	4	0	2	1	2	0	0	0	0	1	3	34
08:30 AM	0	0	0	1	1	0	0	0	18	2	0	0	0	0	4	0	0	0	1	5	32
08:45 AM	0	0	0	4	3	0	0	0	1	7	0	1	0	0	1	0	0	0	2	2	21
Total	0	1	0	11	13	0	0	0	36	17	0	3	1	2	5	0	0	0	5	13	107
Grand Total	0	2	0	21	27	0	0	0	97	49	1	4	1	10	24	0	0	0	8	48	292
Apprch %	0	4	0	42	54	0	0	0	66.4	33.6	2.5	10	2.5	25	60	0	0	0	14.3	85.7	
Total %	0	0.7	0	7.2	9.2	0	0	0	33.2	16.8	0.3	1.4	0.3	3.4	8.2	0	0	0	2.7	16.4	

	Walnut Street From North						Washington Street From East						Walnut Street From South						Washington Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	0	0	0	2	5	7	0	0	0	17	21	38	0	0	0	7	3	10	0	0	0	2	25	27	82
07:45 AM	0	0	0	3	4	7	0	0	0	26	2	28	1	1	0	0	13	15	0	0	0	1	7	8	58
08:00 AM	0	0	0	3	4	7	0	0	0	5	4	9	0	0	0	0	0	0	0	0	0	1	3	4	20
08:15 AM	0	1	0	3	5	9	0	0	0	12	4	16	0	2	1	2	0	5	0	0	0	1	3	4	34
Total Volume	0	1	0	11	18	30	0	0	0	60	31	91	1	3	1	9	16	30	0	0	0	5	38	43	194
% App. Total	0	3.3	0	36.7	60		0	0	0	65.9	34.1		3.3	10	3.3	30	53.3		0	0	0	11.6	88.4		
PHF	.000	.250	.000	.917	.900	.833	.000	.000	.000	.577	.369	.599	.250	.375	.250	.321	.308	.500	.000	.000	.000	.625	.380	.398	.591



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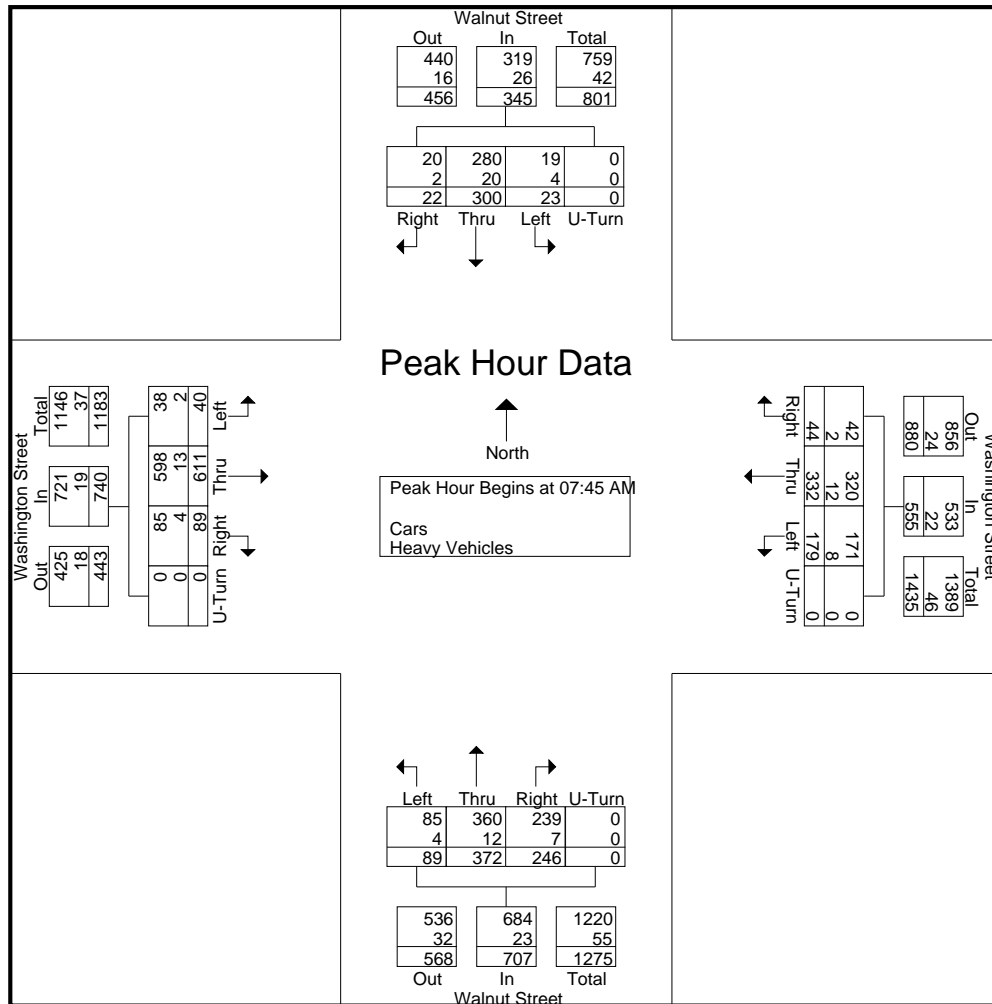
P.O. Box 301 Berlin, MA 01503
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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 A
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	54	11	0	69	8	73	28	0	109	65	105	38	0	208	23	168	7	0	198	584
08:00 AM	9	74	2	0	85	11	76	43	0	130	70	93	18	0	181	19	124	12	0	155	551
08:15 AM	3	83	4	0	90	13	102	50	0	165	54	89	17	0	160	17	153	16	0	186	601
08:30 AM	6	89	6	0	101	12	81	58	0	151	57	85	16	0	158	30	166	5	0	201	611
Total Volume	22	300	23	0	345	44	332	179	0	555	246	372	89	0	707	89	611	40	0	740	2347
% App. Total	6.4	87	6.7	0		7.9	59.8	32.3	0		34.8	52.6	12.6	0		12	82.6	5.4	0		
PHF	.611	.843	.523	.000	.854	.846	.814	.772	.000	.841	.879	.886	.586	.000	.850	.742	.909	.625	.000	.920	.960
Cars	20	280	19	0	319	42	320	171	0	533	239	360	85	0	684	85	598	38	0	721	2257
% Cars	90.9	93.3	82.6	0	92.5	95.5	96.4	95.5	0	96.0	97.2	96.8	95.5	0	96.7	95.5	97.9	95.0	0	97.4	96.2
Heavy Vehicles	2	20	4	0	26	2	12	8	0	22	7	12	4	0	23	4	13	2	0	19	90
% Heavy Vehicles	9.1	6.7	17.4	0	7.5	4.5	3.6	4.5	0	4.0	2.8	3.2	4.5	0	3.3	4.5	2.1	5.0	0	2.6	3.8





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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 AA
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	7	75	3	0	15	125	62	0	37	92	31	0	21	105	8	0	581
04:15 PM	7	78	5	0	12	122	44	0	45	79	26	0	11	99	3	0	531
04:30 PM	10	79	9	0	14	126	49	0	35	95	16	1	12	89	5	0	540
04:45 PM	3	72	4	0	12	133	54	0	37	73	30	0	22	96	6	0	542
Total	27	304	21	0	53	506	209	0	154	339	103	1	66	389	22	0	2194
05:00 PM	8	78	4	0	9	146	46	0	53	104	34	0	14	110	5	0	611
05:15 PM	9	80	8	0	13	119	60	0	43	98	31	0	15	120	4	0	600
05:30 PM	2	92	13	0	17	122	41	0	48	86	28	0	14	122	5	0	590
05:45 PM	8	89	10	0	15	132	57	0	52	87	21	0	17	139	8	0	635
Total	27	339	35	0	54	519	204	0	196	375	114	0	60	491	22	0	2436
Grand Total	54	643	56	0	107	1025	413	0	350	714	217	1	126	880	44	0	4630
Apprch %	7.2	85.4	7.4	0	6.9	66.3	26.7	0	27.3	55.7	16.9	0.1	12	83.8	4.2	0	
Total %	1.2	13.9	1.2	0	2.3	22.1	8.9	0	7.6	15.4	4.7	0	2.7	19	1	0	
Cars	54	628	55	0	103	1005	407	0	347	683	216	1	125	868	43	0	4535
% Cars	100	97.7	98.2	0	96.3	98	98.5	0	99.1	95.7	99.5	100	99.2	98.6	97.7	0	97.9
Heavy Vehicles	0	15	1	0	4	20	6	0	3	31	1	0	1	12	1	0	95
% Heavy Vehicles	0	2.3	1.8	0	3.7	2	1.5	0	0.9	4.3	0.5	0	0.8	1.4	2.3	0	2.1

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	8	78	4	0	90	9	146	46	0	201	53	104	34	0	191	14	110	5	0	129	611
05:15 PM	9	80	8	0	97	13	119	60	0	192	43	98	31	0	172	15	120	4	0	139	600
05:30 PM	2	92	13	0	107	17	122	41	0	180	48	86	28	0	162	14	122	5	0	141	590
05:45 PM	8	89	10	0	107	15	132	57	0	204	52	87	21	0	160	17	139	8	0	164	635
Total Volume	27	339	35	0	401	54	519	204	0	777	196	375	114	0	685	60	491	22	0	573	2436
% App. Total	6.7	84.5	8.7	0		6.9	66.8	26.3	0		28.6	54.7	16.6	0		10.5	85.7	3.8	0		
PHF	.750	.921	.673	.000	.937	.794	.889	.850	.000	.952	.925	.901	.838	.000	.897	.882	.883	.688	.000	.873	.959
Cars	27	333	35	0	395	50	509	203	0	762	194	366	114	0	674	60	486	21	0	567	2398
% Cars	100	98.2	100	0	98.5	92.6	98.1	99.5	0	98.1	99.0	97.6	100	0	98.4	100	99.0	95.5	0	99.0	98.4
Heavy Vehicles	0	6	0	0	6	4	10	1	0	15	2	9	0	0	11	0	5	1	0	6	38
% Heavy Vehicles	0	1.8	0	0	1.5	7.4	1.9	0.5	0	1.9	1.0	2.4	0	0	1.6	0	1.0	4.5	0	1.0	1.6



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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 AA
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	7	74	3	0	15	124	61	0	37	87	30	0	21	102	8	0	569
04:15 PM	7	75	5	0	12	119	43	0	44	71	26	0	11	97	3	0	513
04:30 PM	10	76	8	0	14	125	47	0	35	89	16	1	12	89	5	0	527
04:45 PM	3	70	4	0	12	128	53	0	37	70	30	0	21	94	6	0	528
Total	27	295	20	0	53	496	204	0	153	317	102	1	65	382	22	0	2137
05:00 PM	8	78	4	0	8	143	46	0	53	102	34	0	14	110	5	0	605
05:15 PM	9	78	8	0	13	119	59	0	43	96	31	0	15	119	3	0	593
05:30 PM	2	90	13	0	15	118	41	0	46	82	28	0	14	119	5	0	573
05:45 PM	8	87	10	0	14	129	57	0	52	86	21	0	17	138	8	0	627
Total	27	333	35	0	50	509	203	0	194	366	114	0	60	486	21	0	2398
Grand Total	54	628	55	0	103	1005	407	0	347	683	216	1	125	868	43	0	4535
Apprch %	7.3	85.2	7.5	0	6.8	66.3	26.9	0	27.8	54.8	17.3	0.1	12.1	83.8	4.2	0	
Total %	1.2	13.8	1.2	0	2.3	22.2	9	0	7.7	15.1	4.8	0	2.8	19.1	0.9	0	

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	8	78	4	0	90	8	143	46	0	197	53	102	34	0	189	14	110	5	0	129	605
05:15 PM	9	78	8	0	95	13	119	59	0	191	43	96	31	0	170	15	119	3	0	137	593
05:30 PM	2	90	13	0	105	15	118	41	0	174	46	82	28	0	156	14	119	5	0	138	573
05:45 PM	8	87	10	0	105	14	129	57	0	200	52	86	21	0	159	17	138	8	0	163	627
Total Volume	27	333	35	0	395	50	509	203	0	762	194	366	114	0	674	60	486	21	0	567	2398
% App. Total	6.8	84.3	8.9	0		6.6	66.8	26.6	0		28.8	54.3	16.9	0		10.6	85.7	3.7	0		
PHF	.750	.925	.673	.000	.940	.833	.890	.860	.000	.953	.915	.897	.838	.000	.892	.882	.880	.656	.000	.870	.956



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179-16

N/S: Walnut Street
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 AA
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North				Washington Street From East				Walnut Street From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	1	0	0	0	1	1	0	0	5	1	0	0	3	0	0	12
04:15 PM	0	3	0	0	0	3	1	0	1	8	0	0	0	2	0	0	18
04:30 PM	0	3	1	0	0	1	2	0	0	6	0	0	0	0	0	0	13
04:45 PM	0	2	0	0	0	5	1	0	0	3	0	0	1	2	0	0	14
Total	0	9	1	0	0	10	5	0	1	22	1	0	1	7	0	0	57
05:00 PM	0	0	0	0	1	3	0	0	0	2	0	0	0	0	0	0	6
05:15 PM	0	2	0	0	0	0	1	0	0	2	0	0	0	1	1	0	7
05:30 PM	0	2	0	0	2	4	0	0	2	4	0	0	0	3	0	0	17
05:45 PM	0	2	0	0	1	3	0	0	0	1	0	0	0	1	0	0	8
Total	0	6	0	0	4	10	1	0	2	9	0	0	0	5	1	0	38
Grand Total	0	15	1	0	4	20	6	0	3	31	1	0	1	12	1	0	95
Apprch %	0	93.8	6.2	0	13.3	66.7	20	0	8.6	88.6	2.9	0	7.1	85.7	7.1	0	
Total %	0	15.8	1.1	0	4.2	21.1	6.3	0	3.2	32.6	1.1	0	1.1	12.6	1.1	0	

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	1	0	0	1	0	1	1	0	2	0	5	1	0	6	0	3	0	0	3	12
04:15 PM	0	3	0	0	3	0	3	1	0	4	1	8	0	0	9	0	2	0	0	2	18
04:30 PM	0	3	1	0	4	0	1	2	0	3	0	6	0	0	6	0	0	0	0	0	13
04:45 PM	0	2	0	0	2	0	5	1	0	6	0	3	0	0	3	1	2	0	0	3	14
Total Volume	0	9	1	0	10	0	10	5	0	15	1	22	1	0	24	1	7	0	0	8	57
% App. Total	0	90	10	0		0	66.7	33.3	0		4.2	91.7	4.2	0		12.5	87.5	0	0		
PHF	.000	.750	.250	.000	.625	.000	.500	.625	.000	.625	.250	.688	.250	.000	.667	.250	.583	.000	.000	.667	.792



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179-16

N/S: Walnut Street
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Client: VHB/ C. Trearchis

File Name : 154796 AA
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					
Start Time	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	1	0	5	5	0	0	0	0	0	0	1	0	0	0	0	0	0	7	2	21
04:15 PM	0	0	0	2	5	0	0	0	5	5	0	0	0	0	0	0	0	0	7	3	27
04:30 PM	0	0	0	3	3	0	0	0	1	4	0	1	0	0	1	0	1	0	6	2	22
04:45 PM	0	0	0	5	2	0	0	0	3	10	0	0	0	1	0	0	0	0	14	0	35
Total	0	1	0	15	15	0	0	0	9	19	0	2	0	1	1	0	1	0	34	7	105
05:00 PM	0	0	0	9	3	0	1	0	7	4	0	1	0	0	0	0	0	0	12	3	40
05:15 PM	0	0	0	4	1	1	0	1	5	1	0	0	0	1	0	0	0	0	3	4	21
05:30 PM	0	0	0	11	6	0	0	0	2	17	0	0	0	2	1	0	1	0	12	5	57
05:45 PM	0	0	0	4	6	0	0	0	2	9	0	0	0	2	0	0	0	0	7	2	32
Total	0	0	0	28	16	1	1	1	16	31	0	1	0	5	1	0	1	0	34	14	150
Grand Total	0	1	0	43	31	1	1	1	25	50	0	3	0	6	2	0	2	0	68	21	255
Apprch %	0	1.3	0	57.3	41.3	1.3	1.3	1.3	32.1	64.1	0	27.3	0	54.5	18.2	0	2.2	0	74.7	23.1	
Total %	0	0.4	0	16.9	12.2	0.4	0.4	0.4	9.8	19.6	0	1.2	0	2.4	0.8	0	0.8	0	26.7	8.2	

	Walnut Street From North						Washington Street From East						Walnut Street From South						Washington Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	0	0	5	2	7	0	0	0	3	10	13	0	0	0	1	0	1	0	0	0	14	0	14	35
05:00 PM	0	0	0	9	3	12	0	1	0	7	4	12	0	1	0	0	0	1	0	0	0	12	3	15	40
05:15 PM	0	0	0	4	1	5	1	0	1	5	1	8	0	0	0	1	0	1	0	0	0	3	4	7	21
05:30 PM	0	0	0	11	6	17	0	0	0	2	17	19	0	0	0	2	1	3	0	1	0	12	5	18	57
Total Volume	0	0	0	29	12	41	1	1	1	17	32	52	0	1	0	4	1	6	0	1	0	41	12	54	153
% App. Total	0	0	0	70.7	29.3		1.9	1.9	1.9	32.7	61.5		0	16.7	0	66.7	16.7		0	1.9	0	75.9	22.2		
PHF	.000	.000	.000	.659	.500	.603	.250	.250	.250	.607	.471	.684	.000	.250	.000	.500	.250	.500	.000	.250	.000	.732	.600	.750	.671



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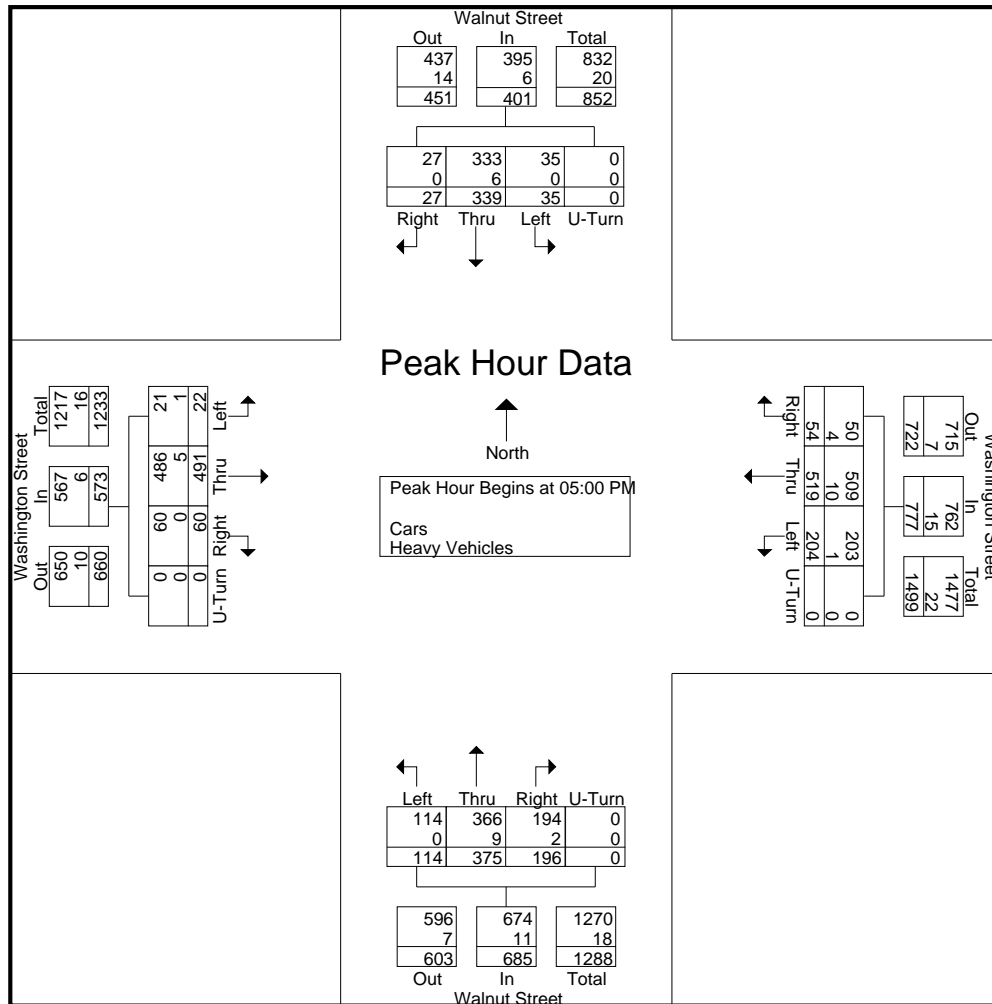
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	Walnut Street From North					Washington Street From East					Walnut Street From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	8	78	4	0	90	9	146	46	0	201	53	104	34	0	191	14	110	5	0	129	611
05:15 PM	9	80	8	0	97	13	119	60	0	192	43	98	31	0	172	15	120	4	0	139	600
05:30 PM	2	92	13	0	107	17	122	41	0	180	48	86	28	0	162	14	122	5	0	141	590
05:45 PM	8	89	10	0	107	15	132	57	0	204	52	87	21	0	160	17	139	8	0	164	635
Total Volume	27	339	35	0	401	54	519	204	0	777	196	375	114	0	685	60	491	22	0	573	2436
% App. Total	6.7	84.5	8.7	0		6.9	66.8	26.3	0		28.6	54.7	16.6	0		10.5	85.7	3.8	0		
PHF	.750	.921	.673	.000	.937	.794	.889	.850	.000	.952	.925	.901	.838	.000	.897	.882	.883	.688	.000	.873	.959
Cars	27	333	35	0	395	50	509	203	0	762	194	366	114	0	674	60	486	21	0	567	2398
% Cars	100	98.2	100	0	98.5	92.6	98.1	99.5	0	98.1	99.0	97.6	100	0	98.4	100	99.0	95.5	0	99.0	98.4
Heavy Vehicles	0	6	0	0	6	4	10	1	0	15	2	9	0	0	11	0	5	1	0	6	38
% Heavy Vehicles	0	1.8	0	0	1.5	7.4	1.9	0.5	0	1.9	1.0	2.4	0	0	1.6	0	1.0	4.5	0	1.0	1.6





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179-16

N: Bailey Place
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 B
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	0	2	0	1	58	0	97	0	0	158
07:15 AM	1	1	0	0	84	0	138	0	0	224
07:30 AM	1	1	0	0	96	0	162	0	0	260
07:45 AM	1	0	0	2	122	0	198	0	0	323
Total	3	4	0	3	360	0	595	0	0	965
08:00 AM	0	0	0	0	103	0	148	2	0	253
08:15 AM	0	0	0	1	122	0	183	0	0	306
08:30 AM	1	0	0	0	103	0	201	1	0	306
08:45 AM	0	0	0	1	96	0	146	1	0	244
Total	1	0	0	2	424	0	678	4	0	1109
Grand Total	4	4	0	5	784	0	1273	4	0	2074
Apprch %	50	50	0	0.6	99.4	0	99.7	0.3	0	
Total %	0.2	0.2	0	0.2	37.8	0	61.4	0.2	0	
Cars	4	3	0	5	744	0	1233	4	0	1993
% Cars	100	75	0	100	94.9	0	96.9	100	0	96.1
Heavy Vehicles	0	1	0	0	40	0	40	0	0	81
% Heavy Vehicles	0	25	0	0	5.1	0	3.1	0	0	3.9

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	1	0	0	1	2	122	0	124	198	0	0	198	323
08:00 AM	0	0	0	0	0	103	0	103	148	2	0	150	253
08:15 AM	0	0	0	0	1	122	0	123	183	0	0	183	306
08:30 AM	1	0	0	1	0	103	0	103	201	1	0	202	306
Total Volume	2	0	0	2	3	450	0	453	730	3	0	733	1188
% App. Total	100	0	0		0.7	99.3	0		99.6	0.4	0		
PHF	.500	.000	.000	.500	.375	.922	.000	.913	.908	.375	.000	.907	.920
Cars	2	0	0	2	3	434	0	437	708	3	0	711	1150
% Cars	100	0	0	100	100	96.4	0	96.5	97.0	100	0	97.0	96.8
Heavy Vehicles	0	0	0	0	0	16	0	16	22	0	0	22	38
% Heavy Vehicles	0	0	0	0	0	3.6	0	3.5	3.0	0	0	3.0	3.2



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Client: VHB/ C. Trearchis

File Name : 154796 B
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	0	2	0	1	55	0	90	0	0	148
07:15 AM	1	0	0	0	75	0	135	0	0	211
07:30 AM	1	1	0	0	88	0	158	0	0	248
07:45 AM	1	0	0	2	118	0	192	0	0	313
Total	3	3	0	3	336	0	575	0	0	920
08:00 AM	0	0	0	0	94	0	145	2	0	241
08:15 AM	0	0	0	1	121	0	174	0	0	296
08:30 AM	1	0	0	0	101	0	197	1	0	300
08:45 AM	0	0	0	1	92	0	142	1	0	236
Total	1	0	0	2	408	0	658	4	0	1073
Grand Total	4	3	0	5	744	0	1233	4	0	1993
Apprch %	57.1	42.9	0	0.7	99.3	0	99.7	0.3	0	
Total %	0.2	0.2	0	0.3	37.3	0	61.9	0.2	0	

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	1	0	0	1	2	118	0	120	192	0	0	192	313
08:00 AM	0	0	0	0	0	94	0	94	145	2	0	147	241
08:15 AM	0	0	0	0	1	121	0	122	174	0	0	174	296
08:30 AM	1	0	0	1	0	101	0	101	197	1	0	198	300
Total Volume	2	0	0	2	3	434	0	437	708	3	0	711	1150
% App. Total	100	0	0		0.7	99.3	0		99.6	0.4	0		
PHF	.500	.000	.000	.500	.375	.897	.000	.895	.898	.375	.000	.898	.919



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File Name : 154796 B
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	0	0	0	0	3	0	7	0	0	10
07:15 AM	0	1	0	0	9	0	3	0	0	13
07:30 AM	0	0	0	0	8	0	4	0	0	12
07:45 AM	0	0	0	0	4	0	6	0	0	10
Total	0	1	0	0	24	0	20	0	0	45
08:00 AM	0	0	0	0	9	0	3	0	0	12
08:15 AM	0	0	0	0	1	0	9	0	0	10
08:30 AM	0	0	0	0	2	0	4	0	0	6
08:45 AM	0	0	0	0	4	0	4	0	0	8
Total	0	0	0	0	16	0	20	0	0	36
Grand Total	0	1	0	0	40	0	40	0	0	81
Apprch %	0	100	0	0	100	0	100	0	0	
Total %	0	1.2	0	0	49.4	0	49.4	0	0	

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	1	0	1	0	9	0	9	3	0	0	3	13
07:30 AM	0	0	0	0	0	8	0	8	4	0	0	4	12
07:45 AM	0	0	0	0	0	4	0	4	6	0	0	6	10
08:00 AM	0	0	0	0	0	9	0	9	3	0	0	3	12
Total Volume	0	1	0	1	0	30	0	30	16	0	0	16	47
% App. Total	0	100	0		0	100	0		100	0	0		
PHF	.000	.250	.000	.250	.000	.833	.000	.833	.667	.000	.000	.667	.904



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Client: VHB/ C. Trearchis

File Name : 154796 B
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Bailey Place From North				Washington Street From East				Washington Street From West				Int. Total
	Right	Left	Peds EB	Peds WB	Right	Thru	Peds SB	Peds NB	Thru	Left	Peds NB	Peds SB	
07:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	4	2	0	0	0	0	0	0	0	0	6
07:30 AM	0	0	5	2	0	0	0	0	0	0	0	0	7
07:45 AM	0	0	2	3	0	1	0	0	0	0	0	0	6
Total	0	0	11	8	0	1	0	0	0	0	0	0	20
08:00 AM	0	0	0	2	0	0	0	0	0	0	0	0	2
08:15 AM	0	0	3	4	0	1	0	0	0	0	0	0	8
08:30 AM	0	0	3	0	0	0	0	0	0	0	0	0	3
08:45 AM	0	0	2	1	0	0	0	0	0	0	0	0	3
Total	0	0	8	7	0	1	0	0	0	0	0	0	16
Grand Total	0	0	19	15	0	2	0	0	0	0	0	0	36
Apprch %	0	0	55.9	44.1	0	100	0	0	0	0	0	0	
Total %	0	0	52.8	41.7	0	5.6	0	0	0	0	0	0	

	Bailey Place From North					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Peds EB	Peds WB	App. Total	Right	Thru	Peds SB	Peds NB	App. Total	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:30 AM																
07:30 AM	0	0	5	2	7	0	0	0	0	0	0	0	0	0	0	7
07:45 AM	0	0	2	3	5	0	1	0	0	1	0	0	0	0	0	6
08:00 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
08:15 AM	0	0	3	4	7	0	1	0	0	1	0	0	0	0	0	8
Total Volume	0	0	10	11	21	0	2	0	0	2	0	0	0	0	0	23
% App. Total	0	0	47.6	52.4		0	100	0	0		0	0	0	0		
PHF	.000	.000	.500	.688	.750	.000	.500	.000	.000	.500	.000	.000	.000	.000	.000	.719



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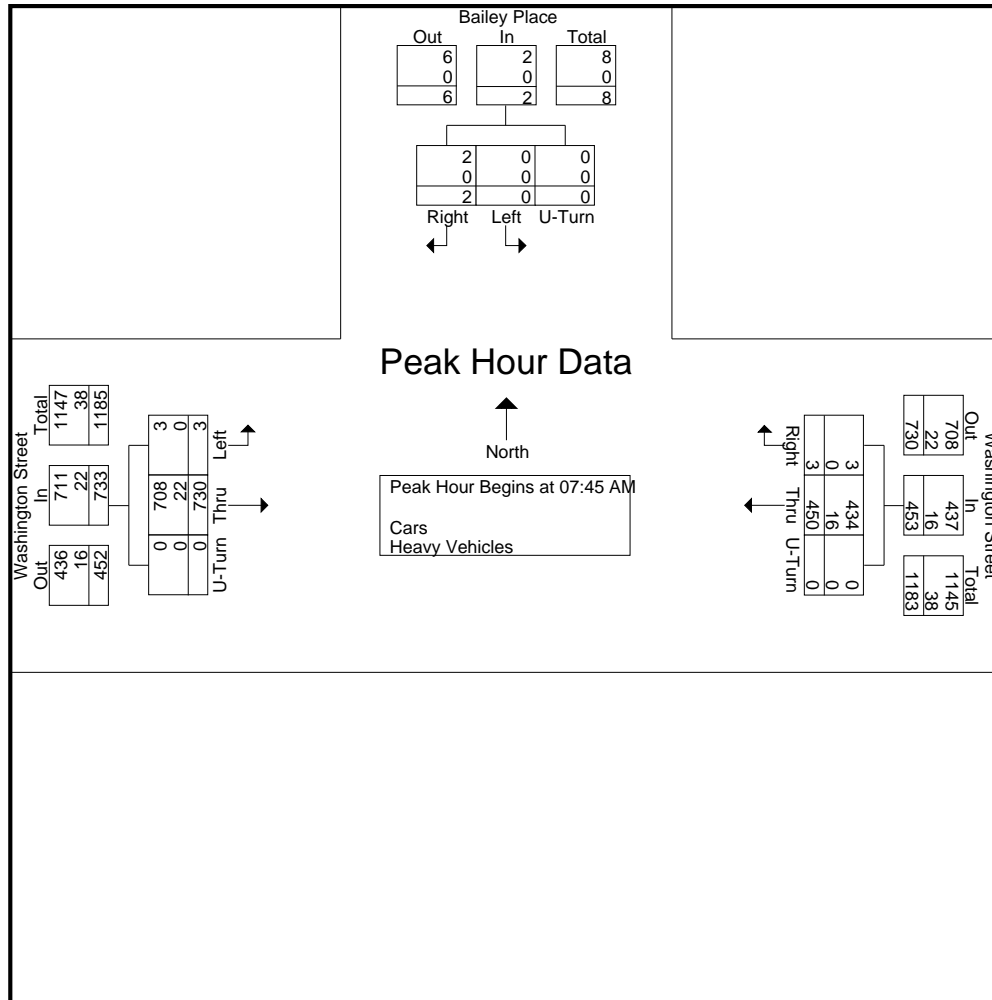
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Page No : 1

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	1	0	0	1	2	122	0	124	198	0	0	198	323
08:00 AM	0	0	0	0	0	103	0	103	148	2	0	150	253
08:15 AM	0	0	0	0	1	122	0	123	183	0	0	183	306
08:30 AM	1	0	0	1	0	103	0	103	201	1	0	202	306
Total Volume	2	0	0	2	3	450	0	453	730	3	0	733	1188
% App. Total	100	0	0		0.7	99.3	0		99.6	0.4	0		
PHF	.500	.000	.000	.500	.375	.922	.000	.913	.908	.375	.000	.907	.920
Cars	2	0	0	2	3	434	0	437	708	3	0	711	1150
% Cars	100	0	0	100	100	96.4	0	96.5	97.0	100	0	97.0	96.8
Heavy Vehicles	0	0	0	0	0	16	0	16	22	0	0	22	38
% Heavy Vehicles	0	0	0	0	0	3.6	0	3.5	3.0	0	0	3.0	3.2





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179-16

N: Bailey Place
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File Name : 154796 BB
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	7	7	0	1	164	1	126	0	0	306
04:15 PM	4	2	0	2	152	0	112	2	0	274
04:30 PM	6	3	0	2	150	0	104	1	0	266
04:45 PM	10	2	0	0	170	2	123	1	0	308
Total	27	14	0	5	636	3	465	4	0	1154
05:00 PM	19	6	0	1	189	0	128	2	0	345
05:15 PM	16	9	0	3	160	0	158	1	0	347
05:30 PM	11	5	0	0	149	0	141	0	0	306
05:45 PM	8	3	0	1	158	0	167	0	0	337
Total	54	23	0	5	656	0	594	3	0	1335
Grand Total	81	37	0	10	1292	3	1059	7	0	2489
Apprch %	68.6	31.4	0	0.8	99	0.2	99.3	0.7	0	
Total %	3.3	1.5	0	0.4	51.9	0.1	42.5	0.3	0	
Cars	80	37	0	10	1268	3	1045	7	0	2450
% Cars	98.8	100	0	100	98.1	100	98.7	100	0	98.4
Heavy Vehicles	1	0	0	0	24	0	14	0	0	39
% Heavy Vehicles	1.2	0	0	0	1.9	0	1.3	0	0	1.6

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	19	6	0	25	1	189	0	190	128	2	0	130	345
05:15 PM	16	9	0	25	3	160	0	163	158	1	0	159	347
05:30 PM	11	5	0	16	0	149	0	149	141	0	0	141	306
05:45 PM	8	3	0	11	1	158	0	159	167	0	0	167	337
Total Volume	54	23	0	77	5	656	0	661	594	3	0	597	1335
% App. Total	70.1	29.9	0		0.8	99.2	0		99.5	0.5	0		
PHF	.711	.639	.000	.770	.417	.868	.000	.870	.889	.375	.000	.894	.962
Cars	53	23	0	76	5	646	0	651	588	3	0	591	1318
% Cars	98.1	100	0	98.7	100	98.5	0	98.5	99.0	100	0	99.0	98.7
Heavy Vehicles	1	0	0	1	0	10	0	10	6	0	0	6	17
% Heavy Vehicles	1.9	0	0	1.3	0	1.5	0	1.5	1.0	0	0	1.0	1.3



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Client: VHB/ C. Trearchis

File Name : 154796 BB
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	7	7	0	1	160	1	123	0	0	299
04:15 PM	4	2	0	2	148	0	110	2	0	268
04:30 PM	6	3	0	2	149	0	104	1	0	265
04:45 PM	10	2	0	0	165	2	120	1	0	300
Total	27	14	0	5	622	3	457	4	0	1132
05:00 PM	18	6	0	1	186	0	128	2	0	341
05:15 PM	16	9	0	3	160	0	156	1	0	345
05:30 PM	11	5	0	0	145	0	138	0	0	299
05:45 PM	8	3	0	1	155	0	166	0	0	333
Total	53	23	0	5	646	0	588	3	0	1318
Grand Total	80	37	0	10	1268	3	1045	7	0	2450
Apprch %	68.4	31.6	0	0.8	99	0.2	99.3	0.7	0	
Total %	3.3	1.5	0	0.4	51.8	0.1	42.7	0.3	0	

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	18	6	0	24	1	186	0	187	128	2	0	130	341
05:15 PM	16	9	0	25	3	160	0	163	156	1	0	157	345
05:30 PM	11	5	0	16	0	145	0	145	138	0	0	138	299
05:45 PM	8	3	0	11	1	155	0	156	166	0	0	166	333
Total Volume	53	23	0	76	5	646	0	651	588	3	0	591	1318
% App. Total	69.7	30.3	0		0.8	99.2	0		99.5	0.5	0		
PHF	.736	.639	.000	.760	.417	.868	.000	.870	.886	.375	.000	.890	.955



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Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Bailey Place From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	0	0	0	0	4	0	3	0	0	7
04:15 PM	0	0	0	0	4	0	2	0	0	6
04:30 PM	0	0	0	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	5	0	3	0	0	8
Total	0	0	0	0	14	0	8	0	0	22
05:00 PM	1	0	0	0	3	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	2	0	0	2
05:30 PM	0	0	0	0	4	0	3	0	0	7
05:45 PM	0	0	0	0	3	0	1	0	0	4
Total	1	0	0	0	10	0	6	0	0	17
Grand Total	1	0	0	0	24	0	14	0	0	39
Apprch %	100	0	0	0	100	0	100	0	0	
Total %	2.6	0	0	0	61.5	0	35.9	0	0	

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	0	0	0	0	4	0	4	3	0	0	3	7
04:15 PM	0	0	0	0	0	4	0	4	2	0	0	2	6
04:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	5	0	5	3	0	0	3	8
Total Volume	0	0	0	0	0	14	0	14	8	0	0	8	22
% App. Total	0	0	0		0	100	0		100	0	0		
PHF	.000	.000	.000	.000	.000	.700	.000	.700	.667	.000	.000	.667	.688



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File Name : 154796 BB
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Bailey Place From North				Washington Street From East				Washington Street From West				Int. Total
	Right	Left	Peds EB	Peds WB	Right	Thru	Peds SB	Peds NB	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	0	1	5	0	0	0	0	0	0	0	0	6
04:15 PM	0	0	2	7	0	0	0	0	2	0	0	0	11
04:30 PM	0	0	0	3	0	0	0	0	0	0	0	0	3
04:45 PM	0	0	3	7	0	0	0	0	0	0	0	0	10
Total	0	0	6	22	0	0	0	0	2	0	0	0	30
05:00 PM	0	0	4	5	0	2	0	0	0	0	0	0	11
05:15 PM	0	0	7	3	0	0	0	0	0	0	0	0	10
05:30 PM	0	0	9	5	0	0	1	0	0	0	0	0	15
05:45 PM	0	0	2	11	0	0	0	0	0	0	0	0	13
Total	0	0	22	24	0	2	1	0	0	0	0	0	49
Grand Total	0	0	28	46	0	2	1	0	2	0	0	0	79
Apprch %	0	0	37.8	62.2	0	66.7	33.3	0	100	0	0	0	
Total %	0	0	35.4	58.2	0	2.5	1.3	0	2.5	0	0	0	

	Bailey Place From North					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Peds EB	Peds WB	App. Total	Right	Thru	Peds SB	Peds NB	App. Total	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	0	0	4	5	9	0	2	0	0	2	0	0	0	0	0	11
05:15 PM	0	0	7	3	10	0	0	0	0	0	0	0	0	0	0	10
05:30 PM	0	0	9	5	14	0	0	1	0	1	0	0	0	0	0	15
05:45 PM	0	0	2	11	13	0	0	0	0	0	0	0	0	0	0	13
Total Volume	0	0	22	24	46	0	2	1	0	3	0	0	0	0	0	49
% App. Total	0	0	47.8	52.2		0	66.7	33.3	0		0	0	0	0		
PHF	.000	.000	.611	.545	.821	.000	.250	.250	.000	.375	.000	.000	.000	.000	.000	.817



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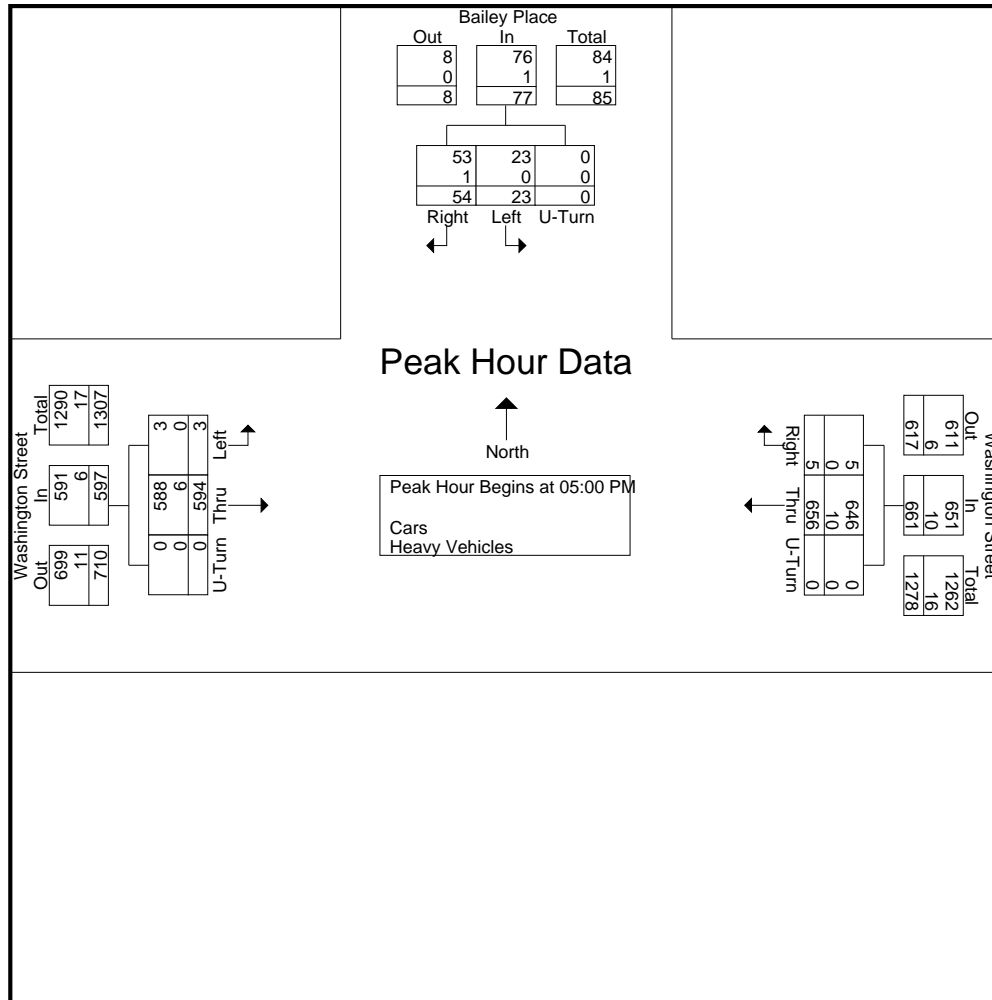
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

179-16

N: Bailey Place
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 BB
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Bailey Place From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	19	6	0	25	1	189	0	190	128	2	0	130	345
05:15 PM	16	9	0	25	3	160	0	163	158	1	0	159	347
05:30 PM	11	5	0	16	0	149	0	149	141	0	0	141	306
05:45 PM	8	3	0	11	1	158	0	159	167	0	0	167	337
Total Volume	54	23	0	77	5	656	0	661	594	3	0	597	1335
% App. Total	70.1	29.9	0		0.8	99.2	0		99.5	0.5	0		
PHF	.711	.639	.000	.770	.417	.868	.000	.870	.889	.375	.000	.894	.962
Cars	53	23	0	76	5	646	0	651	588	3	0	591	1318
% Cars	98.1	100	0	98.7	100	98.5	0	98.5	99.0	100	0	99.0	98.7
Heavy Vehicles	1	0	0	1	0	10	0	10	6	0	0	6	17
% Heavy Vehicles	1.9	0	0	1.3	0	1.5	0	1.5	1.0	0	0	1.0	1.3





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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 C
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				Int. Total
	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	
07:00 AM	0	0	0	0	0	0	60	0	99	0	0	0	0	1	0	0	160
07:15 AM	0	0	0	0	0	0	86	0	143	1	0	0	0	0	0	0	230
07:30 AM	0	0	0	0	0	3	95	0	161	0	1	0	0	1	0	0	261
07:45 AM	0	0	0	0	0	2	120	0	195	0	1	0	0	0	0	1	319
Total	0	0	0	0	0	5	361	0	598	1	2	0	0	2	0	1	970
08:00 AM	0	0	0	0	1	7	91	0	148	2	2	0	0	1	0	0	252
08:15 AM	0	0	0	0	0	1	120	0	185	1	0	0	0	0	0	0	307
08:30 AM	0	0	0	0	1	4	103	0	199	0	0	0	0	1	0	0	308
08:45 AM	0	0	0	0	0	2	90	0	150	1	1	0	0	0	0	0	244
Total	0	0	0	0	2	14	404	0	682	4	3	0	0	2	0	0	1111
Grand Total	0	0	0	0	2	19	765	0	1280	5	5	0	0	4	0	1	2081
Apprch %	0	0	0	0	0.3	2.4	97.3	0	99.2	0.4	0.4	0	0	80	0	20	
Total %	0	0	0	0	0.1	0.9	36.8	0	61.5	0.2	0.2	0	0	0.2	0	0	
Cars	0	0	0	0	2	19	726	0	1243	5	5	0	0	4	0	1	2005
% Cars	0	0	0	0	100	100	94.9	0	97.1	100	100	0	0	100	0	100	96.3
Heavy Vehicles	0	0	0	0	0	0	39	0	37	0	0	0	0	0	0	0	76
% Heavy Vehicles	0	0	0	0	0	0	5.1	0	2.9	0	0	0	0	0	0	0	3.7

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	2	120	0	122	195	0	1	0	196	0	0	0	1	1	319
08:00 AM	0	0	0	0	0	1	7	91	0	99	148	2	2	0	152	0	1	0	0	1	252
08:15 AM	0	0	0	0	0	0	1	120	0	121	185	1	0	0	186	0	0	0	0	0	307
08:30 AM	0	0	0	0	0	1	4	103	0	108	199	0	0	0	199	0	1	0	0	1	308
Total Volume	0	0	0	0	0	2	14	434	0	450	727	3	3	0	733	0	2	0	1	3	1186
% App. Total	0	0	0	0	0	0.4	3.1	96.4	0		99.2	0.4	0.4	0		0	66.7	0	33.3		
PHF	.000	.000	.000	.000	.000	.500	.500	.904	.000	.922	.913	.375	.375	.000	.921	.000	.500	.000	.250	.750	.929
Cars	0	0	0	0	0	2	14	418	0	434	706	3	3	0	712	0	2	0	1	3	1149
% Cars	0	0	0	0	0	100	100	96.3	0	96.4	97.1	100	100	0	97.1	0	100	0	100	100	96.9
Heavy Vehicles	0	0	0	0	0	0	0	16	0	16	21	0	0	0	21	0	0	0	0	0	37
% Heavy Vehicles	0	0	0	0	0	0	0	3.7	0	3.6	2.9	0	0	0	2.9	0	0	0	0	0	3.1



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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 C
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

Start Time	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				Int. Total
	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	
07:00 AM	0	0	0	0	0	0	57	0	93	0	0	0	0	1	0	0	151
07:15 AM	0	0	0	0	0	0	78	0	141	1	0	0	0	0	0	0	220
07:30 AM	0	0	0	0	0	3	87	0	157	0	1	0	0	1	0	0	249
07:45 AM	0	0	0	0	0	2	116	0	188	0	1	0	0	0	0	1	308
Total	0	0	0	0	0	5	338	0	579	1	2	0	0	2	0	1	928
08:00 AM	0	0	0	0	1	7	82	0	145	2	2	0	0	1	0	0	240
08:15 AM	0	0	0	0	0	1	119	0	177	1	0	0	0	0	0	0	298
08:30 AM	0	0	0	0	1	4	101	0	196	0	0	0	0	1	0	0	303
08:45 AM	0	0	0	0	0	2	86	0	146	1	1	0	0	0	0	0	236
Total	0	0	0	0	2	14	388	0	664	4	3	0	0	2	0	0	1077
Grand Total	0	0	0	0	2	19	726	0	1243	5	5	0	0	4	0	1	2005
Apprch %	0	0	0	0	0.3	2.5	97.2	0	99.2	0.4	0.4	0	0	80	0	20	
Total %	0	0	0	0	0.1	0.9	36.2	0	62	0.2	0.2	0	0	0.2	0	0	

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	2	116	0	118	188	0	1	0	189	0	0	0	1	1	308
08:00 AM	0	0	0	0	0	1	7	82	0	90	145	2	2	0	149	0	1	0	0	1	240
08:15 AM	0	0	0	0	0	0	1	119	0	120	177	1	0	0	178	0	0	0	0	0	298
08:30 AM	0	0	0	0	0	1	4	101	0	106	196	0	0	0	196	0	1	0	0	1	303
Total Volume	0	0	0	0	0	2	14	418	0	434	706	3	3	0	712	0	2	0	1	3	1149
% App. Total	0	0	0	0		0.5	3.2	96.3	0		99.2	0.4	0.4	0		0	66.7	0	33.3		
PHF	.000	.000	.000	.000	.000	.500	.500	.878	.000	.904	.901	.375	.375	.000	.908	.000	.500	.000	.250	.750	.933



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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 C
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				
Start Time	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	Int. Total
07:00 AM	0	0	0	0	0	0	3	0	6	0	0	0	0	0	0	0	9
07:15 AM	0	0	0	0	0	0	8	0	2	0	0	0	0	0	0	0	10
07:30 AM	0	0	0	0	0	0	8	0	4	0	0	0	0	0	0	0	12
07:45 AM	0	0	0	0	0	0	4	0	7	0	0	0	0	0	0	0	11
Total	0	0	0	0	0	0	23	0	19	0	0	0	0	0	0	0	42
08:00 AM	0	0	0	0	0	0	9	0	3	0	0	0	0	0	0	0	12
08:15 AM	0	0	0	0	0	0	1	0	8	0	0	0	0	0	0	0	9
08:30 AM	0	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	5
08:45 AM	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	8
Total	0	0	0	0	0	0	16	0	18	0	0	0	0	0	0	0	34
Grand Total	0	0	0	0	0	0	39	0	37	0	0	0	0	0	0	0	76
Apprch %	0	0	0	0	0	0	100	0	100	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	51.3	0	48.7	0	0	0	0	0	0	0	

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	8	0	8	2	0	0	0	2	0	0	0	0	0	10
07:30 AM	0	0	0	0	0	0	0	8	0	8	4	0	0	0	4	0	0	0	0	0	12
07:45 AM	0	0	0	0	0	0	0	4	0	4	7	0	0	0	7	0	0	0	0	0	11
08:00 AM	0	0	0	0	0	0	0	9	0	9	3	0	0	0	3	0	0	0	0	0	12
Total Volume	0	0	0	0	0	0	0	29	0	29	16	0	0	0	16	0	0	0	0	0	45
% App. Total	0	0	0	0	0	0	0	100	0	100	100	0	0	0	100	0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.806	.000	.806	.571	.000	.000	.000	.571	.000	.000	.000	.000	.000	.938



179-16

File Name : 154796 C
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

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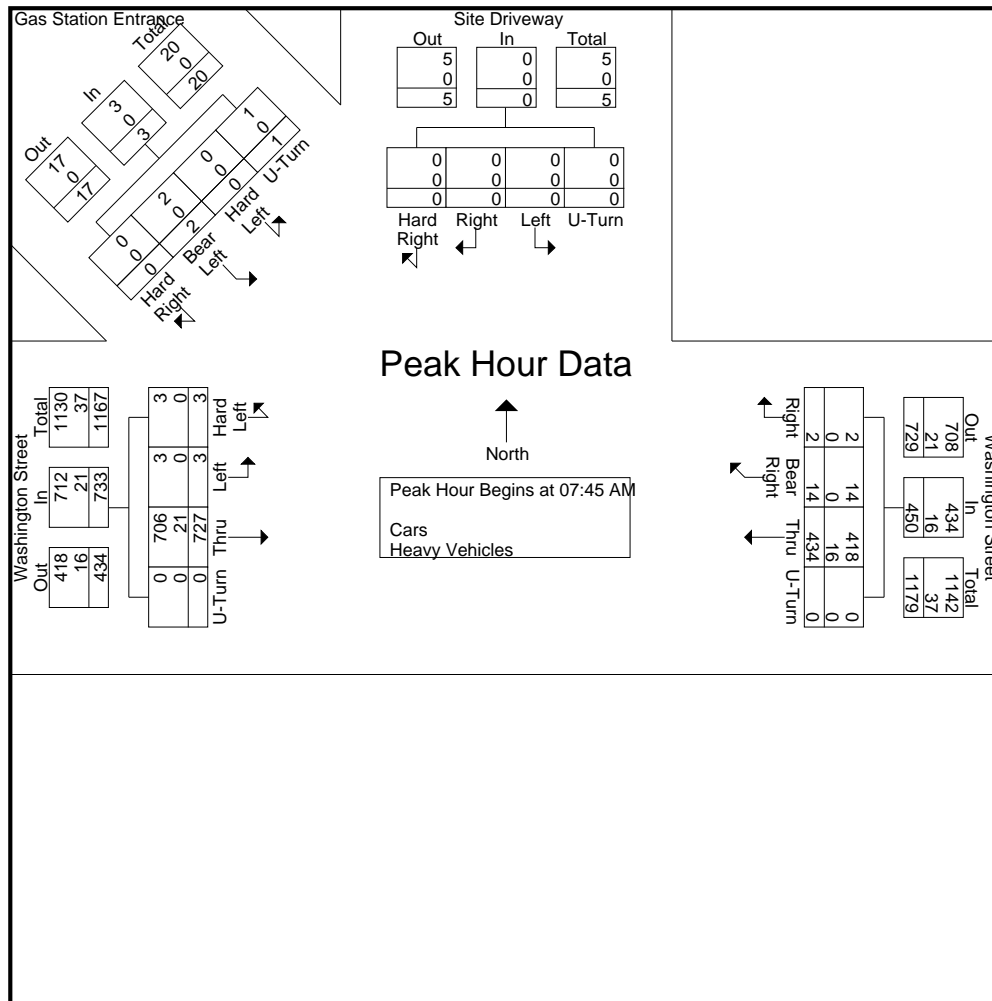
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179-16

N/NW: Site Driveway/Gas Station Entrance
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City, State: Newtonville, MA
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File Name : 154796 C
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	2	120	0	122	195	0	1	0	196	0	0	0	1	1	319
08:00 AM	0	0	0	0	0	1	7	91	0	99	148	2	2	0	152	0	1	0	0	1	252
08:15 AM	0	0	0	0	0	0	1	120	0	121	185	1	0	0	186	0	0	0	0	0	307
08:30 AM	0	0	0	0	0	1	4	103	0	108	199	0	0	0	199	0	1	0	0	1	308
Total Volume	0	0	0	0	0	2	14	434	0	450	727	3	3	0	733	0	2	0	1	3	1186
% App. Total	0	0	0	0	0	0.4	3.1	96.4	0		99.2	0.4	0.4	0		0	66.7	0	33.3		
PHF	.000	.000	.000	.000	.000	.500	.500	.904	.000	.922	.913	.375	.375	.000	.921	.000	.500	.000	.250	.750	.929
Cars	0	0	0	0	0	2	14	418	0	434	706	3	3	0	712	0	2	0	1	3	1149
% Cars	0	0	0	0	0	100	100	96.3	0	96.4	97.1	100	100	0	97.1	0	100	0	100	100	96.9
Heavy Vehicles	0	0	0	0	0	0	0	16	0	16	21	0	0	0	21	0	0	0	0	0	37
% Heavy Vehicles	0	0	0	0	0	0	0	3.7	0	3.6	2.9	0	0	0	2.9	0	0	0	0	0	3.1





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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 CC
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				
Start Time	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	Int. Total
04:00 PM	0	1	1	0	3	7	153	0	125	9	1	0	0	1	0	0	301
04:15 PM	1	0	1	0	7	3	146	0	114	2	1	1	1	1	0	0	278
04:30 PM	0	0	0	0	7	2	143	0	104	5	1	0	1	1	0	0	264
04:45 PM	0	0	0	0	5	8	164	0	121	9	1	0	0	0	2	0	310
Total	1	1	2	0	22	20	606	0	464	25	4	1	2	3	2	0	1153
05:00 PM	1	1	0	0	10	10	189	0	127	6	1	0	2	0	0	0	347
05:15 PM	0	0	0	0	18	7	145	0	154	9	0	0	0	0	0	0	333
05:30 PM	1	0	0	0	10	3	151	0	142	4	0	0	1	0	1	0	313
05:45 PM	1	0	0	0	4	3	165	0	167	4	1	0	0	0	0	0	345
Total	3	1	0	0	42	23	650	0	590	23	2	0	3	0	1	0	1338
Grand Total	4	2	2	0	64	43	1256	0	1054	48	6	1	5	3	3	0	2491
Apprch %	50	25	25	0	4.7	3.2	92.1	0	95	4.3	0.5	0.1	45.5	27.3	27.3	0	
Total %	0.2	0.1	0.1	0	2.6	1.7	50.4	0	42.3	1.9	0.2	0	0.2	0.1	0.1	0	
Cars	4	2	2	0	64	43	1233	0	1044	48	6	1	5	3	3	0	2458
% Cars	100	100	100	0	100	100	98.2	0	99.1	100	100	100	100	100	100	0	98.7
Heavy Vehicles	0	0	0	0	0	0	23	0	10	0	0	0	0	0	0	0	33
% Heavy Vehicles	0	0	0	0	0	0	1.8	0	0.9	0	0	0	0	0	0	0	1.3

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	1	0	0	2	10	10	189	0	209	127	6	1	0	134	2	0	0	0	2	347
05:15 PM	0	0	0	0	0	18	7	145	0	170	154	9	0	0	163	0	0	0	0	0	333
05:30 PM	1	0	0	0	1	10	3	151	0	164	142	4	0	0	146	1	0	1	0	2	313
05:45 PM	1	0	0	0	1	4	3	165	0	172	167	4	1	0	172	0	0	0	0	0	345
Total Volume	3	1	0	0	4	42	23	650	0	715	590	23	2	0	615	3	0	1	0	4	1338
% App. Total	75	25	0	0		5.9	3.2	90.9	0		95.9	3.7	0.3	0		75	0	25	0		
PHF	.750	.250	.000	.000	.500	.583	.575	.860	.000	.855	.883	.639	.500	.000	.894	.375	.000	.250	.000	.500	.964
Cars	3	1	0	0	4	42	23	639	0	704	584	23	2	0	609	3	0	1	0	4	1321
% Cars	100	100	0	0	100	100	100	98.3	0	98.5	99.0	100	100	0	99.0	100	0	100	0	100	98.7
Heavy Vehicles	0	0	0	0	0	0	0	11	0	11	6	0	0	0	6	0	0	0	0	0	17
% Heavy Vehicles	0	0	0	0	0	0	0	1.7	0	1.5	1.0	0	0	0	1.0	0	0	0	0	0	1.3



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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 CC
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				Int. Total
Start Time	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	
04:00 PM	0	1	1	0	3	7	151	0	124	9	1	0	0	1	0	0	298
04:15 PM	1	0	1	0	7	3	142	0	113	2	1	1	1	1	0	0	273
04:30 PM	0	0	0	0	7	2	142	0	104	5	1	0	1	1	0	0	263
04:45 PM	0	0	0	0	5	8	159	0	119	9	1	0	0	0	2	0	303
Total	1	1	2	0	22	20	594	0	460	25	4	1	2	3	2	0	1137
05:00 PM	1	1	0	0	10	10	185	0	127	6	1	0	2	0	0	0	343
05:15 PM	0	0	0	0	18	7	145	0	152	9	0	0	0	0	0	0	331
05:30 PM	1	0	0	0	10	3	147	0	139	4	0	0	1	0	1	0	306
05:45 PM	1	0	0	0	4	3	162	0	166	4	1	0	0	0	0	0	341
Total	3	1	0	0	42	23	639	0	584	23	2	0	3	0	1	0	1321
Grand Total	4	2	2	0	64	43	1233	0	1044	48	6	1	5	3	3	0	2458
Apprch %	50	25	25	0	4.8	3.2	92	0	95	4.4	0.5	0.1	45.5	27.3	27.3	0	
Total %	0.2	0.1	0.1	0	2.6	1.7	50.2	0	42.5	2	0.2	0	0.2	0.1	0.1	0	

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					Int. Total
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	1	0	0	2	10	10	185	0	205	127	6	1	0	134	2	0	0	0	2	343
05:15 PM	0	0	0	0	0	18	7	145	0	170	152	9	0	0	161	0	0	0	0	0	331
05:30 PM	1	0	0	0	1	10	3	147	0	160	139	4	0	0	143	1	0	1	0	2	306
05:45 PM	1	0	0	0	1	4	3	162	0	169	166	4	1	0	171	0	0	0	0	0	341
Total Volume	3	1	0	0	4	42	23	639	0	704	584	23	2	0	609	3	0	1	0	4	1321
% App. Total	75	25	0	0		6	3.3	90.8	0		95.9	3.8	0.3	0		75	0	25	0		
PHF	.750	.250	.000	.000	.500	.583	.575	.864	.000	.859	.880	.639	.500	.000	.890	.375	.000	.250	.000	.500	.963



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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 CC
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Site Driveway From North				Washington Street From East				Washington Street From West				Gas Station Entrance From Northwest				
Start Time	Hard Right	Right	Left	U-Turn	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	Int. Total
04:00 PM	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	5
04:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	0	12	0	4	0	0	0	0	0	0	0	16
05:00 PM	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	0	7
05:45 PM	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	11	0	6	0	0	0	0	0	0	0	17
Grand Total	0	0	0	0	0	0	23	0	10	0	0	0	0	0	0	0	33
Apprch %	0	0	0	0	0	0	100	0	100	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	69.7	0	30.3	0	0	0	0	0	0	0	

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	0	0	5	0	5	2	0	0	0	2	0	0	0	0	0	7
05:00 PM	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	4	0	4	3	0	0	0	3	0	0	0	0	0	7
Total Volume	0	0	0	0	0	0	0	13	0	13	7	0	0	0	7	0	0	0	0	0	20
% App. Total	0	0	0	0	0	0	0	100	0		100	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.650	.000	.650	.583	.000	.000	.000	.583	.000	.000	.000	.000	.000	.714



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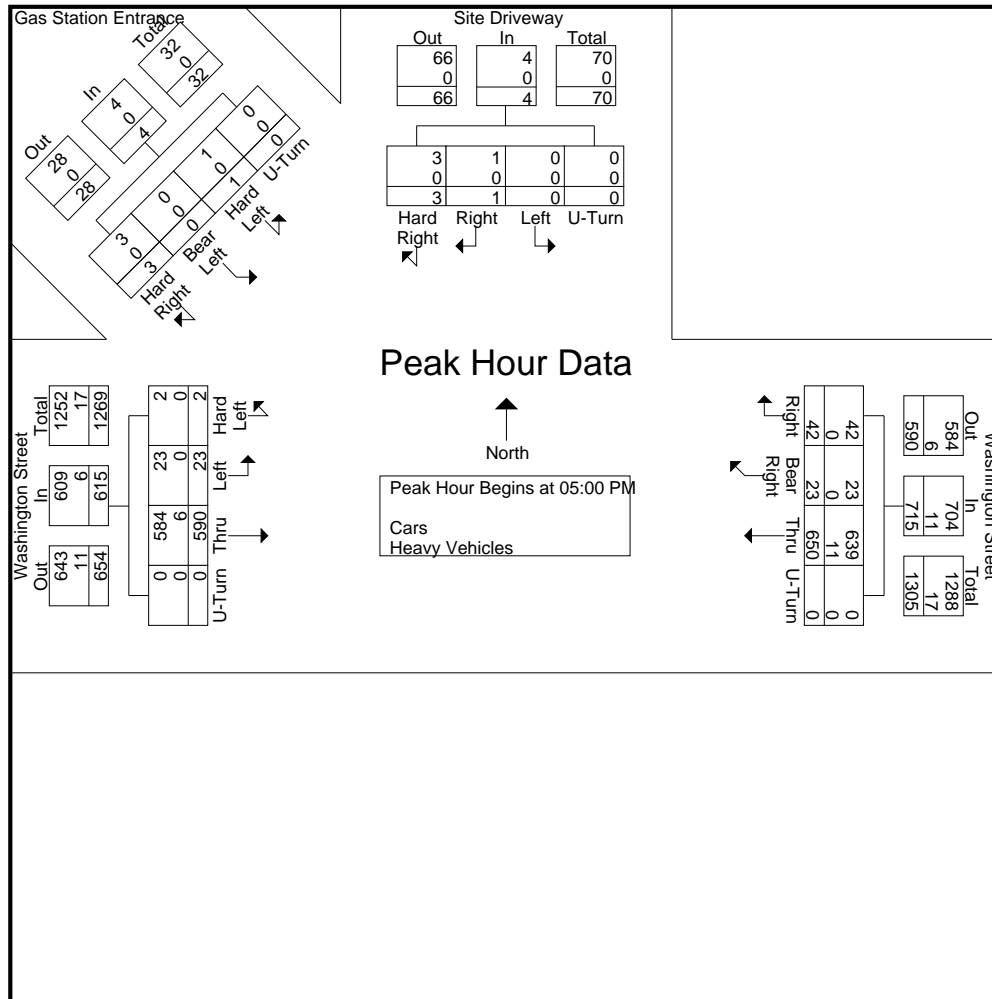
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179-16

N/NW: Site Driveway/Gas Station Entrance
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 CC
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Site Driveway From North					Washington Street From East					Washington Street From West					Gas Station Entrance From Northwest					
Start Time	Hard Right	Right	Left	U-Turn	App. Total	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	1	0	0	2	10	10	189	0	209	127	6	1	0	134	2	0	0	0	2	347
05:15 PM	0	0	0	0	0	18	7	145	0	170	154	9	0	0	163	0	0	0	0	0	333
05:30 PM	1	0	0	0	1	10	3	151	0	164	142	4	0	0	146	1	0	1	0	2	313
05:45 PM	1	0	0	0	1	4	3	165	0	172	167	4	1	0	172	0	0	0	0	0	345
Total Volume	3	1	0	0	4	42	23	650	0	715	590	23	2	0	615	3	0	1	0	4	1338
% App. Total	75	25	0	0		5.9	3.2	90.9	0		95.9	3.7	0.3	0		75	0	25	0		
PHF	.750	.250	.000	.000	.500	.583	.575	.860	.000	.855	.883	.639	.500	.000	.894	.375	.000	.250	.000	.500	.964
Cars	3	1	0	0	4	42	23	639	0	704	584	23	2	0	609	3	0	1	0	4	1321
% Cars	100	100	0	0	100	100	100	98.3	0	98.5	99.0	100	100	0	99.0	100	0	100	0	100	98.7
Heavy Vehicles	0	0	0	0	0	0	0	11	0	11	6	0	0	0	6	0	0	0	0	0	17
% Heavy Vehicles	0	0	0	0	0	0	0	1.7	0	1.5	1.0	0	0	0	1.0	0	0	0	0	0	1.3





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179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 D
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				Int. Total
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	
07:00 AM	1	2	0	0	0	0	0	0	0	1	59	0	96	1	0	0	160
07:15 AM	2	1	0	0	0	0	0	0	0	0	85	0	142	0	0	0	230
07:30 AM	1	1	0	0	0	2	1	0	0	0	94	0	161	1	1	0	262
07:45 AM	2	0	0	0	0	3	1	0	0	1	119	0	195	0	1	0	322
Total	6	4	0	0	0	5	2	0	0	2	357	0	594	2	2	0	974
08:00 AM	1	1	0	0	0	5	2	0	0	1	98	0	148	1	2	0	259
08:15 AM	3	2	0	0	0	3	0	0	0	0	122	0	188	0	1	0	319
08:30 AM	3	2	0	0	0	3	1	0	0	1	101	0	192	1	1	3	308
08:45 AM	0	2	0	0	0	1	1	0	0	0	90	0	149	0	0	0	243
Total	7	7	0	0	0	12	4	0	0	2	411	0	677	2	4	3	1129
Grand Total	13	11	0	0	0	17	6	0	0	4	768	0	1271	4	6	3	2103
Apprch %	54.2	45.8	0	0	0	73.9	26.1	0	0	0.5	99.5	0	99	0.3	0.5	0.2	
Total %	0.6	0.5	0	0	0	0.8	0.3	0	0	0.2	36.5	0	60.4	0.2	0.3	0.1	
Cars	12	7	0	0	0	17	6	0	0	4	729	0	1239	4	3	3	2024
% Cars	92.3	63.6	0	0	0	100	100	0	0	100	94.9	0	97.5	100	50	100	96.2
Heavy Vehicles	1	4	0	0	0	0	0	0	0	0	39	0	32	0	3	0	79
% Heavy Vehicles	7.7	36.4	0	0	0	0	0	0	0	0	5.1	0	2.5	0	50	0	3.8

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	0	0	0	2	0	3	1	0	4	0	1	119	0	120	195	0	1	0	196	322
08:00 AM	1	1	0	0	2	0	5	2	0	7	0	1	98	0	99	148	1	2	0	151	259
08:15 AM	3	2	0	0	5	0	3	0	0	3	0	0	122	0	122	188	0	1	0	189	319
08:30 AM	3	2	0	0	5	0	3	1	0	4	0	1	101	0	102	192	1	1	3	197	308
Total Volume	9	5	0	0	14	0	14	4	0	18	0	3	440	0	443	723	2	5	3	733	1208
% App. Total	64.3	35.7	0	0		0	77.8	22.2	0		0	0.7	99.3	0		98.6	0.3	0.7	0.4		
PHF	.750	.625	.000	.000	.700	.000	.700	.500	.000	.643	.000	.750	.902	.000	.908	.927	.500	.625	.250	.930	.938
Cars	8	3	0	0	11	0	14	4	0	18	0	3	425	0	428	708	2	3	3	716	1173
% Cars	88.9	60.0	0	0	78.6	0	100	100	0	100	0	100	96.6	0	96.6	97.9	100	60.0	100	97.7	97.1
Heavy Vehicles	1	2	0	0	3	0	0	0	0	0	0	0	15	0	15	15	0	2	0	17	35
% Heavy Vehicles	11.1	40.0	0	0	21.4	0	0	0	0	0	0	0	3.4	0	3.4	2.1	0	40.0	0	2.3	2.9

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM



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179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 D
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	Int. Total
07:00 AM	1	1	0	0	0	0	0	0	0	1	56	0	91	1	0	0	151
07:15 AM	2	1	0	0	0	0	0	0	0	0	77	0	138	0	0	0	218
07:30 AM	1	1	0	0	0	2	1	0	0	0	86	0	157	1	0	0	249
07:45 AM	2	0	0	0	0	3	1	0	0	1	116	0	190	0	0	0	313
Total	6	3	0	0	0	5	2	0	0	2	335	0	576	2	0	0	931
08:00 AM	1	1	0	0	0	5	2	0	0	1	89	0	146	1	1	0	247
08:15 AM	2	1	0	0	0	3	0	0	0	0	120	0	182	0	1	0	309
08:30 AM	3	1	0	0	0	3	1	0	0	1	100	0	190	1	1	3	304
08:45 AM	0	1	0	0	0	1	1	0	0	0	85	0	145	0	0	0	233
Total	6	4	0	0	0	12	4	0	0	2	394	0	663	2	3	3	1093
Grand Total	12	7	0	0	0	17	6	0	0	4	729	0	1239	4	3	3	2024
Apprch %	63.2	36.8	0	0	0	73.9	26.1	0	0	0.5	99.5	0	99.2	0.3	0.2	0.2	
Total %	0.6	0.3	0	0	0	0.8	0.3	0	0	0.2	36	0	61.2	0.2	0.1	0.1	

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	0	0	0	2	0	3	1	0	4	0	1	116	0	117	190	0	0	0	190	313
08:00 AM	1	1	0	0	2	0	5	2	0	7	0	1	89	0	90	146	1	1	0	148	247
08:15 AM	2	1	0	0	3	0	3	0	0	3	0	0	120	0	120	182	0	1	0	183	309
08:30 AM	3	1	0	0	4	0	3	1	0	4	0	1	100	0	101	190	1	1	3	195	304
Total Volume	8	3	0	0	11	0	14	4	0	18	0	3	425	0	428	708	2	3	3	716	1173
% App. Total	72.7	27.3	0	0		0	77.8	22.2	0		0	0.7	99.3	0		98.9	0.3	0.4	0.4		
PHF	.667	.750	.000	.000	.688	.000	.700	.500	.000	.643	.000	.750	.885	.000	.892	.932	.500	.750	.250	.918	.937



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179-16

N/NE: Washington Terrace/ Gas Station Dr
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 D
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	0	0	3	0	5	0	0	0	9
07:15 AM	0	0	0	0	0	0	0	0	0	0	8	0	4	0	0	0	12
07:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	4	0	1	0	13
07:45 AM	0	0	0	0	0	0	0	0	0	0	3	0	5	0	1	0	9
Total	0	1	0	0	0	0	0	0	0	0	22	0	18	0	2	0	43
08:00 AM	0	0	0	0	0	0	0	0	0	0	9	0	2	0	1	0	12
08:15 AM	1	1	0	0	0	0	0	0	0	0	2	0	6	0	0	0	10
08:30 AM	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	4
08:45 AM	0	1	0	0	0	0	0	0	0	0	5	0	4	0	0	0	10
Total	1	3	0	0	0	0	0	0	0	0	17	0	14	0	1	0	36
Grand Total	1	4	0	0	0	0	0	0	0	0	39	0	32	0	3	0	79
Apprch %	20	80	0	0	0	0	0	0	0	0	100	0	91.4	0	8.6	0	
Total %	1.3	5.1	0	0	0	0	0	0	0	0	49.4	0	40.5	0	3.8	0	

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	4	0	0	0	4	12
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	4	0	1	0	5	13
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	5	0	1	0	6	9
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9	2	0	1	0	3	12
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28	15	0	3	0	18	46
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	100	0		83.3	0	16.7	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.778	.000	.778	.750	.000	.750	.000	.750	.885



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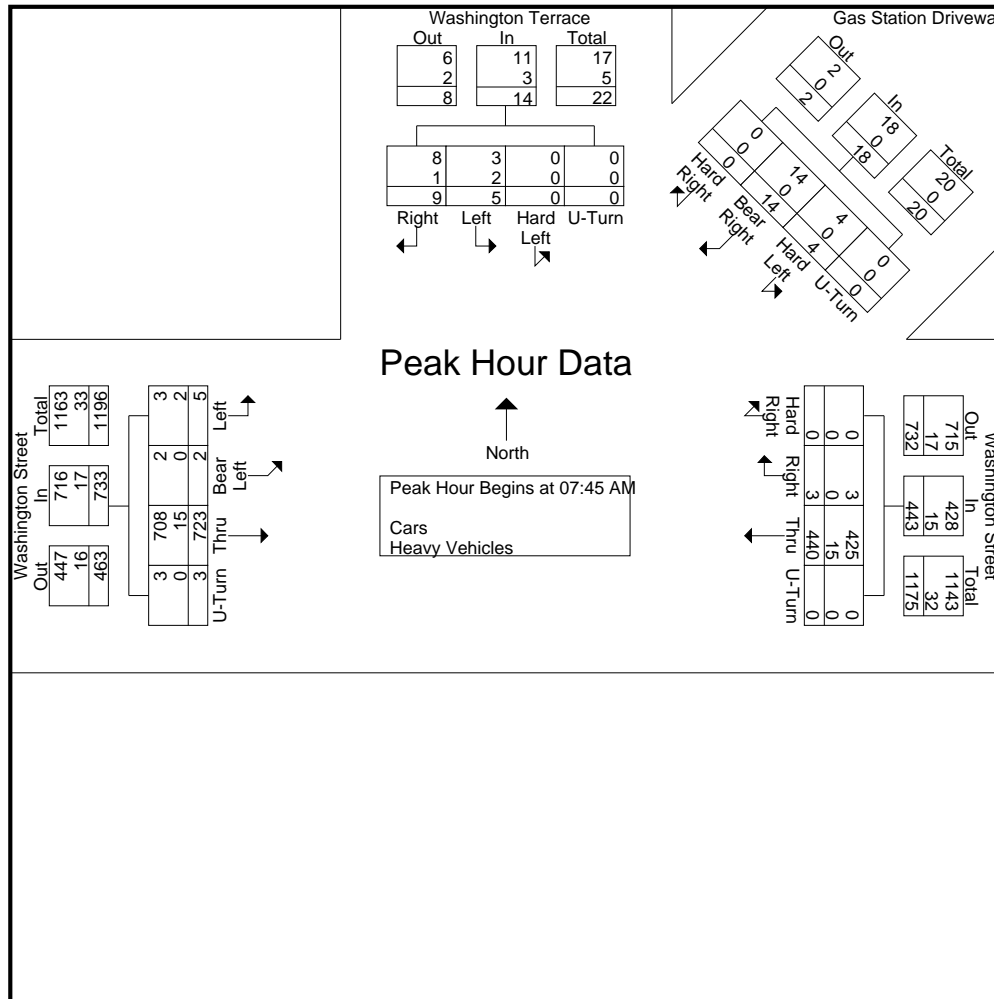
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 D
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	0	0	0	2	0	3	1	0	4	0	1	119	0	120	195	0	1	0	196	322
08:00 AM	1	1	0	0	2	0	5	2	0	7	0	1	98	0	99	148	1	2	0	151	259
08:15 AM	3	2	0	0	5	0	3	0	0	3	0	0	122	0	122	188	0	1	0	189	319
08:30 AM	3	2	0	0	5	0	3	1	0	4	0	1	101	0	102	192	1	1	3	197	308
Total Volume	9	5	0	0	14	0	14	4	0	18	0	3	440	0	443	723	2	5	3	733	1208
% App. Total	64.3	35.7	0	0		0	77.8	22.2	0		0	0.7	99.3	0		98.6	0.3	0.7	0.4		
PHF	.750	.625	.000	.000	.700	.000	.700	.500	.000	.643	.000	.750	.902	.000	.908	.927	.500	.625	.250	.930	.938
Cars	8	3	0	0	11	0	14	4	0	18	0	3	425	0	428	708	2	3	3	716	1173
% Cars	88.9	60.0	0	0	78.6	0	100	100	0	100	0	100	96.6	0	96.6	97.9	100	60.0	100	97.7	97.1
Heavy Vehicles	1	2	0	0	3	0	0	0	0	0	0	0	15	0	15	15	0	2	0	17	35
% Heavy Vehicles	11.1	40.0	0	0	21.4	0	0	0	0	0	0	0	3.4	0	3.4	2.1	0	40.0	0	2.3	2.9





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N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 DD
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	Int. Total
04:00 PM	1	2	0	0	0	5	1	0	0	0	156	0	121	1	0	0	287
04:15 PM	0	1	0	0	0	4	2	0	1	0	148	0	114	1	1	0	272
04:30 PM	1	1	0	0	0	3	0	0	0	0	145	0	113	1	2	1	267
04:45 PM	1	1	0	0	0	4	3	0	0	2	160	0	126	0	4	0	301
Total	3	5	0	0	0	16	6	0	1	2	609	0	474	3	7	1	1127
05:00 PM	3	0	0	0	0	4	2	0	0	0	186	0	128	0	0	0	323
05:15 PM	1	0	0	0	0	8	2	0	0	0	153	0	162	1	0	1	328
05:30 PM	1	0	0	0	0	4	3	0	0	3	144	0	138	0	2	0	295
05:45 PM	0	0	0	0	0	2	1	0	0	1	158	0	181	0	3	1	347
Total	5	0	0	0	0	18	8	0	0	4	641	0	609	1	5	2	1293
Grand Total	8	5	0	0	0	34	14	0	1	6	1250	0	1083	4	12	3	2420
Apprch %	61.5	38.5	0	0	0	70.8	29.2	0	0.1	0.5	99.4	0	98.3	0.4	1.1	0.3	
Total %	0.3	0.2	0	0	0	1.4	0.6	0	0	0.2	51.7	0	44.8	0.2	0.5	0.1	
Cars	8	2	0	0	0	34	14	0	1	4	1230	0	1073	4	10	3	2383
% Cars	100	40	0	0	0	100	100	0	100	66.7	98.4	0	99.1	100	83.3	100	98.5
Heavy Vehicles	0	3	0	0	0	0	0	0	0	2	20	0	10	0	2	0	37
% Heavy Vehicles	0	60	0	0	0	0	0	0	0	33.3	1.6	0	0.9	0	16.7	0	1.5

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
05:00 PM	3	0	0	0	3	0	4	2	0	6	0	0	186	0	186	128	0	0	0	128	323
05:15 PM	1	0	0	0	1	0	8	2	0	10	0	0	153	0	153	162	1	0	1	164	328
05:30 PM	1	0	0	0	1	0	4	3	0	7	0	3	144	0	147	138	0	2	0	140	295
05:45 PM	0	0	0	0	0	0	2	1	0	3	0	1	158	0	159	181	0	3	1	185	347
Total Volume	5	0	0	0	5	0	18	8	0	26	0	4	641	0	645	609	1	5	2	617	1293
% App. Total	100	0	0	0		0	69.2	30.8	0		0	0.6	99.4	0		98.7	0.2	0.8	0.3		
PHF	.417	.000	.000	.000	.417	.000	.563	.667	.000	.650	.000	.333	.862	.000	.867	.841	.250	.417	.500	.834	.932
Cars	5	0	0	0	5	0	18	8	0	26	0	2	631	0	633	603	1	4	2	610	1274
% Cars	100	0	0	0	100	0	100	100	0	100	0	50.0	98.4	0	98.1	99.0	100	80.0	100	98.9	98.5
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	2	10	0	12	6	0	1	0	7	19
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	50.0	1.6	0	1.9	1.0	0	20.0	0	1.1	1.5

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



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179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 DD
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	Int. Total
04:00 PM	1	1	0	0	0	5	1	0	0	0	154	0	119	1	0	0	282
04:15 PM	0	0	0	0	0	4	2	0	1	0	145	0	113	1	1	0	267
04:30 PM	1	1	0	0	0	3	0	0	0	0	144	0	113	1	2	1	266
04:45 PM	1	0	0	0	0	4	3	0	0	2	156	0	125	0	3	0	294
Total	3	2	0	0	0	16	6	0	1	2	599	0	470	3	6	1	1109
05:00 PM	3	0	0	0	0	4	2	0	0	0	182	0	128	0	0	0	319
05:15 PM	1	0	0	0	0	8	2	0	0	0	153	0	160	1	0	1	326
05:30 PM	1	0	0	0	0	4	3	0	0	1	141	0	135	0	2	0	287
05:45 PM	0	0	0	0	0	2	1	0	0	1	155	0	180	0	2	1	342
Total	5	0	0	0	0	18	8	0	0	2	631	0	603	1	4	2	1274
Grand Total	8	2	0	0	0	34	14	0	1	4	1230	0	1073	4	10	3	2383
Apprch %	80	20	0	0	0	70.8	29.2	0	0.1	0.3	99.6	0	98.4	0.4	0.9	0.3	
Total %	0.3	0.1	0	0	0	1.4	0.6	0	0	0.2	51.6	0	45	0.2	0.4	0.1	

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	3	0	0	0	3	0	4	2	0	6	0	0	182	0	182	128	0	0	0	128	319
05:15 PM	1	0	0	0	1	0	8	2	0	10	0	0	153	0	153	160	1	0	1	162	326
05:30 PM	1	0	0	0	1	0	4	3	0	7	0	1	141	0	142	135	0	2	0	137	287
05:45 PM	0	0	0	0	0	0	2	1	0	3	0	1	155	0	156	180	0	2	1	183	342
Total Volume	5	0	0	0	5	0	18	8	0	26	0	2	631	0	633	603	1	4	2	610	1274
% App. Total	100	0	0	0		0	69.2	30.8	0		0	0.3	99.7	0		98.9	0.2	0.7	0.3		
PHF	.417	.000	.000	.000	.417	.000	.563	.667	.000	.650	.000	.500	.867	.000	.870	.838	.250	.500	.500	.833	.931



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179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 DD
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Washington Terrace From North				Gas Station Driveway From Northeast				Washington Street From East				Washington Street From West				
Start Time	Right	Left	Hard Left	U-Turn	Hard Right	Bear Right	Hard Left	U-Turn	Hard Right	Right	Thru	U-Turn	Thru	Bear Left	Left	U-Turn	Int. Total
04:00 PM	0	1	0	0	0	0	0	0	0	0	2	0	2	0	0	0	5
04:15 PM	0	1	0	0	0	0	0	0	0	0	3	0	1	0	0	0	5
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
04:45 PM	0	1	0	0	0	0	0	0	0	0	4	0	1	0	1	0	7
Total	0	3	0	0	0	0	0	0	0	0	10	0	4	0	1	0	18
05:00 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	2	3	0	3	0	0	0	8
05:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	1	0	1	0	5
Total	0	0	0	0	0	0	0	0	0	2	10	0	6	0	1	0	19
Grand Total	0	3	0	0	0	0	0	0	0	2	20	0	10	0	2	0	37
Apprch %	0	100	0	0	0	0	0	0	0	9.1	90.9	0	83.3	0	16.7	0	
Total %	0	8.1	0	0	0	0	0	0	0	5.4	54.1	0	27	0	5.4	0	

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	4	0	4	1	0	1	0	2	7
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	3	0	5	3	0	0	0	3	8
Total Volume	0	1	0	0	1	0	0	0	0	0	0	2	11	0	13	6	0	1	0	7	21
% App. Total	0	100	0	0		0	0	0	0		0	15.4	84.6	0		85.7	0	14.3	0		
PHF	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.250	.688	.000	.650	.500	.000	.250	.000	.583	.656



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179-16

N/NE: Washington Terrace/ Gas Station Dr
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 DD
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	Peds EB	Peds WB	Hard Right	Bear Right	Hard Left	Peds SB	Peds NB	Hard Right	Right	Thru	Peds SB	Peds NB	Thru	Bear Left	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	0	0	1	5	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	13
04:15 PM	0	0	0	2	6	0	0	0	2	6	0	0	0	0	0	2	0	0	0	0	18
04:30 PM	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	3	6	0	0	0	3	7	0	0	0	0	0	0	0	0	0	0	19
Total	0	0	0	6	19	0	0	0	6	20	0	0	0	0	0	2	0	0	0	0	53
05:00 PM	0	0	0	6	8	0	0	0	7	8	0	0	0	0	0	0	0	0	0	0	29
05:15 PM	0	0	0	2	1	0	0	0	3	1	0	0	0	0	0	1	0	0	0	0	8
05:30 PM	0	0	0	1	7	0	0	0	2	7	0	0	0	0	0	0	0	0	0	0	17
05:45 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	9	18	0	0	0	12	18	0	0	0	0	0	1	0	0	0	0	58
Grand Total	0	0	0	15	37	0	0	0	18	38	0	0	0	0	0	3	0	0	0	0	111
Apprch %	0	0	0	28.8	71.2	0	0	0	32.1	67.9	0	0	0	0	0	100	0	0	0	0	
Total %	0	0	0	13.5	33.3	0	0	0	16.2	34.2	0	0	0	0	0	2.7	0	0	0	0	

	Washington Terrace From North						Gas Station Driveway From Northeast						Washington Street From East						Washington Street From West						
Start Time	Right	Left	Hard Left	Peds EB	Peds WB	App. Total	Hard Right	Bear Right	Hard Left	Peds SB	Peds NB	App. Total	Hard Right	Right	Thru	Peds SB	Peds NB	App. Total	Thru	Bear Left	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	0	0	3	6	9	0	0	0	3	7	10	0	0	0	0	0	0	0	0	0	0	0	0	19
05:00 PM	0	0	0	6	8	14	0	0	0	7	8	15	0	0	0	0	0	0	0	0	0	0	0	0	29
05:15 PM	0	0	0	2	1	3	0	0	0	3	1	4	0	0	0	0	0	0	1	0	0	0	0	1	8
05:30 PM	0	0	0	1	7	8	0	0	0	2	7	9	0	0	0	0	0	0	0	0	0	0	0	0	17
Total Volume	0	0	0	12	22	34	0	0	0	15	23	38	0	0	0	0	0	0	1	0	0	0	0	1	73
% App. Total	0	0	0	35.3	64.7		0	0	0	39.5	60.5		0	0	0	0	0		100	0	0	0	0		
PHF	.000	.000	.000	.500	.688	.607	.000	.000	.000	.536	.719	.633	.000	.000	.000	.000	.000	.000	.250	.000	.000	.000	.000	.250	.629



PRECISION
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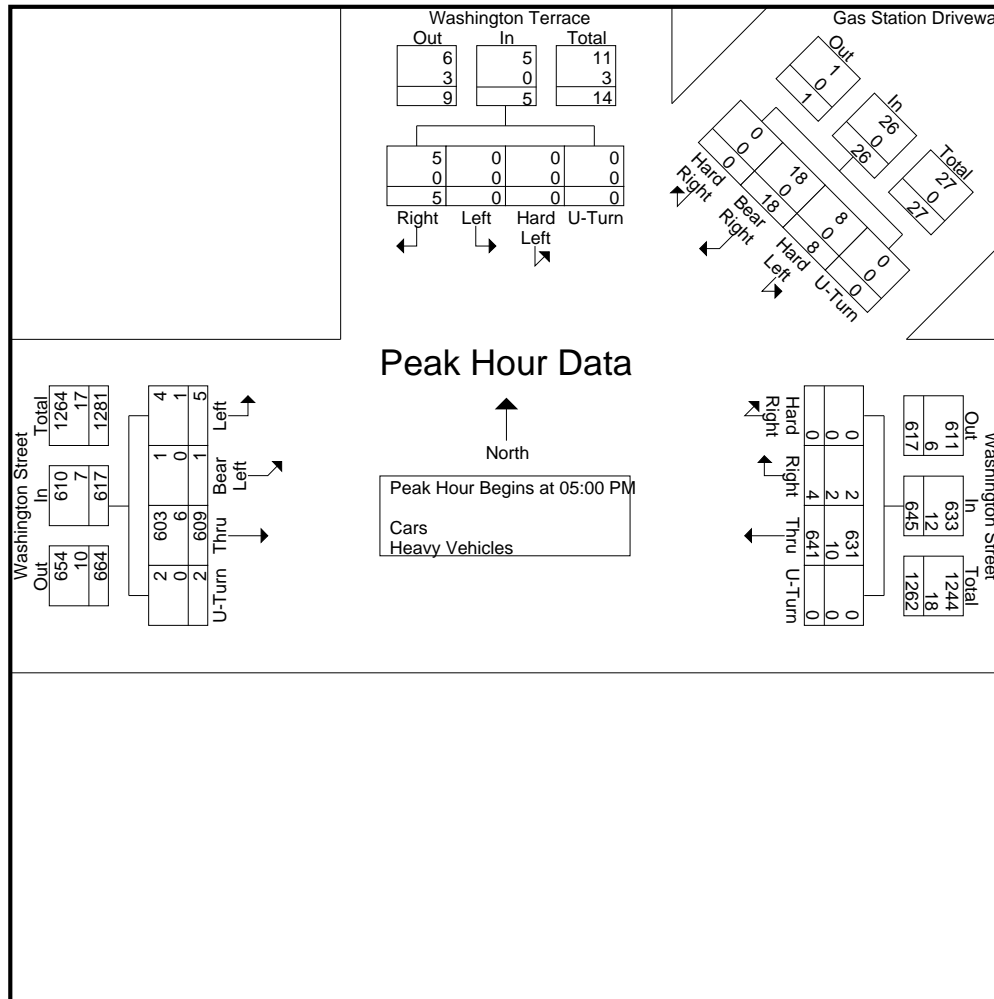
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File Name : 154796 DD
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Washington Terrace From North					Gas Station Driveway From Northeast					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Hard Left	U-Turn	App. Total	Hard Right	Right	Thru	U-Turn	App. Total	Thru	Bear Left	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	3	0	0	0	3	0	4	2	0	6	0	0	186	0	186	128	0	0	0	128	323
05:15 PM	1	0	0	0	1	0	8	2	0	10	0	0	153	0	153	162	1	0	1	164	328
05:30 PM	1	0	0	0	1	0	4	3	0	7	0	3	144	0	147	138	0	2	0	140	295
05:45 PM	0	0	0	0	0	0	2	1	0	3	0	1	158	0	159	181	0	3	1	185	347
Total Volume	5	0	0	0	5	0	18	8	0	26	0	4	641	0	645	609	1	5	2	617	1293
% App. Total	100	0	0	0		0	69.2	30.8	0		0	0.6	99.4	0		98.7	0.2	0.8	0.3		
PHF	.417	.000	.000	.000	.417	.000	.563	.667	.000	.650	.000	.333	.862	.000	.867	.841	.250	.417	.500	.834	.932
Cars	5	0	0	0	5	0	18	8	0	26	0	2	631	0	633	603	1	4	2	610	1274
% Cars	100	0	0	0	100	0	100	100	0	100	0	50.0	98.4	0	98.1	99.0	100	80.0	100	98.9	98.5
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	2	10	0	12	6	0	1	0	7	19
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	50.0	1.6	0	1.9	1.0	0	20.0	0	1.1	1.5





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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 E
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	8	39	1	0	0	50	12	0	24	35	13	0	44	74	9	0	309
07:15 AM	11	72	2	0	1	67	19	0	30	27	21	0	73	114	2	0	439
07:30 AM	5	74	2	0	0	73	17	0	39	58	44	0	88	117	1	0	518
07:45 AM	8	70	4	0	2	102	17	0	46	73	47	0	35	148	7	0	559
Total	32	255	9	0	3	292	65	0	139	193	125	0	240	453	19	0	1825
08:00 AM	9	55	2	0	2	81	9	0	33	43	29	0	26	114	2	0	405
08:15 AM	7	52	2	0	4	106	13	0	39	55	20	0	33	136	10	0	477
08:30 AM	11	63	1	0	2	79	16	0	32	35	23	0	40	152	7	0	461
08:45 AM	8	67	3	0	2	80	16	0	30	53	30	0	32	108	9	0	438
Total	35	237	8	0	10	346	54	0	134	186	102	0	131	510	28	0	1781
Grand Total	67	492	17	0	13	638	119	0	273	379	227	0	371	963	47	0	3606
Apprch %	11.6	85.4	3	0	1.7	82.9	15.5	0	31.1	43.1	25.8	0	26.9	69.7	3.4	0	
Total %	1.9	13.6	0.5	0	0.4	17.7	3.3	0	7.6	10.5	6.3	0	10.3	26.7	1.3	0	
Cars	62	471	16	0	13	607	111	0	271	372	220	0	356	930	46	0	3475
% Cars	92.5	95.7	94.1	0	100	95.1	93.3	0	99.3	98.2	96.9	0	96	96.6	97.9	0	96.4
Heavy Vehicles	5	21	1	0	0	31	8	0	2	7	7	0	15	33	1	0	131
% Heavy Vehicles	7.5	4.3	5.9	0	0	4.9	6.7	0	0.7	1.8	3.1	0	4	3.4	2.1	0	3.6

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	5	74	2	0	81	0	73	17	0	90	39	58	44	0	141	88	117	1	0	206	518
07:45 AM	8	70	4	0	82	2	102	17	0	121	46	73	47	0	166	35	148	7	0	190	559
08:00 AM	9	55	2	0	66	2	81	9	0	92	33	43	29	0	105	26	114	2	0	142	405
08:15 AM	7	52	2	0	61	4	106	13	0	123	39	55	20	0	114	33	136	10	0	179	477
Total Volume	29	251	10	0	290	8	362	56	0	426	157	229	140	0	526	182	515	20	0	717	1959
% App. Total	10	86.6	3.4	0		1.9	85	13.1	0		29.8	43.5	26.6	0		25.4	71.8	2.8	0		
PHF	.806	.848	.625	.000	.884	.500	.854	.824	.000	.866	.853	.784	.745	.000	.792	.517	.870	.500	.000	.870	.876
Cars	27	235	9	0	271	8	345	51	0	404	156	227	136	0	519	176	496	20	0	692	1886
% Cars	93.1	93.6	90.0	0	93.4	100	95.3	91.1	0	94.8	99.4	99.1	97.1	0	98.7	96.7	96.3	100	0	96.5	96.3
Heavy Vehicles	2	16	1	0	19	0	17	5	0	22	1	2	4	0	7	6	19	0	0	25	73
% Heavy Vehicles	6.9	6.4	10.0	0	6.6	0	4.7	8.9	0	5.2	0.6	0.9	2.9	0	1.3	3.3	3.7	0	0	3.5	3.7



PRECISION
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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 E
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	7	37	1	0	0	47	12	0	23	34	11	0	40	69	9	0	290
07:15 AM	10	70	2	0	1	62	17	0	30	27	21	0	70	110	2	0	422
07:30 AM	4	74	2	0	0	67	15	0	38	57	44	0	86	114	1	0	502
07:45 AM	7	64	4	0	2	100	15	0	46	73	47	0	32	140	7	0	537
Total	28	245	9	0	3	276	59	0	137	191	123	0	228	433	19	0	1751
08:00 AM	9	52	1	0	2	75	8	0	33	43	28	0	26	112	2	0	391
08:15 AM	7	45	2	0	4	103	13	0	39	54	17	0	32	130	10	0	456
08:30 AM	11	62	1	0	2	77	15	0	32	33	23	0	40	150	6	0	452
08:45 AM	7	67	3	0	2	76	16	0	30	51	29	0	30	105	9	0	425
Total	34	226	7	0	10	331	52	0	134	181	97	0	128	497	27	0	1724
Grand Total	62	471	16	0	13	607	111	0	271	372	220	0	356	930	46	0	3475
Apprch %	11.3	85.8	2.9	0	1.8	83	15.2	0	31.4	43.1	25.5	0	26.7	69.8	3.5	0	
Total %	1.8	13.6	0.5	0	0.4	17.5	3.2	0	7.8	10.7	6.3	0	10.2	26.8	1.3	0	

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	4	74	2	0	80	0	67	15	0	82	38	57	44	0	139	86	114	1	0	201	502
07:45 AM	7	64	4	0	75	2	100	15	0	117	46	73	47	0	166	32	140	7	0	179	537
08:00 AM	9	52	1	0	62	2	75	8	0	85	33	43	28	0	104	26	112	2	0	140	391
08:15 AM	7	45	2	0	54	4	103	13	0	120	39	54	17	0	110	32	130	10	0	172	456
Total Volume	27	235	9	0	271	8	345	51	0	404	156	227	136	0	519	176	496	20	0	692	1886
% App. Total	10	86.7	3.3	0		2	85.4	12.6	0		30.1	43.7	26.2	0		25.4	71.7	2.9	0		
PHF	.750	.794	.563	.000	.847	.500	.837	.850	.000	.842	.848	.777	.723	.000	.782	.512	.886	.500	.000	.861	.878



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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 E
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	1	2	0	0	0	3	0	0	1	1	2	0	4	5	0	0	19
07:15 AM	1	2	0	0	0	5	2	0	0	0	0	0	3	4	0	0	17
07:30 AM	1	0	0	0	0	6	2	0	1	1	0	0	2	3	0	0	16
07:45 AM	1	6	0	0	0	2	2	0	0	0	0	0	3	8	0	0	22
Total	4	10	0	0	0	16	6	0	2	2	2	0	12	20	0	0	74
08:00 AM	0	3	1	0	0	6	1	0	0	0	1	0	0	2	0	0	14
08:15 AM	0	7	0	0	0	3	0	0	0	1	3	0	1	6	0	0	21
08:30 AM	0	1	0	0	0	2	1	0	0	2	0	0	0	2	1	0	9
08:45 AM	1	0	0	0	0	4	0	0	0	2	1	0	2	3	0	0	13
Total	1	11	1	0	0	15	2	0	0	5	5	0	3	13	1	0	57
Grand Total	5	21	1	0	0	31	8	0	2	7	7	0	15	33	1	0	131
Apprch %	18.5	77.8	3.7	0	0	79.5	20.5	0	12.5	43.8	43.8	0	30.6	67.3	2	0	
Total %	3.8	16	0.8	0	0	23.7	6.1	0	1.5	5.3	5.3	0	11.5	25.2	0.8	0	

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	2	0	0	3	0	3	0	0	3	1	1	2	0	4	4	5	0	0	9	19
07:15 AM	1	2	0	0	3	0	5	2	0	7	0	0	0	0	0	3	4	0	0	7	17
07:30 AM	1	0	0	0	1	0	6	2	0	8	1	1	0	0	2	2	3	0	0	5	16
07:45 AM	1	6	0	0	7	0	2	2	0	4	0	0	0	0	0	3	8	0	0	11	22
Total Volume	4	10	0	0	14	0	16	6	0	22	2	2	2	0	6	12	20	0	0	32	74
% App. Total	28.6	71.4	0	0		0	72.7	27.3	0		33.3	33.3	33.3	0		37.5	62.5	0	0		
PHF	1.00	.417	.000	.000	.500	.000	.667	.750	.000	.688	.500	.500	.250	.000	.375	.750	.625	.000	.000	.727	.841



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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 E
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

	Lowell Avenue From North						Washington Street From East						Lowell Avenue From South						Washington Street From West						
Start Time	Right	Thru	Left	Peds EB	Peds WB		Right	Thru	Left	Peds SB	Peds NB		Right	Thru	Left	Peds WB	Peds EB		Right	Thru	Left	Peds NB	Peds SB		Int. Total
07:00 AM	0	0	0	4	1		0	0	0	5	0		0	0	0	0	0		0	0	0	0	0		10
07:15 AM	0	2	0	7	0		0	0	0	2	0		0	0	0	0	1		1	0	0	0	4		17
07:30 AM	0	2	0	12	1		0	0	0	12	0		0	0	0	0	0		0	0	0	7	4		38
07:45 AM	1	0	0	5	0		0	0	0	6	0		0	2	0	0	2		0	0	0	2	0		18
Total	1	4	0	28	2		0	0	0	25	0		0	2	0	0	3		1	0	0	9	8		83
08:00 AM	0	0	0	0	1		0	0	0	3	0		0	0	0	0	0		0	0	0	1	0		5
08:15 AM	0	0	0	2	2		0	0	0	2	4		0	0	0	0	1		0	0	0	0	0		11
08:30 AM	0	0	0	9	4		0	0	0	6	1		0	1	0	0	0		0	0	0	0	1		22
08:45 AM	0	0	0	6	1		0	0	0	4	1		0	2	0	0	0		1	1	0	1	0		17
Total	0	0	0	17	8		0	0	0	15	6		0	3	0	0	1		1	1	0	2	1		55
Grand Total	1	4	0	45	10		0	0	0	40	6		0	5	0	0	4		2	1	0	11	9		138
Apprch %	1.7	6.7	0	75	16.7		0	0	0	87	13		0	55.6	0	0	44.4		8.7	4.3	0	47.8	39.1		
Total %	0.7	2.9	0	32.6	7.2		0	0	0	29	4.3		0	3.6	0	0	2.9		1.4	0.7	0	8	6.5		

	Lowell Avenue From North						Washington Street From East						Lowell Avenue From South						Washington Street From West							
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:00 AM																										
07:00 AM	0	0	0	4	1	5	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	10
07:15 AM	0	2	0	7	0	9	0	0	0	2	0	2	0	0	0	0	1	1	1	0	0	0	0	4	5	17
07:30 AM	0	2	0	12	1	15	0	0	0	12	0	12	0	0	0	0	0	0	0	0	0	7	4	11	38	
07:45 AM	1	0	0	5	0	6	0	0	0	6	0	6	0	2	0	0	2	4	0	0	0	2	0	2	18	
Total Volume	1	4	0	28	2	35	0	0	0	25	0	25	0	2	0	0	3	5	1	0	0	9	8	18	83	
% App. Total	2.9	11.4	0	80	5.7		0	0	0	100	0		0	40	0	0	60		5.6	0	0	50	44.4			
PHF	.250	.500	.000	.583	.500	.583	.000	.000	.000	.521	.000	.521	.000	.250	.000	.000	.375	.313	.250	.000	.000	.321	.500	.409	.546	



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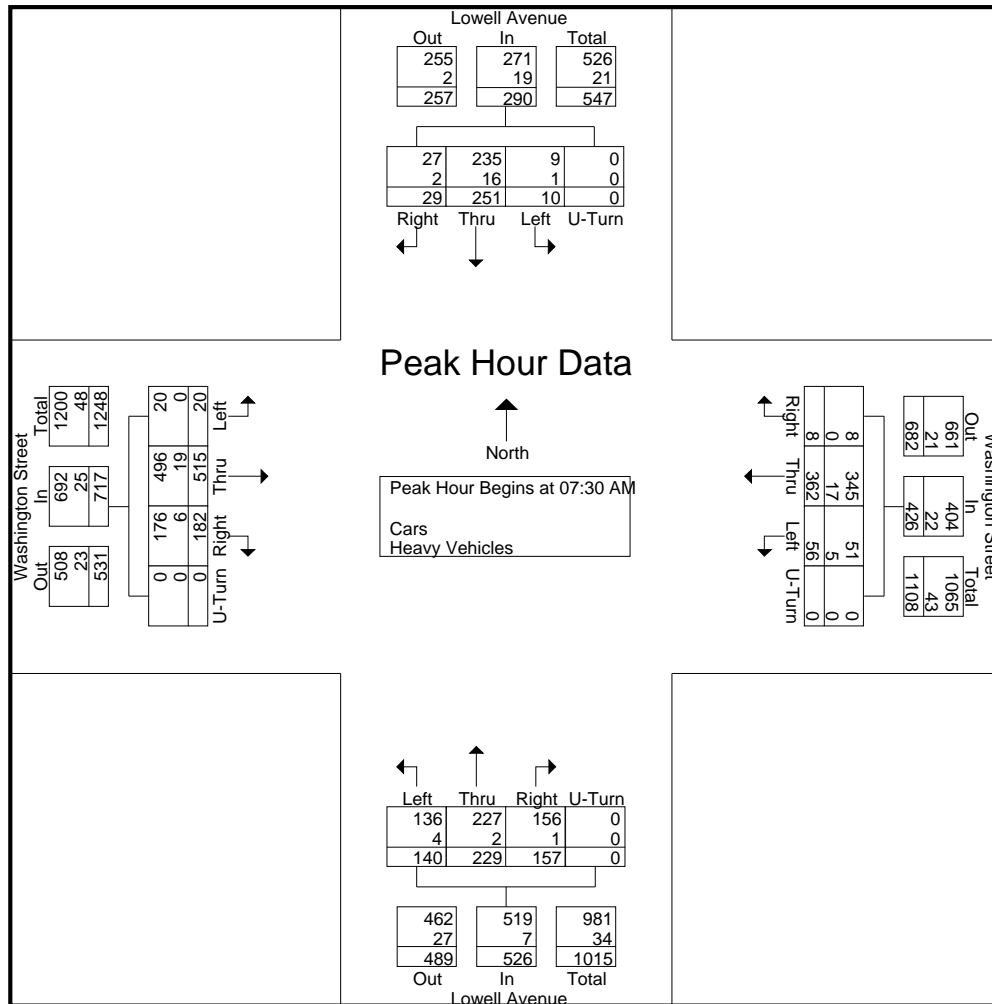
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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 E
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	5	74	2	0	81	0	73	17	0	90	39	58	44	0	141	88	117	1	0	206	518
07:45 AM	8	70	4	0	82	2	102	17	0	121	46	73	47	0	166	35	148	7	0	190	559
08:00 AM	9	55	2	0	66	2	81	9	0	92	33	43	29	0	105	26	114	2	0	142	405
08:15 AM	7	52	2	0	61	4	106	13	0	123	39	55	20	0	114	33	136	10	0	179	477
Total Volume	29	251	10	0	290	8	362	56	0	426	157	229	140	0	526	182	515	20	0	717	1959
% App. Total	10	86.6	3.4	0		1.9	85	13.1	0		29.8	43.5	26.6	0		25.4	71.8	2.8	0		
PHF	.806	.848	.625	.000	.884	.500	.854	.824	.000	.866	.853	.784	.745	.000	.792	.517	.870	.500	.000	.870	.876
Cars	27	235	9	0	271	8	345	51	0	404	156	227	136	0	519	176	496	20	0	692	1886
% Cars	93.1	93.6	90.0	0	93.4	100	95.3	91.1	0	94.8	99.4	99.1	97.1	0	98.7	96.7	96.3	100	0	96.5	96.3
Heavy Vehicles	2	16	1	0	19	0	17	5	0	22	1	2	4	0	7	6	19	0	0	25	73
% Heavy Vehicles	6.9	6.4	10.0	0	6.6	0	4.7	8.9	0	5.2	0.6	0.9	2.9	0	1.3	3.3	3.7	0	0	3.5	3.7





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179-16

N/S: Lowell Avenue
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 EE
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
04:00 PM	12	64	2	0	9	133	21	0	22	37	49	0	29	95	4	0	477
04:15 PM	21	73	1	0	8	122	32	0	25	44	37	0	27	92	2	0	484
04:30 PM	11	66	2	0	4	125	17	0	21	48	34	0	28	98	5	0	459
04:45 PM	9	58	3	0	2	126	35	0	20	42	39	0	35	111	6	0	486
Total	53	261	8	0	23	506	105	0	88	171	159	0	119	396	17	0	1906
05:00 PM	16	68	4	0	16	143	33	0	25	44	28	0	38	106	4	0	525
05:15 PM	5	74	6	0	4	120	42	0	20	42	36	0	36	139	3	0	527
05:30 PM	6	84	2	0	3	111	33	0	20	45	48	0	44	115	5	0	516
05:45 PM	10	69	1	0	4	128	37	0	34	43	34	0	35	157	8	0	560
Total	37	295	13	0	27	502	145	0	99	174	146	0	153	517	20	0	2128
Grand Total	90	556	21	0	50	1008	250	0	187	345	305	0	272	913	37	0	4034
Apprch %	13.5	83.4	3.1	0	3.8	77.1	19.1	0	22.3	41.2	36.4	0	22.3	74.7	3	0	
Total %	2.2	13.8	0.5	0	1.2	25	6.2	0	4.6	8.6	7.6	0	6.7	22.6	0.9	0	
Cars	88	546	21	0	49	990	247	0	183	335	298	0	271	902	36	0	3966
% Cars	97.8	98.2	100	0	98	98.2	98.8	0	97.9	97.1	97.7	0	99.6	98.8	97.3	0	98.3
Heavy Vehicles	2	10	0	0	1	18	3	0	4	10	7	0	1	11	1	0	68
% Heavy Vehicles	2.2	1.8	0	0	2	1.8	1.2	0	2.1	2.9	2.3	0	0.4	1.2	2.7	0	1.7

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	16	68	4	0	88	16	143	33	0	192	25	44	28	0	97	38	106	4	0	148	525
05:15 PM	5	74	6	0	85	4	120	42	0	166	20	42	36	0	98	36	139	3	0	178	527
05:30 PM	6	84	2	0	92	3	111	33	0	147	20	45	48	0	113	44	115	5	0	164	516
05:45 PM	10	69	1	0	80	4	128	37	0	169	34	43	34	0	111	35	157	8	0	200	560
Total Volume	37	295	13	0	345	27	502	145	0	674	99	174	146	0	419	153	517	20	0	690	2128
% App. Total	10.7	85.5	3.8	0		4	74.5	21.5	0		23.6	41.5	34.8	0		22.2	74.9	2.9	0		
PHF	.578	.878	.542	.000	.938	.422	.878	.863	.000	.878	.728	.967	.760	.000	.927	.869	.823	.625	.000	.863	.950
Cars	37	293	13	0	343	26	494	144	0	664	95	168	145	0	408	152	511	20	0	683	2098
% Cars	100	99.3	100	0	99.4	96.3	98.4	99.3	0	98.5	96.0	96.6	99.3	0	97.4	99.3	98.8	100	0	99.0	98.6
Heavy Vehicles	0	2	0	0	2	1	8	1	0	10	4	6	1	0	11	1	6	0	0	7	30
% Heavy Vehicles	0	0.7	0	0	0.6	3.7	1.6	0.7	0	1.5	4.0	3.4	0.7	0	2.6	0.7	1.2	0	0	1.0	1.4



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INDUSTRIES, LLC

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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 EE
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	12	63	2	0	9	130	21	0	22	36	49	0	29	93	3	0	469
04:15 PM	20	69	1	0	8	119	32	0	25	43	33	0	27	91	2	0	470
04:30 PM	10	63	2	0	4	123	17	0	21	47	33	0	28	98	5	0	451
04:45 PM	9	58	3	0	2	124	33	0	20	41	38	0	35	109	6	0	478
Total	51	253	8	0	23	496	103	0	88	167	153	0	119	391	16	0	1868
05:00 PM	16	68	4	0	16	138	32	0	25	43	27	0	38	104	4	0	515
05:15 PM	5	74	6	0	4	120	42	0	19	41	36	0	36	137	3	0	523
05:30 PM	6	82	2	0	2	111	33	0	19	44	48	0	43	114	5	0	509
05:45 PM	10	69	1	0	4	125	37	0	32	40	34	0	35	156	8	0	551
Total	37	293	13	0	26	494	144	0	95	168	145	0	152	511	20	0	2098
Grand Total	88	546	21	0	49	990	247	0	183	335	298	0	271	902	36	0	3966
Apprch %	13.4	83.4	3.2	0	3.8	77	19.2	0	22.4	41.1	36.5	0	22.4	74.6	3	0	
Total %	2.2	13.8	0.5	0	1.2	25	6.2	0	4.6	8.4	7.5	0	6.8	22.7	0.9	0	

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	16	68	4	0	88	16	138	32	0	186	25	43	27	0	95	38	104	4	0	146	515
05:15 PM	5	74	6	0	85	4	120	42	0	166	19	41	36	0	96	36	137	3	0	176	523
05:30 PM	6	82	2	0	90	2	111	33	0	146	19	44	48	0	111	43	114	5	0	162	509
05:45 PM	10	69	1	0	80	4	125	37	0	166	32	40	34	0	106	35	156	8	0	199	551
Total Volume	37	293	13	0	343	26	494	144	0	664	95	168	145	0	408	152	511	20	0	683	2098
% App. Total	10.8	85.4	3.8	0		3.9	74.4	21.7	0		23.3	41.2	35.5	0		22.3	74.8	2.9	0		
PHF	.578	.893	.542	.000	.953	.406	.895	.857	.000	.892	.742	.955	.755	.000	.919	.884	.819	.625	.000	.858	.952



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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 EE
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Lowell Avenue From North				Washington Street From East				Lowell Avenue From South				Washington Street From West				Int. Total
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	1	0	0	0	3	0	0	0	1	0	0	0	2	1	0	8
04:15 PM	1	4	0	0	0	3	0	0	0	1	4	0	0	1	0	0	14
04:30 PM	1	3	0	0	0	2	0	0	0	1	1	0	0	0	0	0	8
04:45 PM	0	0	0	0	0	2	2	0	0	1	1	0	0	2	0	0	8
Total	2	8	0	0	0	10	2	0	0	4	6	0	0	5	1	0	38
05:00 PM	0	0	0	0	0	5	1	0	0	1	1	0	0	2	0	0	10
05:15 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	4
05:30 PM	0	2	0	0	1	0	0	0	1	1	0	0	1	1	0	0	7
05:45 PM	0	0	0	0	0	3	0	0	2	3	0	0	0	1	0	0	9
Total	0	2	0	0	1	8	1	0	4	6	1	0	1	6	0	0	30
Grand Total	2	10	0	0	1	18	3	0	4	10	7	0	1	11	1	0	68
Apprch %	16.7	83.3	0	0	4.5	81.8	13.6	0	19	47.6	33.3	0	7.7	84.6	7.7	0	
Total %	2.9	14.7	0	0	1.5	26.5	4.4	0	5.9	14.7	10.3	0	1.5	16.2	1.5	0	

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					Int. Total
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	1	4	0	0	5	0	3	0	0	3	0	1	4	0	5	0	1	0	0	1	14
04:30 PM	1	3	0	0	4	0	2	0	0	2	0	1	1	0	2	0	0	0	0	0	8
04:45 PM	0	0	0	0	0	0	2	2	0	4	0	1	1	0	2	0	2	0	0	2	8
05:00 PM	0	0	0	0	0	0	5	1	0	6	0	1	1	0	2	0	2	0	0	2	10
Total Volume	2	7	0	0	9	0	12	3	0	15	0	4	7	0	11	0	5	0	0	5	40
% App. Total	22.2	77.8	0	0		0	80	20	0		0	36.4	63.6	0		0	100	0	0		
PHF	.500	.438	.000	.000	.450	.000	.600	.375	.000	.625	.000	1.00	.438	.000	.550	.000	.625	.000	.000	.625	.714



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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 EE
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	0	0	2	4	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	10
04:15 PM	0	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	2	0	1	0	9
04:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	4
04:45 PM	0	0	0	0	4	0	0	0	0	2	0	0	0	1	0	0	1	0	0	0	8
Total	0	0	0	2	13	0	0	0	2	4	0	0	2	1	1	0	3	0	1	2	31
05:00 PM	0	0	0	4	5	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	14
05:15 PM	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	2	1	0	0	0	7
05:30 PM	0	1	0	0	4	0	2	0	0	0	0	1	0	3	0	0	0	0	1	0	12
05:45 PM	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
Total	0	1	0	6	12	0	3	0	2	4	0	1	0	3	0	2	1	0	2	0	37
Grand Total	0	1	0	8	25	0	3	0	4	8	0	1	2	4	1	2	4	0	3	2	68
Apprch %	0	2.9	0	23.5	73.5	0	20	0	26.7	53.3	0	12.5	25	50	12.5	18.2	36.4	0	27.3	18.2	
Total %	0	1.5	0	11.8	36.8	0	4.4	0	5.9	11.8	0	1.5	2.9	5.9	1.5	2.9	5.9	0	4.4	2.9	

	Lowell Avenue From North						Washington Street From East						Lowell Avenue From South						Washington Street From West							
Start Time	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 04:45 PM																										
04:45 PM	0	0	0	0	4	4	0	0	0	0	2	2	0	0	0	1	0	1	0	1	0	0	0	1	8	
05:00 PM	0	0	0	4	5	9	0	0	0	1	3	4	0	0	0	0	0	0	0	0	0	1	0	1	14	
05:15 PM	0	0	0	2	0	2	0	1	0	1	0	2	0	0	0	0	0	0	2	1	0	0	0	3	7	
05:30 PM	0	1	0	0	4	5	0	2	0	0	0	2	0	1	0	3	0	4	0	0	0	1	0	1	12	
Total Volume	0	1	0	6	13	20	0	3	0	2	5	10	0	1	0	4	0	5	2	2	0	2	0	6	41	
% App. Total	0	5	0	30	65		0	30	0	20	50		0	20	0	80	0		33.3	33.3	0	33.3	0			
PHF	.000	.250	.000	.375	.650	.556	.000	.375	.000	.500	.417	.625	.000	.250	.000	.333	.000	.313	.250	.500	.000	.500	.000	.500	.732	



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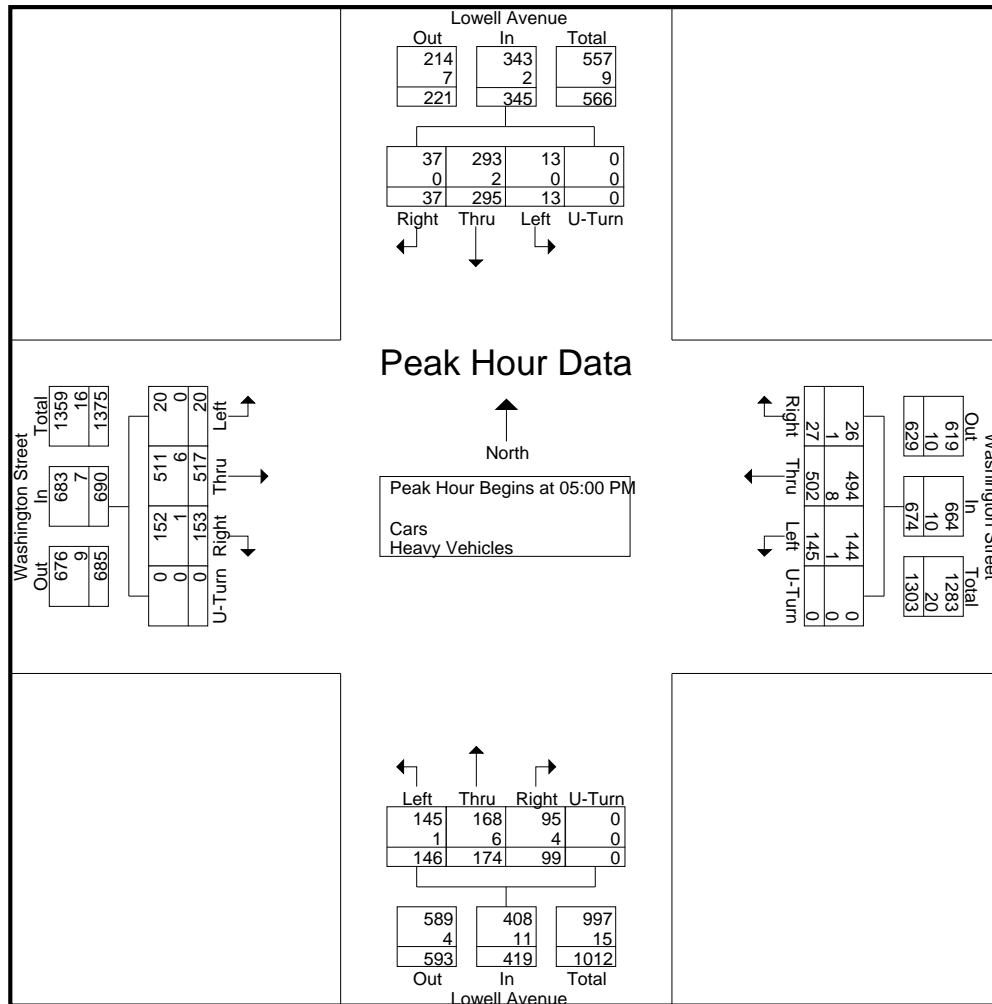
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179-16

N/S: Lowell Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 EE
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Lowell Avenue From North					Washington Street From East					Lowell Avenue From South					Washington Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	16	68	4	0	88	16	143	33	0	192	25	44	28	0	97	38	106	4	0	148	525
05:15 PM	5	74	6	0	85	4	120	42	0	166	20	42	36	0	98	36	139	3	0	178	527
05:30 PM	6	84	2	0	92	3	111	33	0	147	20	45	48	0	113	44	115	5	0	164	516
05:45 PM	10	69	1	0	80	4	128	37	0	169	34	43	34	0	111	35	157	8	0	200	560
Total Volume	37	295	13	0	345	27	502	145	0	674	99	174	146	0	419	153	517	20	0	690	2128
% App. Total	10.7	85.5	3.8	0		4	74.5	21.5	0		23.6	41.5	34.8	0		22.2	74.9	2.9	0		
PHF	.578	.878	.542	.000	.938	.422	.878	.863	.000	.878	.728	.967	.760	.000	.927	.869	.823	.625	.000	.863	.950
Cars	37	293	13	0	343	26	494	144	0	664	95	168	145	0	408	152	511	20	0	683	2098
% Cars	100	99.3	100	0	99.4	96.3	98.4	99.3	0	98.5	96.0	96.6	99.3	0	97.4	99.3	98.8	100	0	99.0	98.6
Heavy Vehicles	0	2	0	0	2	1	8	1	0	10	4	6	1	0	11	1	6	0	0	7	30
% Heavy Vehicles	0	0.7	0	0	0.6	3.7	1.6	0.7	0	1.5	4.0	3.4	0.7	0	2.6	0.7	1.2	0	0	1.0	1.4





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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 F
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	10	3	0	5	78	0	138	12	0	246
07:15 AM	7	3	0	6	94	0	171	6	0	287
07:30 AM	11	13	0	5	115	0	174	7	0	325
07:45 AM	11	10	0	8	110	0	230	13	2	384
Total	39	29	0	24	397	0	713	38	2	1242
08:00 AM	6	5	0	8	116	0	181	11	2	329
08:15 AM	9	9	0	6	160	0	197	12	1	394
08:30 AM	10	4	0	6	139	0	217	14	0	390
08:45 AM	11	7	0	1	124	0	160	14	0	317
Total	36	25	0	21	539	0	755	51	3	1430
Grand Total	75	54	0	45	936	0	1468	89	5	2672
Apprch %	58.1	41.9	0	4.6	95.4	0	94	5.7	0.3	
Total %	2.8	2	0	1.7	35	0	54.9	3.3	0.2	
Cars	71	53	0	42	894	0	1430	83	4	2577
% Cars	94.7	98.1	0	93.3	95.5	0	97.4	93.3	80	96.4
Heavy Vehicles	4	1	0	3	42	0	38	6	1	95
% Heavy Vehicles	5.3	1.9	0	6.7	4.5	0	2.6	6.7	20	3.6

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	11	10	0	21	8	110	0	118	230	13	2	245	384
08:00 AM	6	5	0	11	8	116	0	124	181	11	2	194	329
08:15 AM	9	9	0	18	6	160	0	166	197	12	1	210	394
08:30 AM	10	4	0	14	6	139	0	145	217	14	0	231	390
Total Volume	36	28	0	64	28	525	0	553	825	50	5	880	1497
% App. Total	56.2	43.8	0		5.1	94.9	0		93.8	5.7	0.6		
PHF	.818	.700	.000	.762	.875	.820	.000	.833	.897	.893	.625	.898	.950
Cars	33	28	0	61	26	506	0	532	808	46	4	858	1451
% Cars	91.7	100	0	95.3	92.9	96.4	0	96.2	97.9	92.0	80.0	97.5	96.9
Heavy Vehicles	3	0	0	3	2	19	0	21	17	4	1	22	46
% Heavy Vehicles	8.3	0	0	4.7	7.1	3.6	0	3.8	2.1	8.0	20.0	2.5	3.1



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File Name : 154796 F
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	10	3	0	5	74	0	132	12	0	236
07:15 AM	7	3	0	6	86	0	164	6	0	272
07:30 AM	11	13	0	4	109	0	170	7	0	314
07:45 AM	10	10	0	7	105	0	224	12	1	369
Total	38	29	0	22	374	0	690	37	1	1191
08:00 AM	6	5	0	7	107	0	179	9	2	315
08:15 AM	8	9	0	6	158	0	190	11	1	383
08:30 AM	9	4	0	6	136	0	215	14	0	384
08:45 AM	10	6	0	1	119	0	156	12	0	304
Total	33	24	0	20	520	0	740	46	3	1386
Grand Total	71	53	0	42	894	0	1430	83	4	2577
Apprch %	57.3	42.7	0	4.5	95.5	0	94.3	5.5	0.3	
Total %	2.8	2.1	0	1.6	34.7	0	55.5	3.2	0.2	

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	10	10	0	20	7	105	0	112	224	12	1	237	369
08:00 AM	6	5	0	11	7	107	0	114	179	9	2	190	315
08:15 AM	8	9	0	17	6	158	0	164	190	11	1	202	383
08:30 AM	9	4	0	13	6	136	0	142	215	14	0	229	384
Total Volume	33	28	0	61	26	506	0	532	808	46	4	858	1451
% App. Total	54.1	45.9	0		4.9	95.1	0		94.2	5.4	0.5		
PHF	.825	.700	.000	.763	.929	.801	.000	.811	.902	.821	.500	.905	.945



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File Name : 154796 F
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Page No : 1

Groups Printed- Heavy Vehicles

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
07:00 AM	0	0	0	0	4	0	6	0	0	10
07:15 AM	0	0	0	0	8	0	7	0	0	15
07:30 AM	0	0	0	1	6	0	4	0	0	11
07:45 AM	1	0	0	1	5	0	6	1	1	15
Total	1	0	0	2	23	0	23	1	1	51
08:00 AM	0	0	0	1	9	0	2	2	0	14
08:15 AM	1	0	0	0	2	0	7	1	0	11
08:30 AM	1	0	0	0	3	0	2	0	0	6
08:45 AM	1	1	0	0	5	0	4	2	0	13
Total	3	1	0	1	19	0	15	5	0	44
Grand Total	4	1	0	3	42	0	38	6	1	95
Apprch %	80	20	0	6.7	93.3	0	84.4	13.3	2.2	
Total %	4.2	1.1	0	3.2	44.2	0	40	6.3	1.1	

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	0	0	0	8	0	8	7	0	0	7	15
07:30 AM	0	0	0	0	1	6	0	7	4	0	0	4	11
07:45 AM	1	0	0	1	1	5	0	6	6	1	1	8	15
08:00 AM	0	0	0	0	1	9	0	10	2	2	0	4	14
Total Volume	1	0	0	1	3	28	0	31	19	3	1	23	55
% App. Total	100	0	0		9.7	90.3	0		82.6	13	4.3		
PHF	.250	.000	.000	.250	.750	.778	.000	.775	.679	.375	.250	.719	.917



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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 F
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Central Avenue From North				Washington Street From East				Washington Street From West				Int. Total
	Right	Left	Peds EB	Peds WB	Right	Thru	Peds SB	Peds NB	Thru	Left	Peds NB	Peds SB	
07:00 AM	0	0	0	1	0	0	0	0	0	0	1	1	3
07:15 AM	0	0	4	5	1	0	0	0	0	0	0	0	10
07:30 AM	0	0	0	8	0	0	0	0	0	1	0	1	10
07:45 AM	0	0	3	2	0	1	0	0	1	0	0	1	8
Total	0	0	7	16	1	1	0	0	1	1	1	3	31
08:00 AM	0	0	2	1	0	0	0	0	0	0	0	0	3
08:15 AM	0	0	3	7	0	0	0	1	0	0	0	0	11
08:30 AM	0	0	0	3	0	0	0	0	0	0	1	0	4
08:45 AM	0	0	5	1	0	0	0	0	0	0	1	0	7
Total	0	0	10	12	0	0	0	1	0	0	2	0	25
Grand Total	0	0	17	28	1	1	0	1	1	1	3	3	56
Apprch %	0	0	37.8	62.2	33.3	33.3	0	33.3	12.5	12.5	37.5	37.5	
Total %	0	0	30.4	50	1.8	1.8	0	1.8	1.8	1.8	5.4	5.4	

	Central Avenue From North					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Peds EB	Peds WB	App. Total	Right	Thru	Peds SB	Peds NB	App. Total	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:30 AM																
07:30 AM	0	0	0	8	8	0	0	0	0	0	0	1	0	1	2	10
07:45 AM	0	0	3	2	5	0	1	0	0	1	1	0	0	1	2	8
08:00 AM	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	3
08:15 AM	0	0	3	7	10	0	0	0	1	1	0	0	0	0	0	11
Total Volume	0	0	8	18	26	0	1	0	1	2	1	1	0	2	4	32
% App. Total	0	0	30.8	69.2		0	50	0	50		25	25	0	50		
PHF	.000	.000	.667	.563	.650	.000	.250	.000	.250	.500	.250	.250	.000	.500	.500	.727



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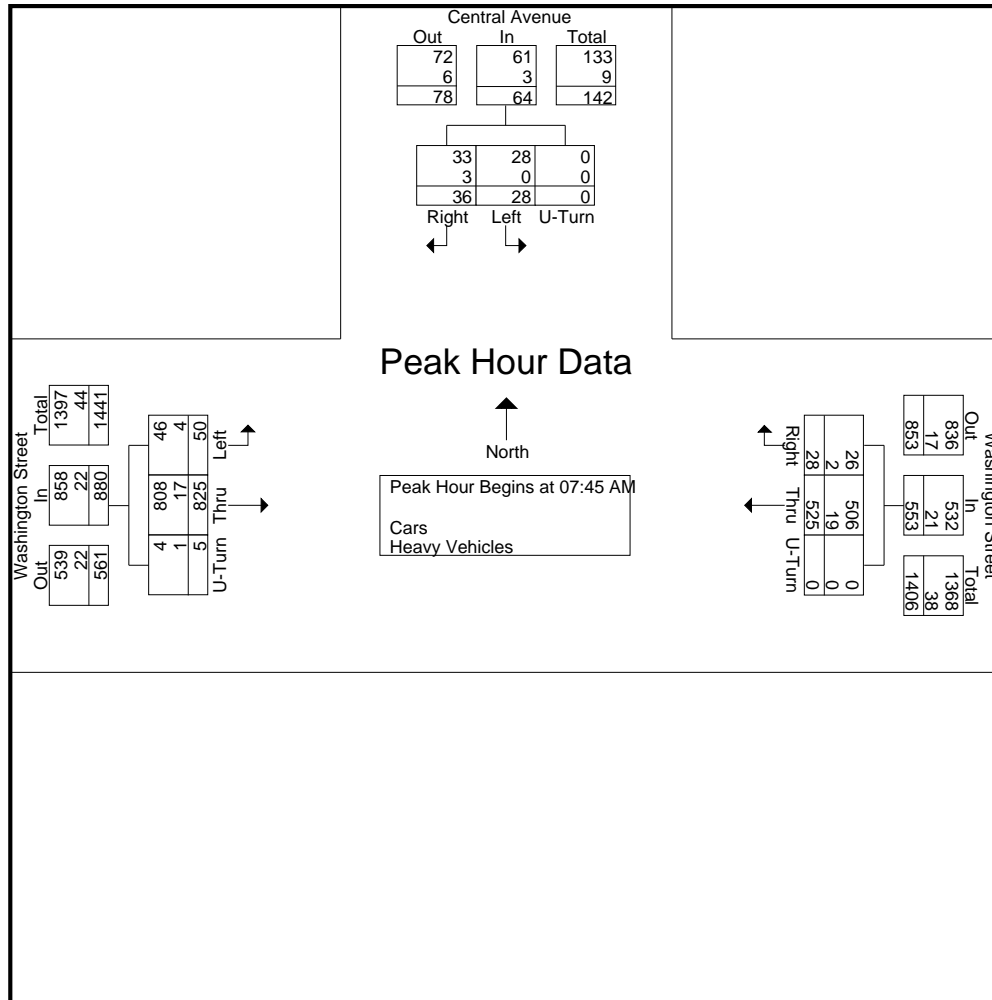
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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 F
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	11	10	0	21	8	110	0	118	230	13	2	245	384
08:00 AM	6	5	0	11	8	116	0	124	181	11	2	194	329
08:15 AM	9	9	0	18	6	160	0	166	197	12	1	210	394
08:30 AM	10	4	0	14	6	139	0	145	217	14	0	231	390
Total Volume	36	28	0	64	28	525	0	553	825	50	5	880	1497
% App. Total	56.2	43.8	0		5.1	94.9	0		93.8	5.7	0.6		
PHF	.818	.700	.000	.762	.875	.820	.000	.833	.897	.893	.625	.898	.950
Cars	33	28	0	61	26	506	0	532	808	46	4	858	1451
% Cars	91.7	100	0	95.3	92.9	96.4	0	96.2	97.9	92.0	80.0	97.5	96.9
Heavy Vehicles	3	0	0	3	2	19	0	21	17	4	1	22	46
% Heavy Vehicles	8.3	0	0	4.7	7.1	3.6	0	3.8	2.1	8.0	20.0	2.5	3.1





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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 FF
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	8	5	0	12	196	0	133	13	1	368
04:15 PM	7	2	0	6	173	0	142	9	0	339
04:30 PM	6	5	0	6	154	0	119	5	0	295
04:45 PM	6	5	0	7	190	0	139	2	1	350
Total	27	17	0	31	713	0	533	29	2	1352
05:00 PM	9	3	0	9	192	0	154	8	0	375
05:15 PM	11	6	0	4	194	0	164	8	0	387
05:30 PM	11	5	0	9	173	0	179	4	1	382
05:45 PM	6	8	0	5	196	0	174	15	2	406
Total	37	22	0	27	755	0	671	35	3	1550
Grand Total	64	39	0	58	1468	0	1204	64	5	2902
Apprch %	62.1	37.9	0	3.8	96.2	0	94.6	5	0.4	
Total %	2.2	1.3	0	2	50.6	0	41.5	2.2	0.2	
Cars	62	39	0	55	1439	0	1191	64	5	2855
% Cars	96.9	100	0	94.8	98	0	98.9	100	100	98.4
Heavy Vehicles	2	0	0	3	29	0	13	0	0	47
% Heavy Vehicles	3.1	0	0	5.2	2	0	1.1	0	0	1.6

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	9	3	0	12	9	192	0	201	154	8	0	162	375
05:15 PM	11	6	0	17	4	194	0	198	164	8	0	172	387
05:30 PM	11	5	0	16	9	173	0	182	179	4	1	184	382
05:45 PM	6	8	0	14	5	196	0	201	174	15	2	191	406
Total Volume	37	22	0	59	27	755	0	782	671	35	3	709	1550
% App. Total	62.7	37.3	0		3.5	96.5	0		94.6	4.9	0.4		
PHF	.841	.688	.000	.868	.750	.963	.000	.973	.937	.583	.375	.928	.954
Cars	36	22	0	58	26	743	0	769	666	35	3	704	1531
% Cars	97.3	100	0	98.3	96.3	98.4	0	98.3	99.3	100	100	99.3	98.8
Heavy Vehicles	1	0	0	1	1	12	0	13	5	0	0	5	19
% Heavy Vehicles	2.7	0	0	1.7	3.7	1.6	0	1.7	0.7	0	0	0.7	1.2



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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 FF
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	8	5	0	10	193	0	130	13	1	360
04:15 PM	7	2	0	6	169	0	140	9	0	333
04:30 PM	6	5	0	6	150	0	117	5	0	289
04:45 PM	5	5	0	7	184	0	138	2	1	342
Total	26	17	0	29	696	0	525	29	2	1324
05:00 PM	9	3	0	9	189	0	154	8	0	372
05:15 PM	10	6	0	4	190	0	163	8	0	381
05:30 PM	11	5	0	9	170	0	175	4	1	375
05:45 PM	6	8	0	4	194	0	174	15	2	403
Total	36	22	0	26	743	0	666	35	3	1531
Grand Total	62	39	0	55	1439	0	1191	64	5	2855
Apprch %	61.4	38.6	0	3.7	96.3	0	94.5	5.1	0.4	
Total %	2.2	1.4	0	1.9	50.4	0	41.7	2.2	0.2	

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	9	3	0	12	9	189	0	198	154	8	0	162	372
05:15 PM	10	6	0	16	4	190	0	194	163	8	0	171	381
05:30 PM	11	5	0	16	9	170	0	179	175	4	1	180	375
05:45 PM	6	8	0	14	4	194	0	198	174	15	2	191	403
Total Volume	36	22	0	58	26	743	0	769	666	35	3	704	1531
% App. Total	62.1	37.9	0		3.4	96.6	0		94.6	5	0.4		
PHF	.818	.688	.000	.906	.722	.957	.000	.971	.951	.583	.375	.921	.950



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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 FF
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Central Avenue From North			Washington Street From East			Washington Street From West			
Start Time	Right	Left	U-Turn	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
04:00 PM	0	0	0	2	3	0	3	0	0	8
04:15 PM	0	0	0	0	4	0	2	0	0	6
04:30 PM	0	0	0	0	4	0	2	0	0	6
04:45 PM	1	0	0	0	6	0	1	0	0	8
Total	1	0	0	2	17	0	8	0	0	28
05:00 PM	0	0	0	0	3	0	0	0	0	3
05:15 PM	1	0	0	0	4	0	1	0	0	6
05:30 PM	0	0	0	0	3	0	4	0	0	7
05:45 PM	0	0	0	1	2	0	0	0	0	3
Total	1	0	0	1	12	0	5	0	0	19
Grand Total	2	0	0	3	29	0	13	0	0	47
Apprch %	100	0	0	9.4	90.6	0	100	0	0	
Total %	4.3	0	0	6.4	61.7	0	27.7	0	0	

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	0	0	0	2	3	0	5	3	0	0	3	8
04:15 PM	0	0	0	0	0	4	0	4	2	0	0	2	6
04:30 PM	0	0	0	0	0	4	0	4	2	0	0	2	6
04:45 PM	1	0	0	1	0	6	0	6	1	0	0	1	8
Total Volume	1	0	0	1	2	17	0	19	8	0	0	8	28
% App. Total	100	0	0		10.5	89.5	0		100	0	0		
PHF	.250	.000	.000	.250	.250	.708	.000	.792	.667	.000	.000	.667	.875



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179-16

N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 FF
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Central Avenue From North				Washington Street From East				Washington Street From West				Int. Total
	Right	Left	Peds EB	Peds WB	Right	Thru	Peds SB	Peds NB	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	0	3	6	0	0	0	0	0	0	0	0	9
04:15 PM	0	0	8	2	0	0	0	0	0	0	1	0	11
04:30 PM	0	0	3	5	0	0	0	0	0	0	0	0	8
04:45 PM	0	0	4	3	0	0	0	0	0	0	1	0	8
Total	0	0	18	16	0	0	0	0	0	0	2	0	36
05:00 PM	1	0	4	3	0	1	0	0	0	0	0	1	10
05:15 PM	1	0	5	2	0	1	0	0	0	0	0	0	9
05:30 PM	0	0	4	4	0	1	0	0	0	0	0	0	9
05:45 PM	0	0	2	8	0	0	0	0	0	0	2	0	12
Total	2	0	15	17	0	3	0	0	0	0	2	1	40
Grand Total	2	0	33	33	0	3	0	0	0	0	4	1	76
Apprch %	2.9	0	48.5	48.5	0	100	0	0	0	0	80	20	
Total %	2.6	0	43.4	43.4	0	3.9	0	0	0	0	5.3	1.3	

	Central Avenue From North					Washington Street From East					Washington Street From West					
Start Time	Right	Left	Peds EB	Peds WB	App. Total	Right	Thru	Peds SB	Peds NB	App. Total	Thru	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	1	0	4	3	8	0	1	0	0	1	0	0	0	1	1	10
05:15 PM	1	0	5	2	8	0	1	0	0	1	0	0	0	0	0	9
05:30 PM	0	0	4	4	8	0	1	0	0	1	0	0	0	0	0	9
05:45 PM	0	0	2	8	10	0	0	0	0	0	0	0	2	0	2	12
Total Volume	2	0	15	17	34	0	3	0	0	3	0	0	2	1	3	40
% App. Total	5.9	0	44.1	50		0	100	0	0		0	0	66.7	33.3		
PHF	.500	.000	.750	.531	.850	.000	.750	.000	.000	.750	.000	.000	.250	.250	.375	.833



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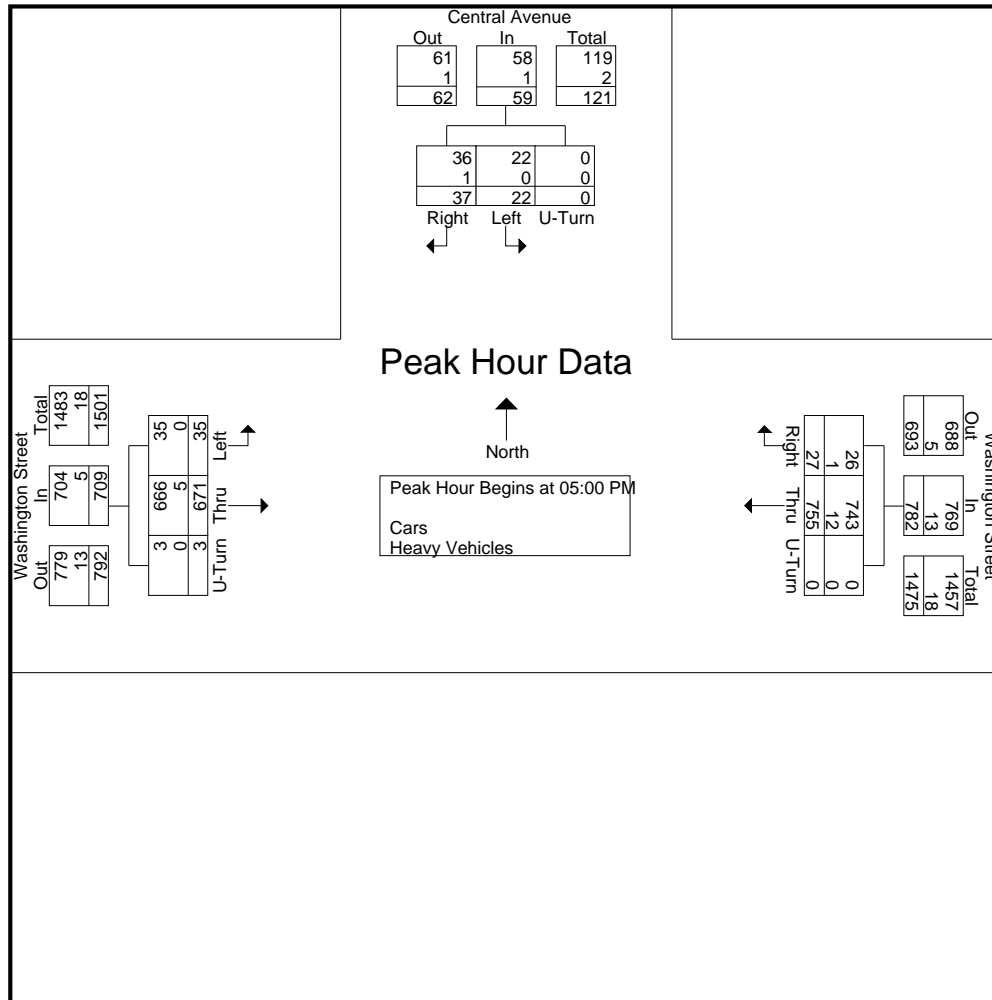
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N: Central Avenue
E/W: Washington Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 FF
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Central Avenue From North				Washington Street From East				Washington Street From West				
Start Time	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	9	3	0	12	9	192	0	201	154	8	0	162	375
05:15 PM	11	6	0	17	4	194	0	198	164	8	0	172	387
05:30 PM	11	5	0	16	9	173	0	182	179	4	1	184	382
05:45 PM	6	8	0	14	5	196	0	201	174	15	2	191	406
Total Volume	37	22	0	59	27	755	0	782	671	35	3	709	1550
% App. Total	62.7	37.3	0		3.5	96.5	0		94.6	4.9	0.4		
PHF	.841	.688	.000	.868	.750	.963	.000	.973	.937	.583	.375	.928	.954
Cars	36	22	0	58	26	743	0	769	666	35	3	704	1531
% Cars	97.3	100	0	98.3	96.3	98.4	0	98.3	99.3	100	100	99.3	98.8
Heavy Vehicles	1	0	0	1	1	12	0	13	5	0	0	5	19
% Heavy Vehicles	2.7	0	0	1.7	3.7	1.6	0	1.7	0.7	0	0	0.7	1.2





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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 G
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total	
07:00 AM	0	0	72	0	0	0	0	0	0	0	1	82	0	0	0	0	0	0	1	0	0	0	0	0	0	0	156
07:15 AM	0	0	93	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169
07:30 AM	0	1	87	1	0	1	0	0	0	0	2	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	206
07:45 AM	0	2	72	3	0	0	0	0	0	0	0	119	0	1	1	1	0	0	0	0	0	0	0	0	0	0	199
Total	0	3	324	4	0	1	0	0	0	0	3	391	0	1	1	1	0	1	0	0	0	0	0	0	0	0	730
08:00 AM	0	0	90	2	0	0	0	0	0	0	2	119	0	0	0	0	1	0	2	0	0	1	1	0	0	0	218
08:15 AM	0	0	94	0	0	0	0	0	0	0	8	111	0	1	1	0	0	0	1	0	0	0	0	0	0	0	216
08:30 AM	0	1	103	2	0	0	0	0	0	0	3	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209
08:45 AM	0	1	110	1	0	0	0	0	1	0	5	110	0	0	1	1	0	0	0	0	0	0	0	0	0	0	230
Total	0	2	397	5	0	0	0	0	1	0	18	440	0	1	2	2	0	3	0	0	0	1	1	0	0	0	873
Grand Total	0	5	721	9	0	1	0	0	1	0	21	831	0	2	3	3	0	4	0	0	1	1	0	0	0	0	1603
Apprch %	0	0.7	98.1	1.2	0	50	0	0	50	0	2.5	97	0	0.2	0.4	42.9	0	57.1	0	0	50	50	0	0	0	0	
Total %	0	0.3	45	0.6	0	0.1	0	0	0.1	0	1.3	51.8	0	0.1	0.2	0.2	0	0.2	0	0	0.1	0.1	0	0	0	0	
Cars	0	5	650	9	0	1	0	0	1	0	21	802	0	1	3	3	0	3	0	0	1	1	0	0	0	0	1501
% Cars	0	100	90.2	100	0	100	0	0	100	0	100	96.5	0	50	100	100	0	75	0	0	100	100	0	0	0	0	93.6
Heavy Vehicles	0	0	71	0	0	0	0	0	0	0	0	29	0	1	0	0	0	1	0	0	0	0	0	0	0	0	102
% Heavy Vehicles	0	0	9.8	0	0	0	0	0	0	0	0	3.5	0	50	0	0	0	25	0	0	0	0	0	0	0	0	6.4

	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest							
Start Time	Hard Right	Right	Thru	Left	U- Turn	App. Total	Right	Bear Right	Thru	Left	U- Turn	App. Total	Right	Thru	Bear Left	Left	U- Turn	App. Total	Right	Thru	Left	Hard Left	U- Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U- Turn	App. Total	Int. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																
Peak Hour for Entire Intersection Begins at 08:00 AM																																
08:00 AM	0	0	90	2	0	92	0	0	0	0	0	0	2	119	0	0	0	121	1	0	2	0	0	3	1	1	0	0	0	2	218	
08:15 AM	0	0	94	0	0	94	0	0	0	0	0	0	8	111	0	1	1	121	0	0	1	0	0	1	0	0	0	0	0	0	216	
08:30 AM	0	1	103	2	0	106	0	0	0	0	0	0	3	100	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	209	
08:45 AM	0	1	110	1	0	112	0	0	0	1	0	1	5	110	0	0	1	116	1	0	0	0	0	1	0	0	0	0	0	0	230	
Total Volume	0	2	397	5	0	404	0	0	0	1	0	1	18	440	0	1	2	461	2	0	3	0	0	5	1	1	0	0	0	2	873	
% App. Total	0	0.5	98.3	1.2	0		0	0	0	100	0		3.9	95.4	0	0.2	0.4		40	0	60	0	0		50	50	0	0	0			
PHF	.000	.500	.902	.625	.000	.902	.000	.000	.000	.250	.000	.250	.563	.924	.000	.250	.500	.952	.500	.000	.375	.000	.000	.417	.250	.250	.000	.000	.000	.250	.949	
Cars	0	2	365	5	0	372	0	0	0	1	0	1	18	429	0	1	2	450	2	0	2	0	0	4	1	1	0	0	0	2	829	
% Cars	0	100	91.9	100	0	92.1	0	0	0	100	0	100	100	97.5	0	100	100	97.6	100	0	66.7	0	0	80.0	100	100	0	0	0	100	95.0	
Heavy Vehicles	0	0	32	0	0	32	0	0	0	0	0	0	0	11	0	0	0	11	0	0	1	0	0	1	0	0	0	0	0	0	44	
% Heavy Vehicles	0	0	8.1	0	0	7.9	0	0	0	0	0	0	0	2.5	0	0	0	2.4	0	0	33.3	0	0	20.0	0	0	0	0	0	0	5.0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM



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INDUSTRIES, LLC

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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 G
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total	
07:00 AM	0	0	61	0	0	0	0	0	0	0	1	80	0	0	0	0	0	0	1	0	0	0	0	0	0	0	143
07:15 AM	0	0	84	0	0	0	0	0	0	0	0	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	153
07:30 AM	0	1	78	1	0	1	0	0	0	0	2	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	194
07:45 AM	0	2	62	3	0	0	0	0	0	0	0	113	0	0	1	1	0	0	0	0	0	0	0	0	0	0	182
Total	0	3	285	4	0	1	0	0	0	0	3	373	0	0	1	1	0	1	0	0	0	0	0	0	0	0	672
08:00 AM	0	0	82	2	0	0	0	0	0	0	2	117	0	0	0	1	0	1	0	0	1	1	0	0	0	0	207
08:15 AM	0	0	88	0	0	0	0	0	0	0	8	109	0	1	1	0	0	1	0	0	0	0	0	0	0	0	208
08:30 AM	0	1	91	2	0	0	0	0	0	0	3	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	193
08:45 AM	0	1	104	1	0	0	0	0	1	0	5	107	0	0	1	1	0	0	0	0	0	0	0	0	0	0	221
Total	0	2	365	5	0	0	0	0	1	0	18	429	0	1	2	2	0	2	0	0	1	1	0	0	0	0	829
Grand Total	0	5	650	9	0	1	0	0	1	0	21	802	0	1	3	3	0	3	0	0	1	1	0	0	0	0	1501
Apprch %	0	0.8	97.9	1.4	0	50	0	0	50	0	2.5	97	0	0.1	0.4	50	0	50	0	0	50	50	0	0	0	0	
Total %	0	0.3	43.3	0.6	0	0.1	0	0	0.1	0	1.4	53.4	0	0.1	0.2	0.2	0	0.2	0	0	0.1	0.1	0	0	0	0	

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	
08:00 AM	0	0	82	2	0	84	0	0	0	0	0	0	2	117	0	0	0	119	1	0	1	0	0	2	1	1	0	0	0	2	207
08:15 AM	0	0	88	0	0	88	0	0	0	0	0	0	8	109	0	1	1	119	0	0	1	0	0	1	0	0	0	0	0	0	208
08:30 AM	0	1	91	2	0	94	0	0	0	0	0	0	3	96	0	0	0	99	0	0	0	0	0	0	0	0	0	0	0	0	193
08:45 AM	0	1	104	1	0	106	0	0	0	1	0	1	5	107	0	0	1	113	1	0	0	0	0	1	0	0	0	0	0	0	221
Total Volume	0	2	365	5	0	372	0	0	0	1	0	1	18	429	0	1	2	450	2	0	2	0	0	4	1	1	0	0	0	2	829
% App. Total	0	0.5	98.1	1.3	0		0	0	0	100	0		4	95.3	0	0.2	0.4		50	0	50	0	0		50	50	0	0	0		
PHF	.000	.500	.877	.625	.000	.877	.000	.000	.000	.250	.000	.250	.563	.917	.000	.250	.500	.945	.500	.000	.500	.000	.000	.500	.250	.250	.000	.000	.000	.250	.938

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM



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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 G
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total	
07:00 AM	0	0	11	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	13	
07:15 AM	0	0	9	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	16	
07:30 AM	0	0	9	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	
07:45 AM	0	0	10	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	17	
Total	0	0	39	0	0	0	0	0	0	0	0	18	0	1	0	0	0	0	0	0	0	0	0	0	0	58	
08:00 AM	0	0	8	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	11	
08:15 AM	0	0	6	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	8	
08:30 AM	0	0	12	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	16	
08:45 AM	0	0	6	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	9	
Total	0	0	32	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	1	0	0	0	0	0	0	44	
Grand Total	0	0	71	0	0	0	0	0	0	0	0	29	0	1	0	0	0	0	1	0	0	0	0	0	0	102	
Apprch %	0	0	100	0	0	0	0	0	0	0	0	96.7	0	3.3	0	0	0	100	0	0	0	0	0	0	0		
Total %	0	0	69.6	0	0	0	0	0	0	0	0	28.4	0	1	0	0	0	1	0	0	0	0	0	0	0		

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	
07:00 AM	0	0	11	0	0	11	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	13
07:15 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	16
07:30 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	12
07:45 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	6	0	1	0	7	0	0	0	0	0	0	0	0	0	0	0	0	17
Total Volume	0	0	39	0	0	39	0	0	0	0	0	0	0	18	0	1	0	19	0	0	0	0	0	0	0	0	0	0	0	0	58
% App. Total	0	0	100	0	0		0	0	0	0	0		0	94.7	0	5.3	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.886	.000	.000	.886	.000	.000	.000	.000	.000	.000	.000	.643	.000	.250	.000	.679	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.853

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM



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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 G
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	Peds EB	Peds WB	Right	Bear Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Bear Left	Left	Peds WB	Peds EB	Right	Thru	Left	Hard Left	Peds NB	Peds SB	Hard Right	Bear Right	Bear Left	Hard Left	Peds EB	Peds WB	
07:00 AM	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	8
07:15 AM	0	0	0	0	0	0	0	0	0	0	9	6	0	0	0	0	2	2	0	0	0	0	0	4	0	0	0	0	0	0	23
07:30 AM	0	0	6	0	0	0	0	0	0	0	16	21	0	0	0	0	0	1	0	0	0	0	7	11	0	0	0	0	0	0	62
07:45 AM	0	0	0	0	1	0	0	0	0	1	21	3	0	1	0	0	3	1	0	0	0	0	1	5	0	0	0	0	0	0	37
Total	0	0	7	0	1	0	0	0	0	1	50	30	0	1	0	0	6	4	0	0	0	0	8	22	0	0	0	0	0	0	130
08:00 AM	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	12
08:15 AM	0	0	0	0	0	0	0	0	0	0	12	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	15
08:30 AM	0	0	0	0	0	0	0	0	0	0	10	2	0	0	0	0	2	0	0	0	0	0	1	8	0	0	0	0	0	0	23
08:45 AM	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	0	0	0	0	0	29	6	0	2	0	0	3	1	0	0	0	0	3	13	0	0	0	0	0	0	57
Grand Total	0	0	7	0	1	0	0	0	0	1	79	36	0	3	0	0	9	5	0	0	0	0	11	35	0	0	0	0	0	0	187
Apprch %	0	0	87.5	0	12.5	0	0	0	0	0.9	68.1	31	0	17.6	0	0	52.9	29.4	0	0	0	0	23.9	76.1	0	0	0	0	0	0	0
Total %	0	0	3.7	0	0.5	0	0	0	0	0.5	42.2	19.3	0	1.6	0	0	4.8	2.7	0	0	0	0	5.9	18.7	0	0	0	0	0	0	0

	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest													
Start Time	Har d Ri ght	Right	Thru	Left	Ped s EB	Ped s WB	App. Total	Right	Bear Right	Thru	Left	Ped s SB	Ped s NB	App. Total	Right	Thru	Bear Left	Left	Ped s WB	Ped s EB	App. Total	Right	Thru	Left	Har d Le ft	Ped s NB	Ped s SB	App. Total	Har d Ri ght	Bear Right	Bear Left	Har d Le ft	Ped s EB	Ped s WB	App. Total	Int. Total		
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																						
Peak Hour for Entire Intersection Begins at 07:15 AM																																						
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	9	6	15	0	0	0	0	2	2	4	0	0	0	0	0	4	4	0	0	0	0	0	0	0	23		
07:30 AM	0	0	6	0	0	0	6	0	0	0	0	16	21	37	0	0	0	0	0	1	1	0	0	0	0	7	11	18	0	0	0	0	0	0	0	62		
07:45 AM	0	0	0	0	1	0	1	0	0	0	1	21	3	25	0	1	0	0	3	1	5	0	0	0	0	1	5	6	0	0	0	0	0	0	0	37		
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	5	2	7	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	12			
Total Volume	0	0	6	0	1	0	7	0	0	0	1	51	32	84	0	1	0	0	5	4	10	0	0	0	0	8	25	33	0	0	0	0	0	0	0	134		
% App. Total	0	0	85.7	0	14.3	0	0	0	0	1.2	60.7	38.1	0	10	0	0	0	50	40	0	0	0	0	0	0	24.2	75.8	0	0	0	0	0	0	0	0			
PHF	.000	.000	.250	.000	.250	.000	.292	.000	.000	.000	.250	.607	.381	.568	.000	.250	.000	.000	.417	.500	.500	.000	.000	.000	.000	.286	.568	.458	.000	.000	.000	.000	.000	.000	.540			

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:15 AM



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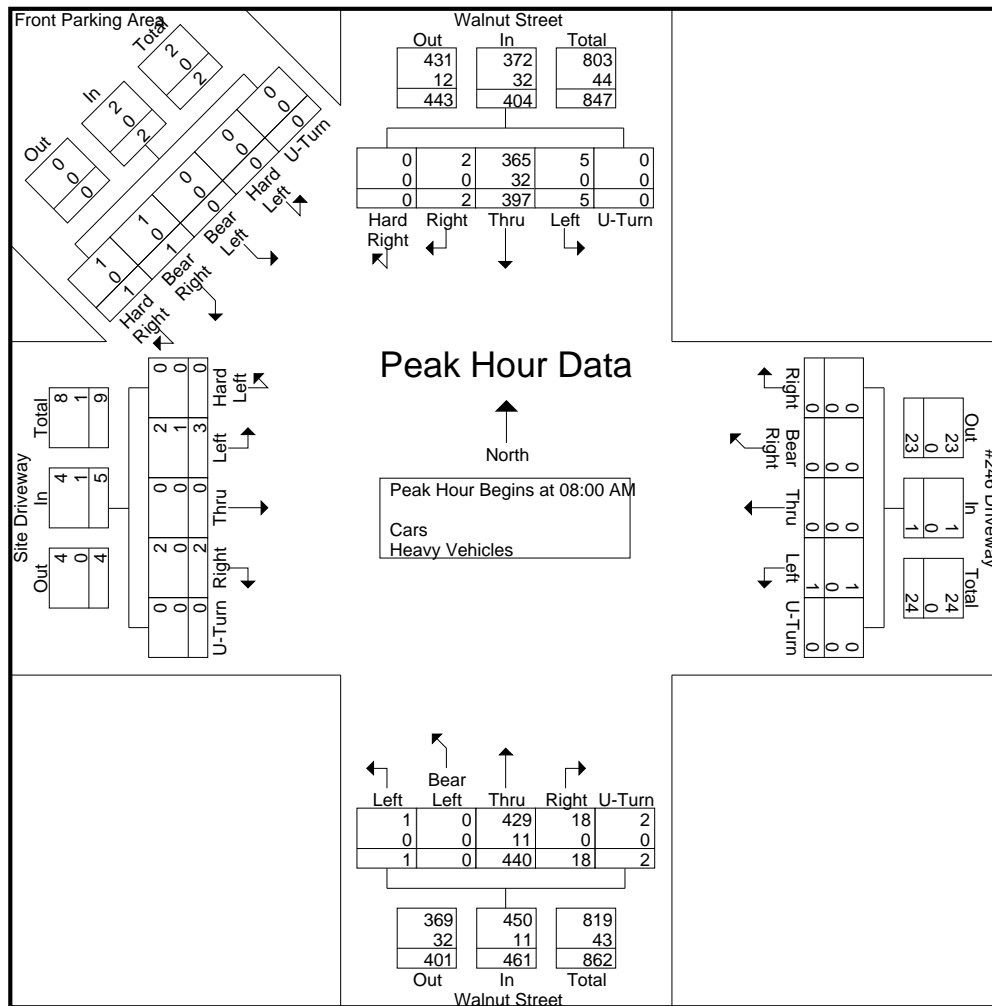
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179-16

N/S/NW: Walnut Street/Front Parking Area
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City, State: Newtonville, MA
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	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U- Turn	App. Total	Right	Bear Right	Thru	Left	U- Turn	App. Total	Right	Thru	Bear Left	Left	U- Turn	App. Total	Right	Thru	Left	Hard Left	U- Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U- Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 08:00 AM																															
08:00 AM	0	0	90	2	0	92	0	0	0	0	0	0	2	119	0	0	0	121	1	0	2	0	0	3	1	1	0	0	0	2	218
08:15 AM	0	0	94	0	0	94	0	0	0	0	0	0	8	111	0	1	1	121	0	0	1	0	0	1	0	0	0	0	0	0	216
08:30 AM	0	1	103	2	0	106	0	0	0	0	0	0	3	100	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	209
08:45 AM	0	1	110	1	0	112	0	0	0	1	0	1	5	110	0	0	1	116	1	0	0	0	0	1	0	0	0	0	0	0	230
Total Volume	0	2	397	5	0	404	0	0	0	1	0	1	18	440	0	1	2	461	2	0	3	0	0	5	1	1	0	0	0	2	873
% App. Total	0	0.5	98.3	1.2	0		0	0	0	100	0		3.9	95.4	0	0.2	0.4		40	0	60	0	0		50	50	0	0	0		
PHF	.000	.500	.902	.625	.000	.902	.000	.000	.000	.250	.000	.250	.563	.924	.000	.250	.500	.952	.500	.000	.375	.000	.000	.417	.250	.250	.000	.000	.000	.250	.949
Cars	0	2	365	5	0	372	0	0	0	1	0	1	18	429	0	1	2	450	2	0	2	0	0	4	1	1	0	0	0	2	829
% Cars	0	100	91.9	100	0	92.1	0	0	0	100	0	100	100	97.5	0	100	100	97.6	100	0	66.7	0	0	80.0	100	100	0	0	0	100	95.0
Heavy Vehicles	0	0	32	0	0	32	0	0	0	0	0	0	0	11	0	0	0	11	0	0	1	0	0	1	0	0	0	0	0	0	44
% Heavy Vehicles	0	0	8.1	0	0	7.9	0	0	0	0	0	0	0	2.5	0	0	0	2.4	0	0	33.3	0	0	20.0	0	0	0	0	0	0	5.0





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Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total	
04:00 PM	0	3	84	1	2	1	0	0	0	0	1	112	0	0	1	1	0	2	0	0	0	0	0	0	0	0	208
04:15 PM	0	2	84	0	0	3	0	0	1	0	0	87	0	0	2	1	0	3	0	0	0	0	0	0	0	0	183
04:30 PM	0	0	82	1	0	3	0	0	4	0	1	115	0	1	3	0	0	0	0	0	0	1	2	0	0	0	213
04:45 PM	0	4	79	0	0	1	0	0	0	0	0	90	0	1	1	4	0	5	0	0	0	0	0	0	0	0	185
Total	0	9	329	2	2	8	0	0	5	0	2	404	0	2	7	6	0	10	0	0	1	2	0	0	0	0	789
05:00 PM	0	5	82	0	0	6	0	0	3	0	0	117	0	1	0	2	0	4	0	0	0	0	0	0	0	0	220
05:15 PM	0	4	82	0	0	2	0	0	3	0	0	103	0	3	0	6	0	3	0	0	2	0	0	0	0	0	208
05:30 PM	0	2	97	0	0	2	0	0	1	0	0	110	0	1	2	9	0	2	0	0	0	1	0	0	0	0	227
05:45 PM	0	1	93	0	0	3	0	0	4	0	1	110	0	0	0	1	0	1	0	0	2	0	0	0	0	0	216
Total	0	12	354	0	0	13	0	0	11	0	1	440	0	5	2	18	0	10	0	0	4	1	0	0	0	0	871
Grand Total	0	21	683	2	2	21	0	0	16	0	3	844	0	7	9	24	0	20	0	0	5	3	0	0	0	0	1660
Apprch %	0	3	96.5	0.3	0.3	56.8	0	0	43.2	0	0.3	97.8	0	0.8	1	54.5	0	45.5	0	0	62.5	37.5	0	0	0	0	
Total %	0	1.3	41.1	0.1	0.1	1.3	0	0	1	0	0.2	50.8	0	0.4	0.5	1.4	0	1.2	0	0	0.3	0.2	0	0	0	0	
Cars	0	21	665	2	2	21	0	0	16	0	3	798	0	6	9	24	0	20	0	0	5	3	0	0	0	0	1595
% Cars	0	100	97.4	100	100	100	0	0	100	0	100	94.5	0	85.7	100	100	0	100	0	0	100	100	0	0	0	0	96.1
Heavy Vehicles	0	0	18	0	0	0	0	0	0	0	0	46	0	1	0	0	0	0	0	0	0	0	0	0	0	0	65
% Heavy Vehicles	0	0	2.6	0	0	0	0	0	0	0	0	5.5	0	14.3	0	0	0	0	0	0	0	0	0	0	0	0	3.9

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	
05:00 PM	0	5	82	0	0	87	6	0	0	3	0	9	0	117	0	1	0	118	2	0	4	0	0	6	0	0	0	0	0	0	220
05:15 PM	0	4	82	0	0	86	2	0	0	3	0	5	0	103	0	3	0	106	6	0	3	0	0	9	2	0	0	0	0	2	208
05:30 PM	0	2	97	0	0	99	2	0	0	1	0	3	0	110	0	1	2	113	9	0	2	0	0	11	0	1	0	0	0	1	227
05:45 PM	0	1	93	0	0	94	3	0	0	4	0	7	1	110	0	0	0	111	1	0	1	0	0	2	2	0	0	0	0	2	216
Total Volume	0	12	354	0	0	366	13	0	0	11	0	24	1	440	0	5	2	448	18	0	10	0	0	28	4	1	0	0	0	5	871
% App. Total	0	3.3	96.7	0	0		54.2	0	0	45.8	0		0.2	98.2	0	1.1	0.4		64.3	0	35.7	0	0		80	20	0	0	0		
PHF	.000	.600	.912	.000	.000	.924	.542	.000	.000	.688	.000	.667	.250	.940	.000	.417	.250	.949	.500	.000	.625	.000	.000	.636	.500	.250	.000	.000	.000	.625	.959
Cars	0	12	347	0	0	359	13	0	0	11	0	24	1	420	0	4	2	427	18	0	10	0	0	28	4	1	0	0	0	5	843
% Cars	0	100	98.0	0	0	98.1	100	0	0	100	0	100	100	95.5	0	80.0	100	95.3	100	0	100	0	0	100	100	100	0	0	0	100	96.8
Heavy Vehicles	0	0	7	0	0	7	0	0	0	0	0	0	0	20	0	1	0	21	0	0	0	0	0	0	0	0	0	0	0	0	28
% Heavy Vehicles	0	0	2.0	0	0	1.9	0	0	0	0	0	0	0	4.5	0	20.0	0	4.7	0	0	0	0	0	0	0	0	0	0	0	0	3.2

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



PRECISION
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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 GG
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Int. Total	
04:00 PM	0	3	83	1	2	1	0	0	0	0	1	108	0	0	1	1	0	2	0	0	0	0	0	0	0	0	203
04:15 PM	0	2	81	0	0	3	0	0	1	0	0	77	0	0	2	1	0	3	0	0	0	0	0	0	0	0	170
04:30 PM	0	0	78	1	0	3	0	0	4	0	1	107	0	1	3	0	0	0	0	0	1	2	0	0	0	0	201
04:45 PM	0	4	76	0	0	1	0	0	0	0	0	86	0	1	1	4	0	5	0	0	0	0	0	0	0	0	178
Total	0	9	318	2	2	8	0	0	5	0	2	378	0	2	7	6	0	10	0	0	1	2	0	0	0	0	752
05:00 PM	0	5	81	0	0	6	0	0	3	0	0	114	0	0	0	2	0	4	0	0	0	0	0	0	0	0	215
05:15 PM	0	4	81	0	0	2	0	0	3	0	0	94	0	3	0	6	0	3	0	0	2	0	0	0	0	0	198
05:30 PM	0	2	94	0	0	2	0	0	1	0	0	104	0	1	2	9	0	2	0	0	0	1	0	0	0	0	218
05:45 PM	0	1	91	0	0	3	0	0	4	0	1	108	0	0	0	1	0	1	0	0	2	0	0	0	0	0	212
Total	0	12	347	0	0	13	0	0	11	0	1	420	0	4	2	18	0	10	0	0	4	1	0	0	0	0	843
Grand Total	0	21	665	2	2	21	0	0	16	0	3	798	0	6	9	24	0	20	0	0	5	3	0	0	0	0	1595
Apprch %	0	3	96.4	0.3	0.3	56.8	0	0	43.2	0	0.4	97.8	0	0.7	1.1	54.5	0	45.5	0	0	62.5	37.5	0	0	0	0	
Total %	0	1.3	41.7	0.1	0.1	1.3	0	0	1	0	0.2	50	0	0.4	0.6	1.5	0	1.3	0	0	0.3	0.2	0	0	0	0	

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	
05:00 PM	0	5	81	0	0	86	6	0	0	3	0	9	0	114	0	0	0	114	2	0	4	0	0	6	0	0	0	0	0	0	215
05:15 PM	0	4	81	0	0	85	2	0	0	3	0	5	0	94	0	3	0	97	6	0	3	0	0	9	2	0	0	0	0	2	198
05:30 PM	0	2	94	0	0	96	2	0	0	1	0	3	0	104	0	1	2	107	9	0	2	0	0	11	0	1	0	0	0	1	218
05:45 PM	0	1	91	0	0	92	3	0	0	4	0	7	1	108	0	0	0	109	1	0	1	0	0	2	2	0	0	0	0	2	212
Total Volume	0	12	347	0	0	359	13	0	0	11	0	24	1	420	0	4	2	427	18	0	10	0	0	28	4	1	0	0	0	5	843
% App. Total	0	3.3	96.7	0	0		54.2	0	0	45.8	0		0.2	98.4	0	0.9	0.5		64.3	0	35.7	0	0		80	20	0	0	0		
PHF	.000	.600	.923	.000	.000	.935	.542	.000	.000	.688	.000	.667	.250	.921	.000	.333	.250	.936	.500	.000	.625	.000	.000	.636	.500	.250	.000	.000	.000	.625	.967

Peak Hour for Entire Intersection Begins at 05:00 PM

Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1



PRECISION
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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 GG
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Walnut Street From North					#246 Driveway From East					Walnut Street From South					Site Driveway From West					Front Parking Area From Northwest					Int. Total
	Hard Right	Right	Thru	Left	U-Turn	Right	Bear Right	Thru	Left	U-Turn	Right	Thru	Bear Left	Left	U-Turn	Right	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	
04:00 PM	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5
04:15 PM	0	0	3	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	13
04:30 PM	0	0	4	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	12
04:45 PM	0	0	3	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Total	0	0	11	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	37
05:00 PM	0	0	1	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	5
05:15 PM	0	0	1	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	10
05:30 PM	0	0	3	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	9
05:45 PM	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	7	0	0	0	0	0	0	0	0	20	0	1	0	0	0	0	0	0	0	0	0	0	0	28
Grand Total	0	0	18	0	0	0	0	0	0	0	0	46	0	1	0	0	0	0	0	0	0	0	0	0	0	65
Apprch %	0	0	100	0	0	0	0	0	0	0	0	97.9	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0
Total %	0	0	27.7	0	0	0	0	0	0	0	0	70.8	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						Int. Total
	Hard Right	Right	Thru	Left	U-Turn	App. Total	Right	Bear Right	Thru	Left	U-Turn	App. Total	Right	Thru	Bear Left	Left	U-Turn	App. Total	Right	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	App. Total	
04:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	5
04:15 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	13
04:30 PM	0	0	4	0	0	4	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	12
04:45 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	7
Total Volume	0	0	11	0	0	11	0	0	0	0	0	0	0	26	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	37
% App. Total	0	0	100	0	0		0	0	0	0	0		0	100	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.688	.000	.000	.688	.000	.000	.000	.000	.000	.000	.000	.650	.000	.000	.000	.650	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.712

Peak Hour for Entire Intersection Begins at 04:00 PM

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1



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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 GG
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest							
Start Time	Hard Right	Right	Thru	Left	Peds EB	Peds WB	Right	Bear Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Bear Left	Left	Peds WB	Peds EB	Right	Thru	Left	Hard Left	Peds NB	Peds SB	Hard Right	Bear Right	Bear Left	Hard Left	Peds EB	Peds WB	Int. Total	
04:00 PM	0	0	1	0	1	1	0	0	0	0	6	5	0	1	0	0	0	1	0	0	0	0	7	1	0	0	0	0	0	0	0	24
04:15 PM	0	0	0	0	0	0	0	0	0	0	6	9	0	0	0	0	2	1	0	0	0	0	6	0	0	0	0	0	0	0	0	24
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	2	10
04:45 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	0	2	2	0	0	0	0	2	1	0	0	0	0	0	0	0	12
Total	0	0	1	0	1	1	0	0	0	0	14	18	0	4	0	0	5	5	0	0	0	0	16	3	0	0	0	0	0	0	2	70
05:00 PM	0	0	0	0	0	0	0	0	0	0	1	2	0	1	0	0	0	1	0	0	0	0	1	6	0	0	0	0	0	0	0	12
05:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	0	0	10
05:30 PM	0	0	1	0	0	0	0	0	0	0	3	2	0	2	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	15
05:45 PM	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Total	0	0	1	0	0	1	0	0	0	0	5	5	0	4	0	0	0	1	0	0	0	0	13	10	0	0	0	0	0	0	0	40
Grand Total	0	0	2	0	1	2	0	0	0	0	19	23	0	8	0	0	5	6	0	0	0	0	29	13	0	0	0	0	0	0	2	110
Apprch %	0	0	40	0	20	40	0	0	0	0	45.2	54.8	0	42.1	0	0	26.3	31.6	0	0	0	0	69	31	0	0	0	0	0	0	100	
Total %	0	0	1.8	0	0.9	1.8	0	0	0	0	17.3	20.9	0	7.3	0	0	4.5	5.5	0	0	0	0	26.4	11.8	0	0	0	0	0	0	1.8	

	Walnut Street From North							#246 Driveway From East							Walnut Street From South							Site Driveway From West							Front Parking Area From Northwest									
Start Time	Har d Ri ght	Right	Thru	Left	Ped s EB	Ped s WB	App. Total	Right	Bear Right	Thru	Left	Ped s SB	Ped s NB	App. Total	Right	Thru	Bear Left	Left	Ped s WB	Ped s EB	App. Total	Right	Thru	Left	Har d Le ft	Ped s NB	Ped s SB	App. Total	Har d Ri ght	Bear Right	Bear Left	Har d Le ft	Ped s EB	Ped s WB	App. Total	Int. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																						
Peak Hour for Entire Intersection Begins at 04:00 PM																																						
04:00 PM	0	0	1	0	1	1	3	0	0	0	0	6	5	11	0	1	0	0	0	1	2	0	0	0	0	7	1	8	0	0	0	0	0	0	0	24		
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	6	9	15	0	0	0	0	2	1	3	0	0	0	0	6	0	6	0	0	0	0	0	0	0	24		
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	1	0	0	1	1	3	0	0	0	0	1	1	2	0	0	0	0	0	2	2	10		
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	1	3	0	2	0	0	2	2	6	0	0	0	0	2	1	3	0	0	0	0	0	0	0	12		
Total Volume	0	0	1	0	1	1	3	0	0	0	0	14	18	32	0	4	0	0	5	5	14	0	0	0	0	16	3	19	0	0	0	0	0	2	2	70		
% App. Total	0	0	33.3	0	33.3	33.3		0	0	0	0	43.8	56.2		0	28.6	0	0	35.7	35.7		0	0	0	0	84.2	15.8		0	0	0	0	0	100				
PHF	.000	.000	.250	.000	.250	.250	.250	.000	.000	.000	.000	.583	.500	.533	.000	.500	.000	.000	.625	.625	.583	.000	.000	.000	.000	.571	.750	.594	.000	.000	.000	.000	.000	.250	.729			

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



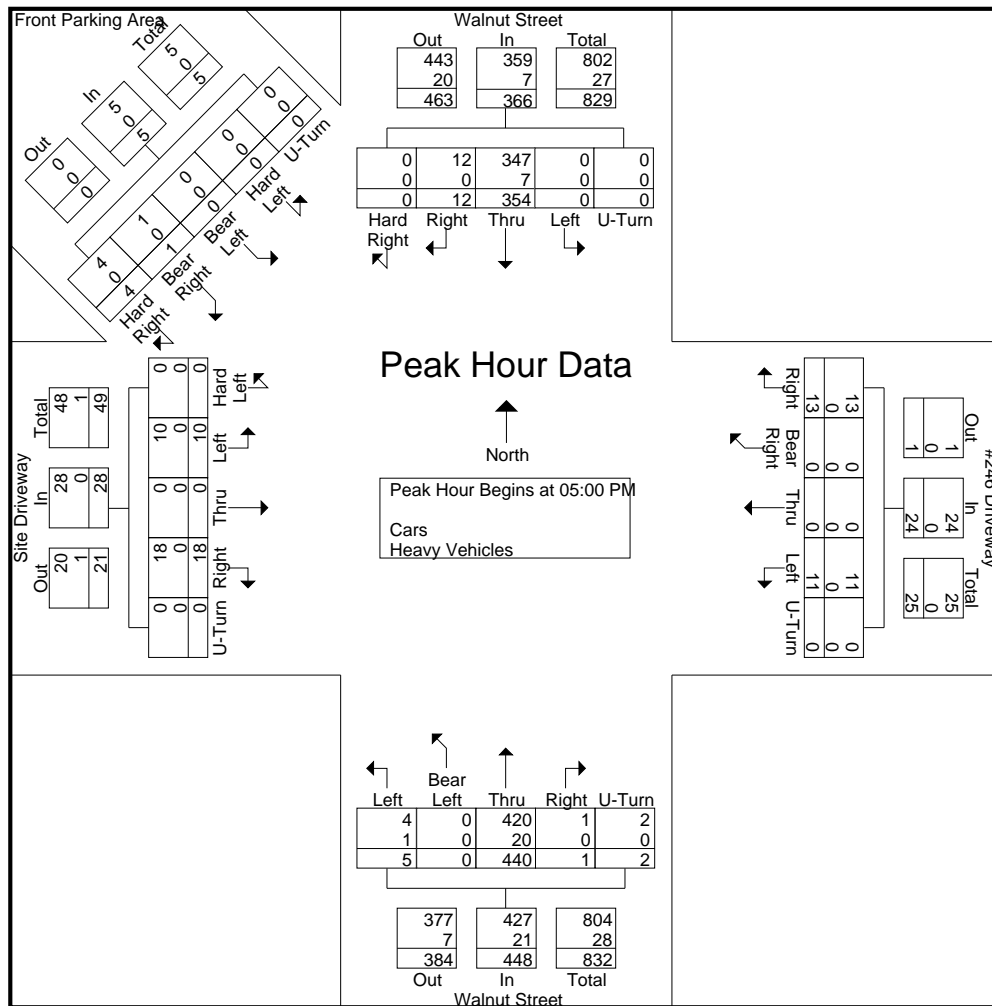
PRECISION
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179-16

N/S/NW: Walnut Street/Front Parking Area
E/W: #246 Driveway/ Site Drive
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 GG
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Page No : 1

	Walnut Street From North						#246 Driveway From East						Walnut Street From South						Site Driveway From West						Front Parking Area From Northwest						
Start Time	Hard Right	Right	Thru	Left	U- Turn	App. Total	Right	Bear Right	Thru	Left	U- Turn	App. Total	Right	Thru	Bear Left	Left	U- Turn	App. Total	Right	Thru	Left	Hard Left	U- Turn	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	U- Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 05:00 PM																															
05:00 PM	0	5	82	0	0	87	6	0	0	3	0	9	0	117	0	1	0	118	2	0	4	0	0	6	0	0	0	0	0	0	220
05:15 PM	0	4	82	0	0	86	2	0	0	3	0	5	0	103	0	3	0	106	6	0	3	0	0	9	2	0	0	0	0	2	208
05:30 PM	0	2	97	0	0	99	2	0	0	1	0	3	0	110	0	1	2	113	9	0	2	0	0	11	0	1	0	0	0	1	227
05:45 PM	0	1	93	0	0	94	3	0	0	4	0	7	1	110	0	0	0	111	1	0	1	0	0	2	2	0	0	0	0	2	216
Total Volume	0	12	354	0	0	366	13	0	0	11	0	24	1	440	0	5	2	448	18	0	10	0	0	28	4	1	0	0	0	5	871
% App. Total	0	3.3	96.7	0	0		54.2	0	0	45.8	0		0.2	98.2	0	1.1	0.4		64.3	0	35.7	0	0		80	20	0	0	0		
PHF	.000	.600	.912	.000	.000	.924	.542	.000	.000	.688	.000	.667	.250	.940	.000	.417	.250	.949	.500	.000	.625	.000	.000	.636	.500	.250	.000	.000	.000	.625	.959
Cars	0	12	347	0	0	359	13	0	0	11	0	24	1	420	0	4	2	427	18	0	10	0	0	28	4	1	0	0	0	5	843
% Cars	0	100	98.0	0	0	98.1	100	0	0	100	0	100	100	95.5	0	80.0	100	95.3	100	0	100	0	0	100	100	100	0	0	0	100	96.8
Heavy Vehicles	0	0	7	0	0	7	0	0	0	0	0	0	0	20	0	1	0	21	0	0	0	0	0	0	0	0	0	0	0	0	28
% Heavy Vehicles	0	0	2.0	0	0	1.9	0	0	0	0	0	0	0	4.5	0	20.0	0	4.7	0	0	0	0	0	0	0	0	0	0	0	0	3.2





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File Name : 154796 H
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File Name : 154796 H
Site Code : 13263.00
Start Date : 11/19/2015
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179-16

N/S: Walnut Street
W/NW: Alley Driveway/ Front Parking Area
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 H
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North				Walnut Street From South				Front Prking Area From Southwest				Alley Driveway (North Side) From West				Int. Total
Start Time	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	Hard Right	Right	Left	U-Turn	
07:00 AM	0	0	11	0	2	0	0	0	0	0	0	0	0	0	0	0	13
07:15 AM	0	0	9	0	7	0	0	0	0	0	0	0	0	0	0	0	16
07:30 AM	0	0	9	0	2	0	0	0	0	0	0	0	0	0	0	0	11
07:45 AM	0	0	9	0	5	0	0	0	0	0	0	0	0	0	0	0	14
Total	0	0	38	0	16	0	0	0	0	0	0	0	0	0	0	0	54
08:00 AM	0	0	8	0	3	0	0	0	0	0	0	0	0	0	0	0	11
08:15 AM	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	10
08:30 AM	0	0	10	0	4	0	0	0	0	0	0	0	0	0	0	0	14
08:45 AM	0	0	6	0	3	0	0	0	0	0	0	0	0	0	0	0	9
Total	0	0	32	0	12	0	0	0	0	0	0	0	0	0	0	0	44
Grand Total	0	0	70	0	28	0	0	0	0	0	0	0	0	0	0	0	98
Apprch %	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	71.4	0	28.6	0	0	0	0	0	0	0	0	0	0	0	

	Walnut Street From North					Walnut Street From South					Front Prking Area From Southwest					Alley Driveway (North Side) From West					Int. Total
Start Time	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Hard Right	Right	Left	U-Turn	App. Total	
07:00 AM	0	0	11	0	11	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	13
07:15 AM	0	0	9	0	9	7	0	0	0	7	0	0	0	0	0	0	0	0	0	0	16
07:30 AM	0	0	9	0	9	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	11
07:45 AM	0	0	9	0	9	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	14
Total Volume	0	0	38	0	38	16	0	0	0	16	0	0	0	0	0	0	0	0	0	0	54
% App. Total	0	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.864	.000	.864	.571	.000	.000	.000	.571	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.844

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM



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179-16

N/S: Walnut Street
W/NW: Alley Driveway/ Front Parking Area
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 H
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

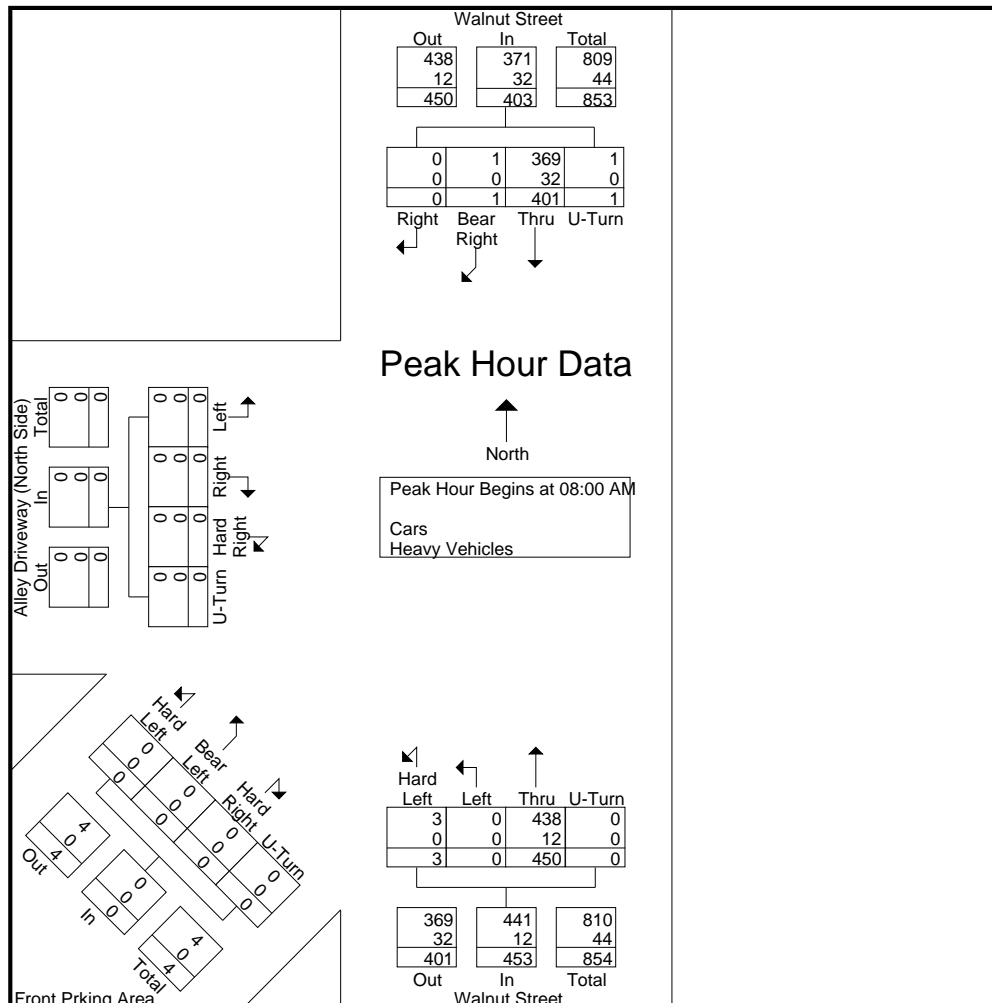
Start Time	Walnut Street From North					Walnut Street From South					Front Prking Area From Southwest					Alley Driveway (North Side) From West					Int. Total
	Right	Bear Right	Thru	Peds EB	Peds WB	Thru	Left	Hard Left	Peds WB	Peds EB	Hard Right	Bear Left	Hard Left	Peds NB	Peds SB	Hard Right	Right	Left	Peds NB	Peds SB	
07:00 AM	0	0	1	1	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	8
07:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	13
07:30 AM	0	0	5	3	0	0	0	0	0	0	0	0	0	7	9	0	0	0	7	10	41
07:45 AM	0	0	0	2	0	1	0	0	0	2	0	0	0	1	6	0	0	0	1	7	20
Total	0	0	6	7	2	1	0	0	0	2	0	0	0	8	23	0	0	0	8	25	82
08:00 AM	0	0	0	4	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	10
08:15 AM	0	0	1	9	4	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	18
08:30 AM	0	0	0	2	1	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	15
08:45 AM	0	0	0	4	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	8
Total	0	0	1	19	8	2	0	0	0	0	0	0	0	1	9	0	0	0	1	10	51
Grand Total	0	0	7	26	10	3	0	0	0	2	0	0	0	9	32	0	0	0	9	35	133
Apprch %	0	0	16.3	60.5	23.3	60	0	0	0	40	0	0	0	22	78	0	0	0	20.5	79.5	
Total %	0	0	5.3	19.5	7.5	2.3	0	0	0	1.5	0	0	0	6.8	24.1	0	0	0	6.8	26.3	

	Walnut Street From North						Walnut Street From South						Front Prking Area From Southwest						Alley Driveway (North Side) From West						
Start Time	Right	Bear Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Hard Left	Peds WB	Peds EB	App. Total	Hard Right	Bear Left	Hard Left	Peds NB	Peds SB	App. Total	Hard Right	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	0	0	5	3	0	8	0	0	0	0	0	0	0	0	0	7	9	16	0	0	0	7	10	17	41
07:45 AM	0	0	0	2	0	2	1	0	0	0	2	3	0	0	0	1	6	7	0	0	0	1	7	8	20
08:00 AM	0	0	0	4	2	6	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2	10
08:15 AM	0	0	1	9	4	14	1	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	2	2	18
Total Volume	0	0	6	18	6	30	2	0	0	0	2	4	0	0	0	8	18	26	0	0	0	8	21	29	89
% App. Total	0	0	20	60	20		50	0	0	0	50		0	0	0	30.8	69.2		0	0	0	27.6	72.4		
PHF	.000	.000	.300	.500	.375	.536	.500	.000	.000	.000	.250	.333	.000	.000	.000	.286	.500	.406	.000	.000	.000	.286	.525	.426	.543



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179-16

N/S: Walnut Street
W/NW: Alley Driveway/ Front Parking Area
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 HH
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North				Walnut Street From South				Front Prking Area From Southwest				Alley Driveway (North Side) From West				Int. Total
Start Time	Right	Bear Right	Thru	U-Turn	Thru	Left	Hard Left	U-Turn	Hard Right	Bear Left	Hard Left	U-Turn	Hard Right	Right	Left	U-Turn	
04:00 PM	0	0	93	0	113	0	0	0	0	0	0	0	0	0	0	0	206
04:15 PM	0	0	81	0	84	0	0	0	0	0	0	0	0	0	0	0	165
04:30 PM	0	0	78	0	111	0	2	0	0	0	0	0	0	0	0	0	191
04:45 PM	0	0	81	0	90	0	1	0	0	0	0	0	0	0	0	0	172
Total	0	0	333	0	398	0	3	0	0	0	0	0	0	0	0	0	734
05:00 PM	0	0	87	0	129	0	0	0	0	0	0	0	0	0	0	0	216
05:15 PM	0	1	85	0	106	0	1	2	1	0	0	0	0	0	0	0	196
05:30 PM	0	1	97	0	112	0	0	0	0	0	0	0	0	0	0	0	210
05:45 PM	0	1	91	0	119	0	0	0	0	0	0	0	0	0	0	0	211
Total	0	3	360	0	466	0	1	2	1	0	0	0	0	0	0	0	833
Grand Total	0	3	693	0	864	0	4	2	1	0	0	0	0	0	0	0	1567
Apprch %	0	0.4	99.6	0	99.3	0	0.5	0.2	100	0	0	0	0	0	0	0	
Total %	0	0.2	44.2	0	55.1	0	0.3	0.1	0.1	0	0	0	0	0	0	0	

	Walnut Street From North					Walnut Street From South					Front Prking Area From Southwest					Alley Driveway (North Side) From West					Int. Total
Start Time	Right	Bear Right	Thru	U-Turn	App. Total	Thru	Left	Hard Left	U-Turn	App. Total	Hard Right	Bear Left	Hard Left	U-Turn	App. Total	Hard Right	Right	Left	U-Turn	App. Total	
05:00 PM	0	0	87	0	87	129	0	0	0	129	0	0	0	0	0	0	0	0	0	0	216
05:15 PM	0	1	85	0	86	106	0	1	2	109	1	0	0	0	1	0	0	0	0	0	196
05:30 PM	0	1	97	0	98	112	0	0	0	112	0	0	0	0	0	0	0	0	0	0	210
05:45 PM	0	1	91	0	92	119	0	0	0	119	0	0	0	0	0	0	0	0	0	0	211
Total Volume	0	3	360	0	363	466	0	1	2	469	1	0	0	0	1	0	0	0	0	0	833
% App. Total	0	0.8	99.2	0		99.4	0	0.2	0.4		100	0	0	0		0	0	0	0		
PHF	.000	.750	.928	.000	.926	.903	.000	.250	.250	.909	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.964

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



179-16

File Name : 154796 HH
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

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179-16

N/S: Walnut Street
W/NW: Alley Driveway/ Front Parking Area
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 HH
Site Code : 13263.00
Start Date : 11/19/2015
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Groups Printed- Peds and Bicycles

Start Time	Walnut Street From North					Walnut Street From South					Front Prking Area From Southwest					Alley Driveway (North Side) From West					Int. Total
	Right	Bear Right	Thru	Peds EB	Peds WB	Thru	Left	Hard Left	Peds WB	Peds EB	Hard Right	Bear Left	Hard Left	Peds NB	Peds SB	Hard Right	Right	Left	Peds NB	Peds SB	
04:00 PM	0	0	1	1	1	0	0	0	0	0	0	0	0	6	1	0	0	0	5	1	16
04:15 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2	3	11
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	6	2	14
04:45 PM	0	0	0	0	1	2	0	0	0	0	0	0	0	8	2	0	0	0	5	1	19
Total	0	0	1	2	2	2	0	0	0	0	0	0	0	22	6	0	0	0	18	7	60
05:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	6	8	0	0	0	2	3	20
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	6	1	13
05:30 PM	0	0	1	2	1	2	0	0	0	0	0	0	0	5	3	0	0	0	5	2	21
05:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	1	0	6
Total	0	0	1	2	2	2	0	0	0	2	0	0	0	16	15	0	0	0	14	6	60
Grand Total	0	0	2	4	4	4	0	0	0	2	0	0	0	38	21	0	0	0	32	13	120
Apprch %	0	0	20	40	40	66.7	0	0	0	33.3	0	0	0	64.4	35.6	0	0	0	71.1	28.9	
Total %	0	0	1.7	3.3	3.3	3.3	0	0	0	1.7	0	0	0	31.7	17.5	0	0	0	26.7	10.8	

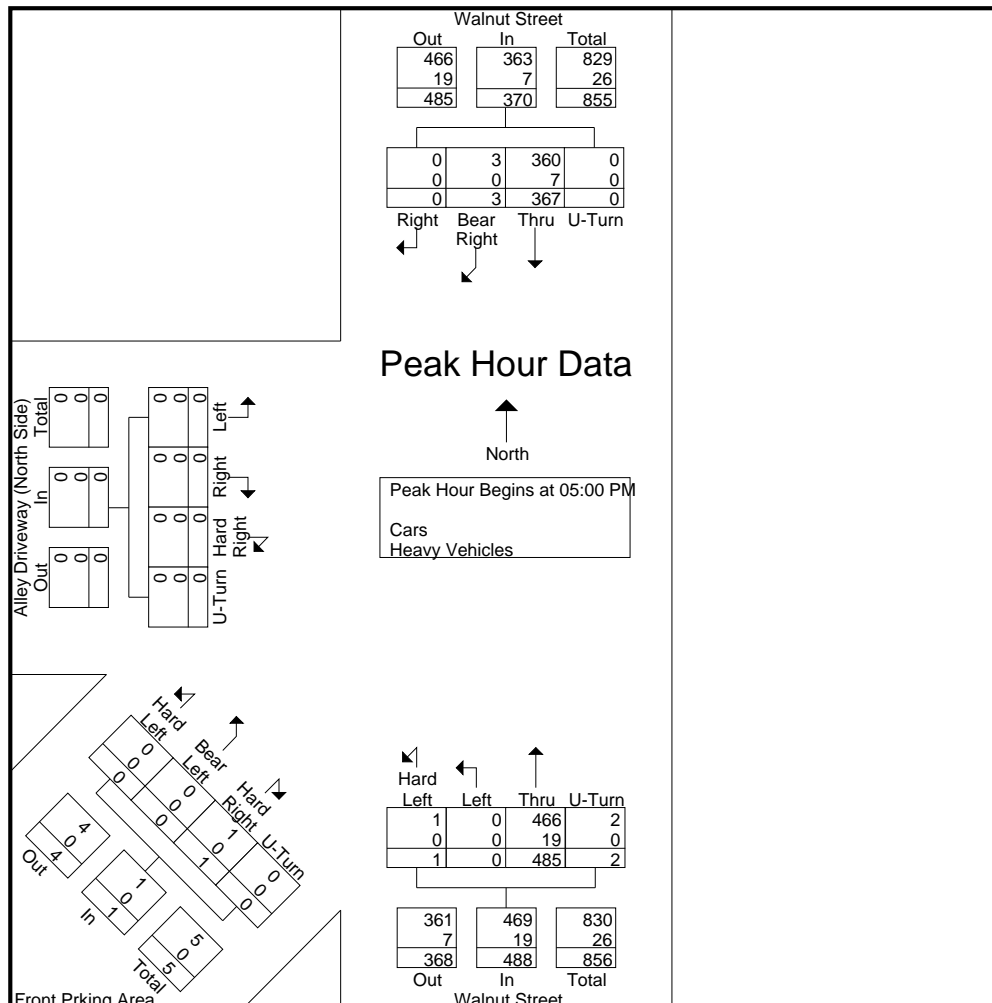
	Walnut Street From North						Walnut Street From South						Front Prking Area From Southwest						Alley Driveway (North Side) From West						
Start Time	Right	Bear Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Hard Left	Peds WB	Peds EB	App. Total	Hard Right	Bear Left	Hard Left	Peds NB	Peds SB	App. Total	Hard Right	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	0	0	0	1	1	2	0	0	0	0	2	0	0	0	8	2	10	0	0	0	5	1	6	19
05:00 PM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	6	8	14	0	0	0	2	3	5	20
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6	0	0	0	6	1	7	13
05:30 PM	0	0	1	2	1	4	2	0	0	0	0	2	0	0	0	5	3	8	0	0	0	5	2	7	21
Total Volume	0	0	1	2	3	6	4	0	0	0	0	4	0	0	0	21	17	38	0	0	0	18	7	25	73
% App. Total	0	0	16.7	33.3	50		100	0	0	0	0		0	0	0	55.3	44.7		0	0	0	72	28		
PHF	.000	.000	.250	.250	.750	.375	.500	.000	.000	.000	.000	.500	.000	.000	.000	.656	.531	.679	.000	.000	.000	.750	.583	.893	.869



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File Name : 154796 HH
Site Code : 13263.00
Start Date : 11/19/2015
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Peak Hour for Entire Intersection Begins at 05:00 PM





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179-16

N/S: Walnut Street
W: Foster Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 I
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	72	0	80	1	0	0	0	0	153
07:15 AM	2	95	0	74	0	0	1	0	0	172
07:30 AM	5	86	0	111	3	1	0	0	0	206
07:45 AM	2	74	1	118	2	0	0	0	0	197
Total	9	327	1	383	6	1	1	0	0	728
08:00 AM	7	93	0	118	2	0	0	0	0	220
08:15 AM	4	93	0	108	1	1	0	0	0	207
08:30 AM	1	102	0	103	2	0	0	0	0	208
08:45 AM	3	110	0	107	1	1	0	0	0	222
Total	15	398	0	436	6	2	0	0	0	857
Grand Total	24	725	1	819	12	3	1	0	0	1585
Apprch %	3.2	96.7	0.1	98.2	1.4	0.4	100	0	0	
Total %	1.5	45.7	0.1	51.7	0.8	0.2	0.1	0	0	
Cars	24	658	1	790	12	3	1	0	0	1489
% Cars	100	90.8	100	96.5	100	100	100	0	0	93.9
Heavy Vehicles	0	67	0	29	0	0	0	0	0	96
% Heavy Vehicles	0	9.2	0	3.5	0	0	0	0	0	6.1

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	7	93	0	100	118	2	0	120	0	0	0	0	220
08:15 AM	4	93	0	97	108	1	1	110	0	0	0	0	207
08:30 AM	1	102	0	103	103	2	0	105	0	0	0	0	208
08:45 AM	3	110	0	113	107	1	1	109	0	0	0	0	222
Total Volume	15	398	0	413	436	6	2	444	0	0	0	0	857
% App. Total	3.6	96.4	0		98.2	1.4	0.5		0	0	0		
PHF	.536	.905	.000	.914	.924	.750	.500	.925	.000	.000	.000	.000	.965
Cars	15	370	0	385	423	6	2	431	0	0	0	0	816
% Cars	100	93.0	0	93.2	97.0	100	100	97.1	0	0	0	0	95.2
Heavy Vehicles	0	28	0	28	13	0	0	13	0	0	0	0	41
% Heavy Vehicles	0	7.0	0	6.8	3.0	0	0	2.9	0	0	0	0	4.8



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179-16

N/S: Walnut Street
W: Foster Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 I
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	61	0	78	1	0	0	0	0	140
07:15 AM	2	84	0	67	0	0	1	0	0	154
07:30 AM	5	77	0	109	3	1	0	0	0	195
07:45 AM	2	66	1	113	2	0	0	0	0	184
Total	9	288	1	367	6	1	1	0	0	673
08:00 AM	7	85	0	115	2	0	0	0	0	209
08:15 AM	4	87	0	106	1	1	0	0	0	199
08:30 AM	1	93	0	99	2	0	0	0	0	195
08:45 AM	3	105	0	103	1	1	0	0	0	213
Total	15	370	0	423	6	2	0	0	0	816
Grand Total	24	658	1	790	12	3	1	0	0	1489
Apprch %	3.5	96.3	0.1	98.1	1.5	0.4	100	0	0	
Total %	1.6	44.2	0.1	53.1	0.8	0.2	0.1	0	0	

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	7	85	0	92	115	2	0	117	0	0	0	0	209
08:15 AM	4	87	0	91	106	1	1	108	0	0	0	0	199
08:30 AM	1	93	0	94	99	2	0	101	0	0	0	0	195
08:45 AM	3	105	0	108	103	1	1	105	0	0	0	0	213
Total Volume	15	370	0	385	423	6	2	431	0	0	0	0	816
% App. Total	3.9	96.1	0		98.1	1.4	0.5		0	0	0		
PHF	.536	.881	.000	.891	.920	.750	.500	.921	.000	.000	.000	.000	.958



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179-16

N/S: Walnut Street
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 I
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	11	0	2	0	0	0	0	0	13
07:15 AM	0	11	0	7	0	0	0	0	0	18
07:30 AM	0	9	0	2	0	0	0	0	0	11
07:45 AM	0	8	0	5	0	0	0	0	0	13
Total	0	39	0	16	0	0	0	0	0	55
08:00 AM	0	8	0	3	0	0	0	0	0	11
08:15 AM	0	6	0	2	0	0	0	0	0	8
08:30 AM	0	9	0	4	0	0	0	0	0	13
08:45 AM	0	5	0	4	0	0	0	0	0	9
Total	0	28	0	13	0	0	0	0	0	41
Grand Total	0	67	0	29	0	0	0	0	0	96
Apprch %	0	100	0	100	0	0	0	0	0	
Total %	0	69.8	0	30.2	0	0	0	0	0	

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	0	11	0	11	2	0	0	2	0	0	0	0	13
07:15 AM	0	11	0	11	7	0	0	7	0	0	0	0	18
07:30 AM	0	9	0	9	2	0	0	2	0	0	0	0	11
07:45 AM	0	8	0	8	5	0	0	5	0	0	0	0	13
Total Volume	0	39	0	39	16	0	0	16	0	0	0	0	55
% App. Total	0	100	0		100	0	0		0	0	0		
PHF	.000	.886	.000	.886	.571	.000	.000	.571	.000	.000	.000	.000	.764



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179-16

N/S: Walnut Street
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 I
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Walnut Street From North				Walnut Street From South				Foster Street From West				Int. Total
	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	
07:00 AM	0	1	0	1	0	0	0	0	0	0	0	1	3
07:15 AM	0	0	1	0	0	0	0	0	0	0	1	3	5
07:30 AM	0	7	3	0	0	0	0	1	0	0	6	8	25
07:45 AM	0	0	2	0	1	0	0	0	0	0	1	7	11
Total	0	8	6	1	1	0	0	1	0	0	8	19	44
08:00 AM	0	1	9	2	0	0	0	0	0	0	0	1	13
08:15 AM	0	0	10	3	1	0	0	0	0	0	0	2	16
08:30 AM	0	0	2	1	0	0	0	0	0	0	0	4	7
08:45 AM	0	0	6	0	1	0	0	0	0	0	3	0	10
Total	0	1	27	6	2	0	0	0	0	0	3	7	46
Grand Total	0	9	33	7	3	0	0	1	0	0	11	26	90
Apprch %	0	18.4	67.3	14.3	75	0	0	25	0	0	29.7	70.3	
Total %	0	10	36.7	7.8	3.3	0	0	1.1	0	0	12.2	28.9	

	Walnut Street From North					Walnut Street From South					Foster Street From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:30 AM																
07:30 AM	0	7	3	0	10	0	0	0	1	1	0	0	6	8	14	25
07:45 AM	0	0	2	0	2	1	0	0	0	1	0	0	1	7	8	11
08:00 AM	0	1	9	2	12	0	0	0	0	0	0	0	0	1	1	13
08:15 AM	0	0	10	3	13	1	0	0	0	1	0	0	0	2	2	16
Total Volume	0	8	24	5	37	2	0	0	1	3	0	0	7	18	25	65
% App. Total	0	21.6	64.9	13.5		66.7	0	0	33.3		0	0	28	72		
PHF	.000	.286	.600	.417	.712	.500	.000	.000	.250	.750	.000	.000	.292	.563	.446	.650

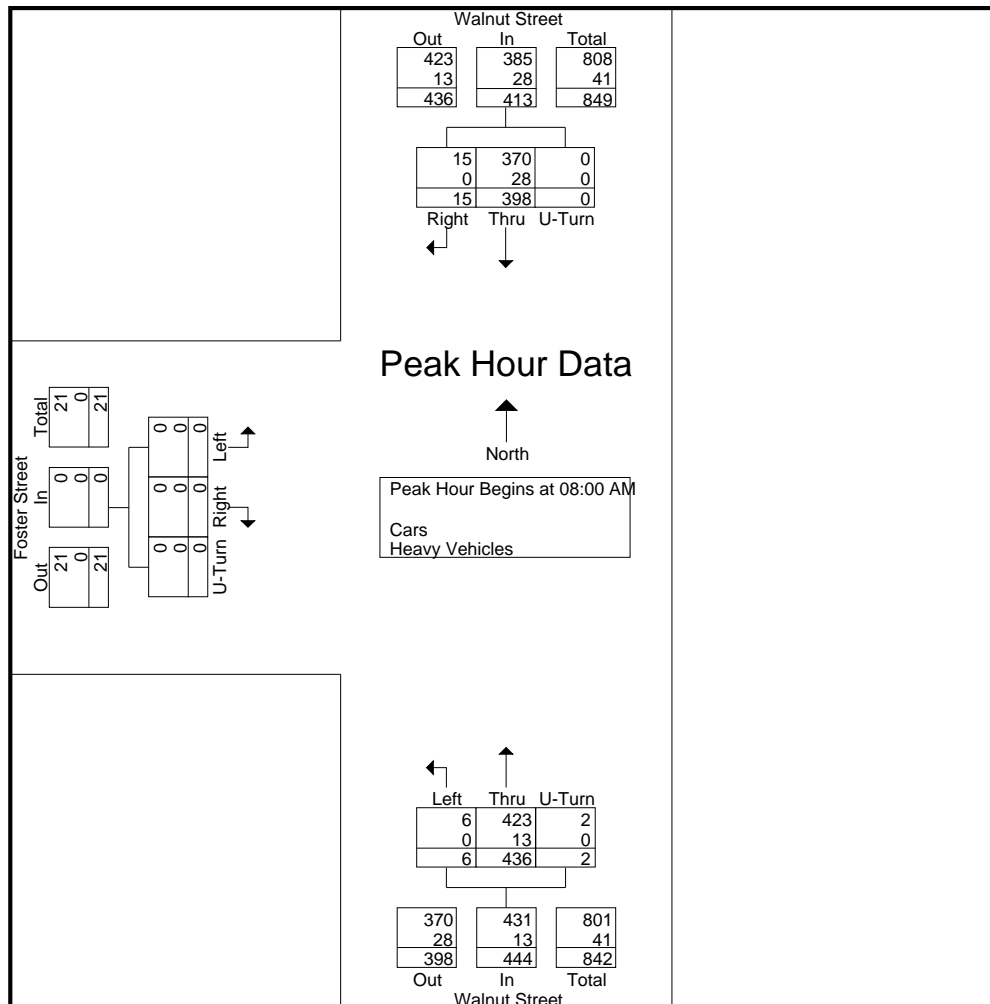


179-16

N/S: Walnut Street
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 I
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	7	93	0	100	118	2	0	120	0	0	0	0	220
08:15 AM	4	93	0	97	108	1	1	110	0	0	0	0	207
08:30 AM	1	102	0	103	103	2	0	105	0	0	0	0	208
08:45 AM	3	110	0	113	107	1	1	109	0	0	0	0	222
Total Volume	15	398	0	413	436	6	2	444	0	0	0	0	857
% App. Total	3.6	96.4	0		98.2	1.4	0.5		0	0	0		
PHF	.536	.905	.000	.914	.924	.750	.500	.925	.000	.000	.000	.000	.965
Cars	15	370	0	385	423	6	2	431	0	0	0	0	816
% Cars	100	93.0	0	93.2	97.0	100	100	97.1	0	0	0	0	95.2
Heavy Vehicles	0	28	0	28	13	0	0	13	0	0	0	0	41
% Heavy Vehicles	0	7.0	0	6.8	3.0	0	0	2.9	0	0	0	0	4.8





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179-16

N/S: Walnut Street
W: Foster Street
City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 II
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	2	94	0	113	4	0	0	0	0	213
04:15 PM	2	86	0	92	1	0	0	0	0	181
04:30 PM	2	81	0	112	3	0	0	0	0	198
04:45 PM	2	91	0	92	3	0	0	0	0	188
Total	8	352	0	409	11	0	0	0	0	780
05:00 PM	2	83	0	123	5	0	0	0	0	213
05:15 PM	2	93	0	102	5	0	0	0	0	202
05:30 PM	4	100	0	109	4	0	0	0	0	217
05:45 PM	1	89	0	105	10	1	0	0	0	206
Total	9	365	0	439	24	1	0	0	0	838
Grand Total	17	717	0	848	35	1	0	0	0	1618
Apprch %	2.3	97.7	0	95.9	4	0.1	0	0	0	
Total %	1.1	44.3	0	52.4	2.2	0.1	0	0	0	
Cars	17	700	0	804	34	1	0	0	0	1556
% Cars	100	97.6	0	94.8	97.1	100	0	0	0	96.2
Heavy Vehicles	0	17	0	44	1	0	0	0	0	62
% Heavy Vehicles	0	2.4	0	5.2	2.9	0	0	0	0	3.8

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	2	83	0	85	123	5	0	128	0	0	0	0	213
05:15 PM	2	93	0	95	102	5	0	107	0	0	0	0	202
05:30 PM	4	100	0	104	109	4	0	113	0	0	0	0	217
05:45 PM	1	89	0	90	105	10	1	116	0	0	0	0	206
Total Volume	9	365	0	374	439	24	1	464	0	0	0	0	838
% App. Total	2.4	97.6	0		94.6	5.2	0.2		0	0	0		
PHF	.563	.913	.000	.899	.892	.600	.250	.906	.000	.000	.000	.000	.965
Cars	9	358	0	367	419	23	1	443	0	0	0	0	810
% Cars	100	98.1	0	98.1	95.4	95.8	100	95.5	0	0	0	0	96.7
Heavy Vehicles	0	7	0	7	20	1	0	21	0	0	0	0	28
% Heavy Vehicles	0	1.9	0	1.9	4.6	4.2	0	4.5	0	0	0	0	3.3



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179-16

N/S: Walnut Street
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City, State: Newtonville, MA
Client: VHB/ C. Trearchis

File Name : 154796 II
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Cars

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	2	93	0	109	4	0	0	0	0	208
04:15 PM	2	83	0	82	1	0	0	0	0	168
04:30 PM	2	77	0	106	3	0	0	0	0	188
04:45 PM	2	89	0	88	3	0	0	0	0	182
Total	8	342	0	385	11	0	0	0	0	746
05:00 PM	2	82	0	120	5	0	0	0	0	209
05:15 PM	2	91	0	94	4	0	0	0	0	191
05:30 PM	4	98	0	103	4	0	0	0	0	209
05:45 PM	1	87	0	102	10	1	0	0	0	201
Total	9	358	0	419	23	1	0	0	0	810
Grand Total	17	700	0	804	34	1	0	0	0	1556
Apprch %	2.4	97.6	0	95.8	4.1	0.1	0	0	0	
Total %	1.1	45	0	51.7	2.2	0.1	0	0	0	

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	2	82	0	84	120	5	0	125	0	0	0	0	209
05:15 PM	2	91	0	93	94	4	0	98	0	0	0	0	191
05:30 PM	4	98	0	102	103	4	0	107	0	0	0	0	209
05:45 PM	1	87	0	88	102	10	1	113	0	0	0	0	201
Total Volume	9	358	0	367	419	23	1	443	0	0	0	0	810
% App. Total	2.5	97.5	0		94.6	5.2	0.2		0	0	0		
PHF	.563	.913	.000	.900	.873	.575	.250	.886	.000	.000	.000	.000	.969



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179-16

N/S: Walnut Street
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File Name : 154796 II
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Page No : 1

Groups Printed- Heavy Vehicles

	Walnut Street From North			Walnut Street From South			Foster Street From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	1	0	4	0	0	0	0	0	5
04:15 PM	0	3	0	10	0	0	0	0	0	13
04:30 PM	0	4	0	6	0	0	0	0	0	10
04:45 PM	0	2	0	4	0	0	0	0	0	6
Total	0	10	0	24	0	0	0	0	0	34
05:00 PM	0	1	0	3	0	0	0	0	0	4
05:15 PM	0	2	0	8	1	0	0	0	0	11
05:30 PM	0	2	0	6	0	0	0	0	0	8
05:45 PM	0	2	0	3	0	0	0	0	0	5
Total	0	7	0	20	1	0	0	0	0	28
Grand Total	0	17	0	44	1	0	0	0	0	62
Apprch %	0	100	0	97.8	2.2	0	0	0	0	
Total %	0	27.4	0	71	1.6	0	0	0	0	

	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	1	0	1	4	0	0	4	0	0	0	0	5
04:15 PM	0	3	0	3	10	0	0	10	0	0	0	0	13
04:30 PM	0	4	0	4	6	0	0	6	0	0	0	0	10
04:45 PM	0	2	0	2	4	0	0	4	0	0	0	0	6
Total Volume	0	10	0	10	24	0	0	24	0	0	0	0	34
% App. Total	0	100	0		100	0	0		0	0	0		
PHF	.000	.625	.000	.625	.600	.000	.000	.600	.000	.000	.000	.000	.654



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File Name : 154796 II
Site Code : 13263.00
Start Date : 11/19/2015
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Walnut Street From North				Walnut Street From South				Foster Street From West				Int. Total
	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	
04:00 PM	0	1	2	2	1	0	0	0	0	0	0	0	6
04:15 PM	0	0	1	0	0	0	0	0	0	0	4	0	5
04:30 PM	0	0	0	2	1	0	0	0	0	0	3	2	8
04:45 PM	0	0	0	4	2	0	0	0	0	0	4	2	12
Total	0	1	3	8	4	0	0	0	0	0	11	4	31
05:00 PM	0	0	1	1	1	0	0	0	0	0	4	5	12
05:15 PM	0	0	2	1	0	1	0	0	0	0	4	2	10
05:30 PM	0	1	2	1	2	0	0	0	0	0	4	2	12
05:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	1
Total	0	1	6	3	3	1	0	0	0	0	12	9	35
Grand Total	0	2	9	11	7	1	0	0	0	0	23	13	66
Apprch %	0	9.1	40.9	50	87.5	12.5	0	0	0	0	63.9	36.1	
Total %	0	3	13.6	16.7	10.6	1.5	0	0	0	0	34.8	19.7	

	Walnut Street From North					Walnut Street From South					Foster Street From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 04:45 PM																
04:45 PM	0	0	0	4		2	0	0	0	2	0	0	4	2	6	12
05:00 PM	0	0	1	1	2	1	0	0	0	1	0	0	4	5	9	12
05:15 PM	0	0	2	1	3	0	1	0	0	1	0	0	4	2	6	10
05:30 PM	0	1	2	1	4	2	0	0	0	2	0	0	4	2	6	12
Total Volume	0	1	5	7	13	5	1	0	0	6	0	0	16	11	27	46
% App. Total	0	7.7	38.5	53.8		83.3	16.7	0	0		0	0	59.3	40.7		
PHF	.000	.250	.625	.438	.813	.625	.250	.000	.000	.750	.000	.000	1.00	.550	.750	.958



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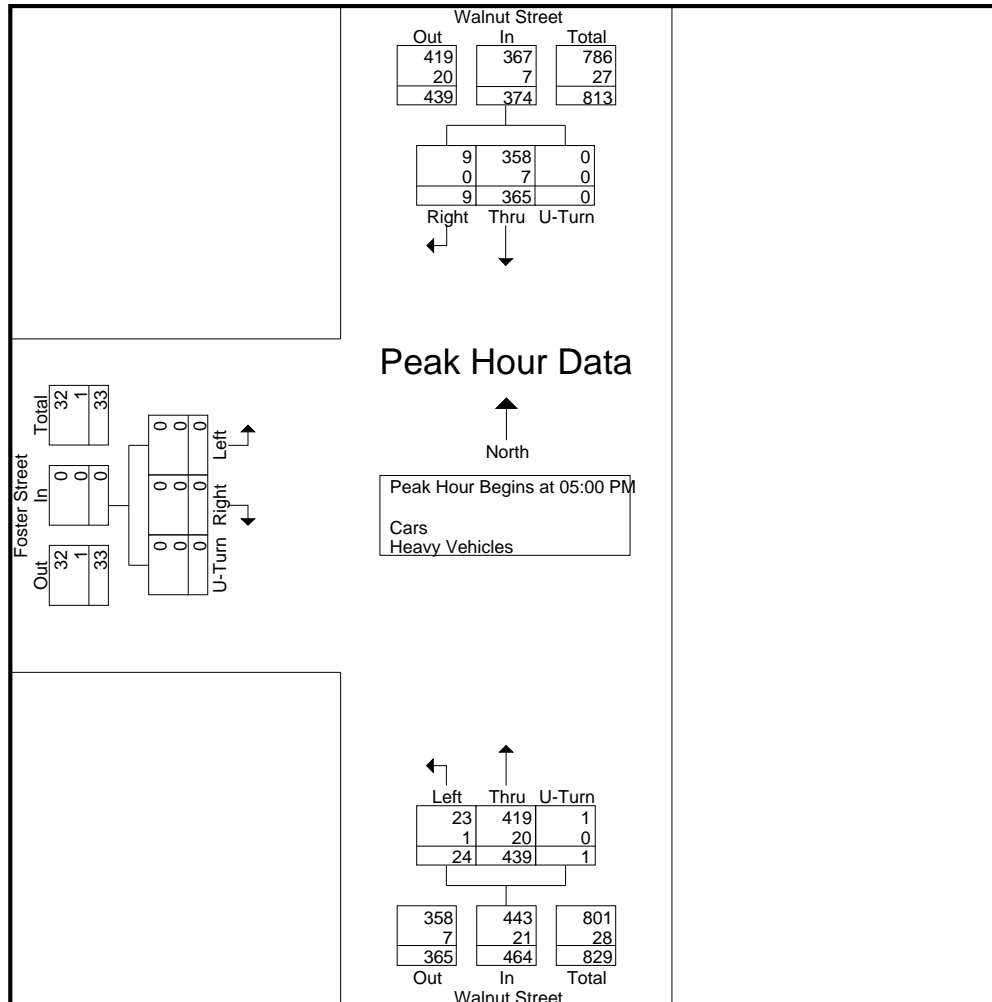
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N/S: Walnut Street
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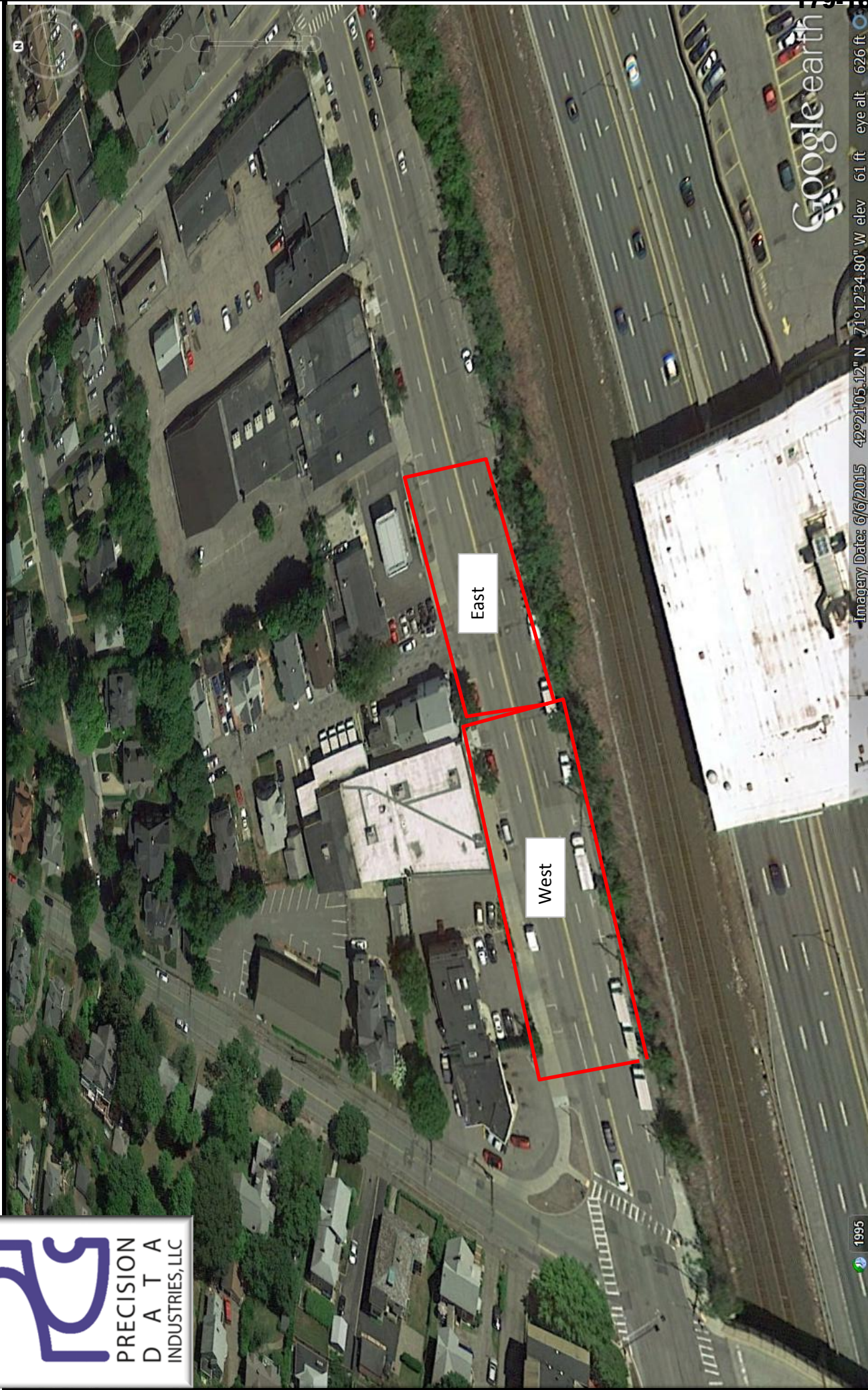
File Name : 154796 II
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	Walnut Street From North				Walnut Street From South				Foster Street From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	2	83	0	85	123	5	0	128	0	0	0	0	213
05:15 PM	2	93	0	95	102	5	0	107	0	0	0	0	202
05:30 PM	4	100	0	104	109	4	0	113	0	0	0	0	217
05:45 PM	1	89	0	90	105	10	1	116	0	0	0	0	206
Total Volume	9	365	0	374	439	24	1	464	0	0	0	0	838
% App. Total	2.4	97.6	0		94.6	5.2	0.2		0	0	0		
PHF	.563	.913	.000	.899	.892	.600	.250	.906	.000	.000	.000	.000	.965
Cars	9	358	0	367	419	23	1	443	0	0	0	0	810
% Cars	100	98.1	0	98.1	95.4	95.8	100	95.5	0	0	0	0	96.7
Heavy Vehicles	0	7	0	7	20	1	0	21	0	0	0	0	28
% Heavy Vehicles	0	1.9	0	1.9	4.6	4.2	0	4.5	0	0	0	0	3.3





Location Map: 165037 West Newton, MA



Imagery Date: 6/6/2015 42°21'05.12" N 71°12'34.80" W elev 61 ft eye alt 626 ft

Client: VHB	Engineer: C. Trearchis	Site Code: 13263.00	Date: Wed 4/13/2016	PDI Job # 165037	City, State: West Newton, MA
----------------	---------------------------	------------------------	------------------------	---------------------	---------------------------------



PRECISION
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INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01752
Office: 508.875.0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

179-16

Washington Street between
Post Office and Gas Station
City, State: West Newton, MA
Client: VHB/ C. Trearchis

File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 1

Groups Printed- Pedestrians - Bicycles

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Bikes-SB	Bikes-NB	Thru	Bikes-NB	Bikes-SB	
06:00 AM	0	0	0	0	0	0	0
06:15 AM	0	0	2	0	0	0	2
06:30 AM	0	1	0	0	0	0	1
06:45 AM	0	0	0	0	0	0	0
Total	0	1	2	0	0	0	3
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0
07:30 AM	0	1	0	0	1	1	3
07:45 AM	0	0	0	0	0	0	0
Total	0	1	0	0	1	1	3
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	1	1
08:30 AM	0	0	0	0	0	1	1
08:45 AM	0	3	0	0	2	2	7
Total	0	3	0	0	2	4	9
09:00 AM	0	1	1	0	0	2	4
09:15 AM	0	0	0	0	0	1	1
09:30 AM	0	0	1	0	1	3	5
09:45 AM	0	1	0	0	5	3	9
Total	0	2	2	0	6	9	19
10:00 AM	0	0	1	0	1	3	5
10:15 AM	0	1	0	0	0	1	2
10:30 AM	0	1	1	0	1	1	4
10:45 AM	0	1	1	0	3	4	9
Total	0	3	3	0	5	9	20
11:00 AM	0	0	1	0	6	4	11
11:15 AM	0	1	0	0	1	3	5
11:30 AM	0	0	0	0	3	2	5
11:45 AM	0	1	0	0	1	3	5
Total	0	2	1	0	11	12	26
12:00 PM	0	0	0	0	5	4	9
12:15 PM	0	0	1	0	1	2	4
12:30 PM	0	0	0	0	4	2	6
12:45 PM	0	1	1	0	0	0	2
Total	0	1	2	0	10	8	21
01:00 PM	0	1	0	0	3	2	6
01:15 PM	0	0	1	0	2	3	6
01:30 PM	0	0	0	0	5	3	8
01:45 PM	0	0	0	0	4	5	9
Total	0	1	1	0	14	13	29
02:00 PM	0	0	0	0	1	2	3
02:15 PM	0	0	0	0	0	1	1
02:30 PM	0	1	0	0	3	2	6
02:45 PM	0	0	1	0	0	0	1
Total	0	1	1	0	4	5	11
03:00 PM	0	0	0	0	3	2	5
03:15 PM	0	0	1	0	2	1	4
03:30 PM	0	0	0	0	4	3	7
03:45 PM	0	1	1	0	4	7	13
Total	0	1	2	0	13	13	29



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179-16

Washington Street between
Post Office and Gas Station
City, State: West Newton, MA
Client: VHB/ C. Trearchis

File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 2

Groups Printed- Pedestrians - Bicycles

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Bikes-SB	Bikes-NB	Thru	Bikes-NB	Bikes-SB	
04:00 PM	0	1	0	0	5	4	10
04:15 PM	0	0	0	0	4	6	10
04:30 PM	0	1	0	0	0	4	5
04:45 PM	0	0	1	0	7	2	10
Total	0	2	1	0	16	16	35
05:00 PM	0	0	0	0	2	2	4
05:15 PM	0	0	0	0	4	2	6
05:30 PM	0	0	0	0	3	3	6
05:45 PM	0	0	0	0	7	6	13
Total	0	0	0	0	16	13	29
06:00 PM	0	2	0	0	2	3	7
06:15 PM	0	0	1	0	1	0	2
06:30 PM	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0
Total	0	2	1	0	3	3	9
Grand Total	0	20	16	0	101	106	243
Apprch %	0	55.6	44.4	0	48.8	51.2	
Total %	0	8.2	6.6	0	41.6	43.6	
Pedestrians	0	19	16	0	100	106	241
% Pedestrians	0	95	100	0	99	100	99.2
Bicycles	0	1	0	0	1	0	2
% Bicycles	0	5	0	0	1	0	0.8

Start Time	Washington Street From East				Washington Street From West				Int. Total
	Thru	Bikes-SB	Bikes-NB	App. Total	Thru	Bikes-NB	Bikes-SB	App. Total	
10:45 AM	0	1	1	2	0	3	4	7	9
11:00 AM	0	0	1	1	0	6	4	10	11
11:15 AM	0	1	0	1	0	1	3	4	5
11:30 AM	0	0	0	0	0	3	2	5	5
Total Volume	0	2	2	4	0	13	13	26	30
% App. Total	0	50	50		0	50	50		
PHF	.000	.500	.500	.500	.000	.542	.813	.650	.682
Pedestrians	0	2	2	4	0	13	13	26	30
% Pedestrians	0	100	100	100	0	100	100	100	100
Bicycles	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0

Peak Hour Analysis From 12:45 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 03:30 PM

03:30 PM	0	0	0	0	0	4	3	7	7
03:45 PM	0	1	1	2	0	4	7	11	13
04:00 PM	0	1	0	1	0	5	4	9	10
04:15 PM	0	0	0	0	0	4	6	10	10
Total Volume	0	2	1	3	0	17	20	37	40
% App. Total	0	66.7	33.3		0	45.9	54.1		
PHF	.000	.500	.250	.375	.000	.850	.714	.841	.769
Pedestrians	0	2	1	3	0	16	20	36	39
% Pedestrians	0	100	100	100	0	94.1	100	97.3	97.5
Bicycles	0	0	0	0	0	1	0	1	1
% Bicycles	0	0	0	0	0	5.9	0	2.7	2.5



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179-16

Washington Street between
Post Office and Gas Station
City, State: West Newton, MA
Client: VHB/ C. Trearchis

File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 1

Groups Printed- Pedestrians

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Peds-SB	Peds-NB	Thru	Peds-NB	Peds-SB	
06:00 AM	0	0	0	0	0	0	0
06:15 AM	0	0	2	0	0	0	2
06:30 AM	0	1	0	0	0	0	1
06:45 AM	0	0	0	0	0	0	0
Total	0	1	2	0	0	0	3
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0
07:30 AM	0	1	0	0	1	1	3
07:45 AM	0	0	0	0	0	0	0
Total	0	1	0	0	1	1	3
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	1	1
08:30 AM	0	0	0	0	0	1	1
08:45 AM	0	3	0	0	2	2	7
Total	0	3	0	0	2	4	9
09:00 AM	0	1	1	0	0	2	4
09:15 AM	0	0	0	0	0	1	1
09:30 AM	0	0	1	0	1	3	5
09:45 AM	0	1	0	0	5	3	9
Total	0	2	2	0	6	9	19
10:00 AM	0	0	1	0	1	3	5
10:15 AM	0	1	0	0	0	1	2
10:30 AM	0	1	1	0	1	1	4
10:45 AM	0	1	1	0	3	4	9
Total	0	3	3	0	5	9	20
11:00 AM	0	0	1	0	6	4	11
11:15 AM	0	1	0	0	1	3	5
11:30 AM	0	0	0	0	3	2	5
11:45 AM	0	1	0	0	1	3	5
Total	0	2	1	0	11	12	26
12:00 PM	0	0	0	0	5	4	9
12:15 PM	0	0	1	0	1	2	4
12:30 PM	0	0	0	0	4	2	6
12:45 PM	0	1	1	0	0	0	2
Total	0	1	2	0	10	8	21
01:00 PM	0	1	0	0	3	2	6
01:15 PM	0	0	1	0	2	3	6
01:30 PM	0	0	0	0	5	3	8
01:45 PM	0	0	0	0	4	5	9
Total	0	1	1	0	14	13	29
02:00 PM	0	0	0	0	1	2	3
02:15 PM	0	0	0	0	0	1	1
02:30 PM	0	1	0	0	3	2	6
02:45 PM	0	0	1	0	0	0	1
Total	0	1	1	0	4	5	11
03:00 PM	0	0	0	0	3	2	5
03:15 PM	0	0	1	0	2	1	4
03:30 PM	0	0	0	0	4	3	7
03:45 PM	0	1	1	0	3	7	12
Total	0	1	2	0	12	13	28



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179-16

Washington Street between
Post Office and Gas Station
City, State: West Newton, MA
Client: VHB/ C. Trearchis

File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 2

Groups Printed- Pedestrians

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Peds-SB	Peds-NB	Thru	Peds-NB	Peds-SB	
04:00 PM	0	1	0	0	5	4	10
04:15 PM	0	0	0	0	4	6	10
04:30 PM	0	0	0	0	0	4	4
04:45 PM	0	0	1	0	7	2	10
Total	0	1	1	0	16	16	34
05:00 PM	0	0	0	0	2	2	4
05:15 PM	0	0	0	0	4	2	6
05:30 PM	0	0	0	0	3	3	6
05:45 PM	0	0	0	0	7	6	13
Total	0	0	0	0	16	13	29
06:00 PM	0	2	0	0	2	3	7
06:15 PM	0	0	1	0	1	0	2
06:30 PM	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0
Total	0	2	1	0	3	3	9
Grand Total	0	19	16	0	100	106	241
Apprch %	0	54.3	45.7	0	48.5	51.5	
Total %	0	7.9	6.6	0	41.5	44	

	Washington Street From East				Washington Street From West				
Start Time	Thru	Peds-SB	Peds-NB	App. Total	Thru	Peds-NB	Peds-SB	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:30 PM - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 10:45 AM									
10:45 AM	0	1	1	2	0	3	4	7	9
11:00 AM	0	0	1	1	0	6	4	10	11
11:15 AM	0	1	0	1	0	1	3	4	5
11:30 AM	0	0	0	0	0	3	2	5	5
Total Volume	0	2	2	4	0	13	13	26	30
% App. Total	0	50	50		0	50	50		
PHF	.000	.500	.500	.500	.000	.542	.813	.650	.682

Peak Hour Analysis From 12:45 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 03:30 PM

03:30 PM	0	0	0	0	0	4	3	7	7
03:45 PM	0	1	1	2	0	3	7	10	12
04:00 PM	0	1	0	1	0	5	4	9	10
04:15 PM	0	0	0	0	0	4	6	10	10
Total Volume	0	2	1	3	0	16	20	36	39
% App. Total	0	66.7	33.3		0	44.4	55.6		
PHF	.000	.500	.250	.375	.000	.800	.714	.900	.813



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179-16

Washington Street between
Post Office and Gas Station
City, State: West Newton, MA
Client: VHB/ C. Trearchis

File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 1

Groups Printed- Bicycles

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Bikes-SB	Bikes-NB	Thru	Bikes-NB	Bikes-SB	
06:00 AM	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	1	0	1
Total	0	0	0	0	1	0	1



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Page No : 2

Groups Printed- Bicycles

Start Time	Washington Street From East			Washington Street From West			Int. Total
	Thru	Bikes-SB	Bikes-NB	Thru	Bikes-NB	Bikes-SB	
04:00 PM	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0
04:30 PM	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
06:00 PM	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	1	0	0	1	0	2
Apprch %	0	100	0	0	100	0	
Total %	0	50	0	0	50	0	

	Washington Street From East				Washington Street From West				
Start Time	Thru	Bikes-SB	Bikes-NB	App. Total	Thru	Bikes-NB	Bikes-SB	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:30 PM - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 06:00 AM									
06:00 AM	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000

Peak Hour Analysis From 12:45 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 03:45 PM

03:45 PM	0	0	0	0	0	1	0	1	1
04:00 PM	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0
04:30 PM	0	1	0	1	0	0	0	0	1
Total Volume	0	1	0	1	0	1	0	1	2
% App. Total	0	100	0		0	100	0		
PHF	.000	.250	.000	.250	.000	.250	.000	.250	.500



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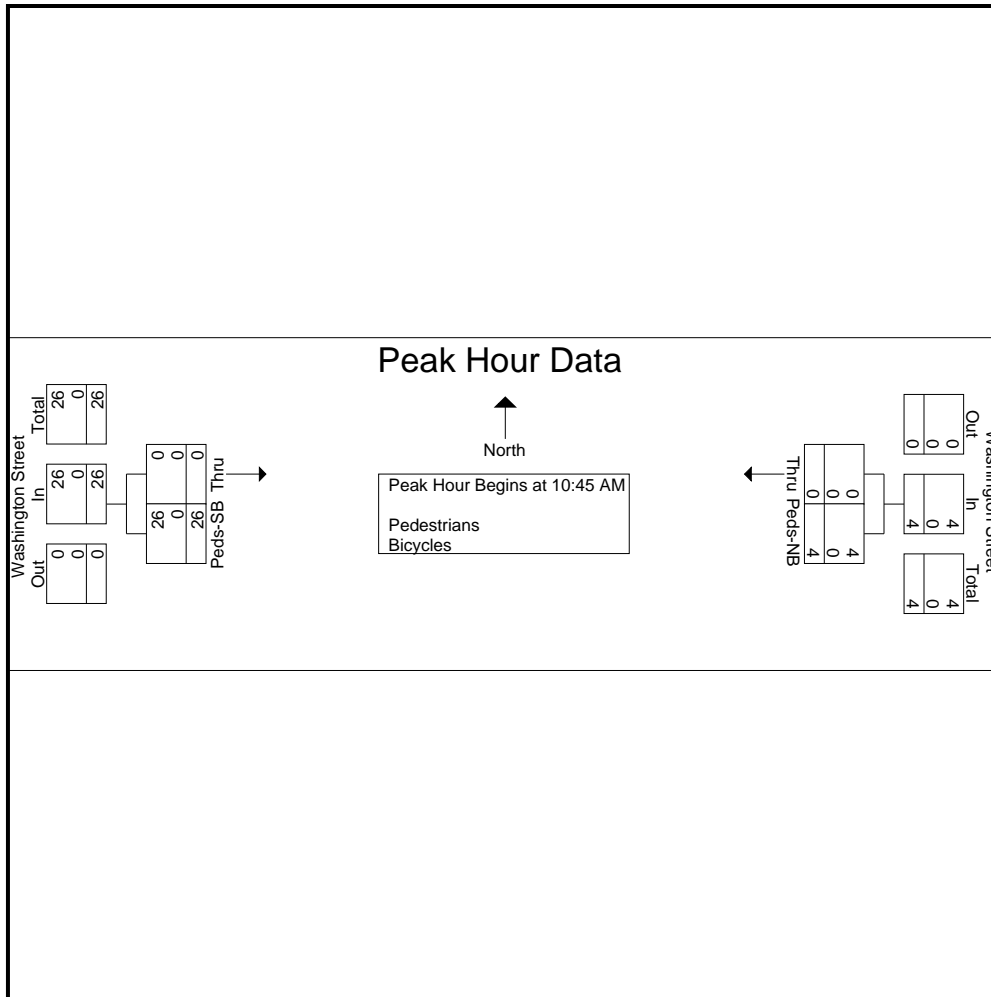
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179-16

Washington Street between
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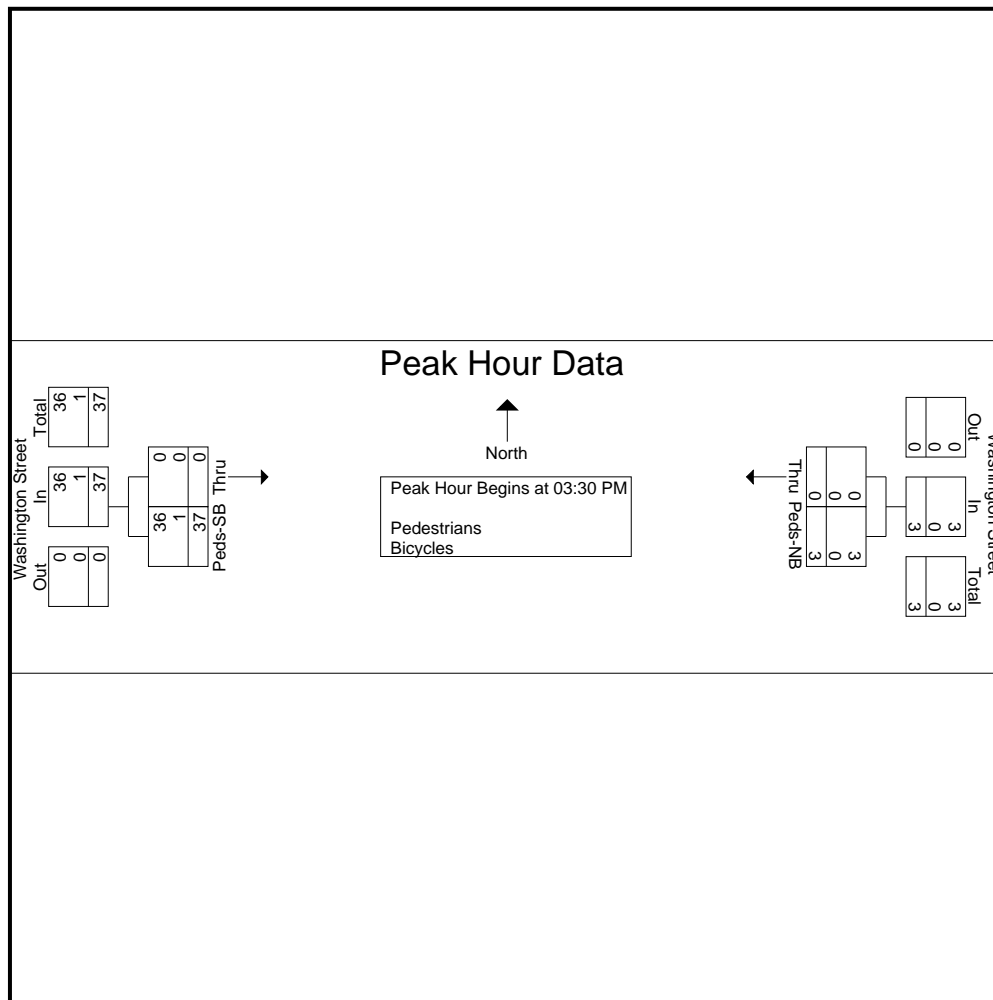
File Name : 165037 A
Site Code : TBA
Start Date : 4/13/2016
Page No : 1

	Washington Street From East				Washington Street From West				
Start Time	Thru	Bikes-SB	Bikes-NB	App. Total	Thru	Bikes-NB	Bikes-SB	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:30 PM - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 10:45 AM									
10:45 AM	0	1	1	2	0	3	4	7	9
11:00 AM	0	0	1	1	0	6	4	10	11
11:15 AM	0	1	0	1	0	1	3	4	5
11:30 AM	0	0	0	0	0	3	2	5	5
Total Volume	0	2	2	4	0	13	13	26	30
% App. Total	0	50	50		0	50	50		
PHF	.000	.500	.500	.500	.000	.542	.813	.650	.682
Pedestrians	0	2	2	4	0	13	13	26	30
% Pedestrians	0	100	100	100	0	100	100	100	100
Bicycles	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0





	Washington Street From East				Washington Street From West				
Start Time	Thru	Bikes-SB	Bikes-NB	App. Total	Thru	Bikes-NB	Bikes-SB	App. Total	Int. Total
Peak Hour Analysis From 12:45 PM to 06:45 PM - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 03:30 PM									
03:30 PM	0	0	0	0	0	4	3	7	7
03:45 PM	0	1	1	2	0	4	7	11	13
04:00 PM	0	1	0	1	0	5	4	9	10
04:15 PM	0	0	0	0	0	4	6	10	10
Total Volume	0	2	1	3	0	17	20	37	40
% App. Total	0	66.7	33.3		0	45.9	54.1		
PHF	.000	.500	.250	.375	.000	.850	.714	.841	.769
Pedestrians	0	2	1	3	0	16	20	36	39
% Pedestrians	0	100	100	100	0	94.1	100	97.3	97.5
Bicycles	0	0	0	0	0	1	0	1	1
% Bicycles	0	0	0	0	0	5.9	0	2.7	2.5





Seasonal Adjustment Factors

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2011 WEEKDAY SEASONAL FACTORS *

* Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.98	0.93	0.90	0.89	0.90	0.88	0.91	0.90	0.89	0.89	0.93	0.95
GROUP 2 - RURAL MAJOR COLLECTOR (R-5) Use group 2 for R5, R6, & R0	1.12	1.12	1.07	0.99	0.91	0.90	0.86	0.86	0.92	0.93	1.01	1.05
GROUP 3A - RECREATIONAL ** (1-4) See below	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
GROUP 3B - RECREATIONAL *** (5) See below	1.22	1.26	1.22	1.06	0.96	0.90	0.72	0.74	0.97	1.02	1.14	1.15
GROUP 4 - I-495 INTERSTATE	1.02	1.00	1.00	0.96	0.92	0.89	0.85	0.83	0.93	0.96	1.01	1.03
GROUP 5 - EAST INTERSTATE	1.04	1.00	0.96	0.93	0.92	0.91	0.91	0.89	0.93	0.93	0.96	1.01
GROUP 6 - URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3) Use group 6 for U2, U3, U5, U6, U0, R2, & R3	1.03	1.01	0.96	0.92	0.91	0.90	0.92	0.92	0.93	0.92	0.97	0.97
GROUP 7 - I-84 PROXIMITY (STAS. 17,3921)	1.24	1.24	1.15	1.04	0.99	1.00	0.93	0.89	1.05	1.05	1.05	1.12
GROUP 8 - I-295 PROXIMITY (STA. 6590)	1.00	0.99	0.95	0.92	0.94	0.91	0.93	0.92	0.95	0.94	0.97	0.95
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.13	1.05	1.03	0.95	0.89	0.87	0.86	0.79	0.88	0.91	0.99	1.03

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

1. CAPE COD (ALL TOWNS)
2. PLYMOUTH (SOUTH OF RTE.3A)

7014, 7079, 7080, 7090, 7091, 7092, 7093, 7094, 7095, 7096, 7097, 7108, 7178

3. MARTHA'S VINEYARD

4. NANTUCKET

***GROUP 3B:

5. PERMANENTS 2 & 189

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, 2198

Apply I-84 factor to stations: 3290, 3929

2011 AXLE CORRECTION FACTORS

ROAD INVENTORY
FUNCTIONAL
CLASSIFICATION

RURAL

1 0.95
2 0.97
3 0.98
0,5,6 0.98

URBAN

1 0.96
2 0.98
3 0.98
5 0.98
0,6 0.99
I-84 0.90

0 - 99910
> 1,000100

ROUND OFF



Vehicle Crash Data



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton COUNT DATE : 2/14/2006

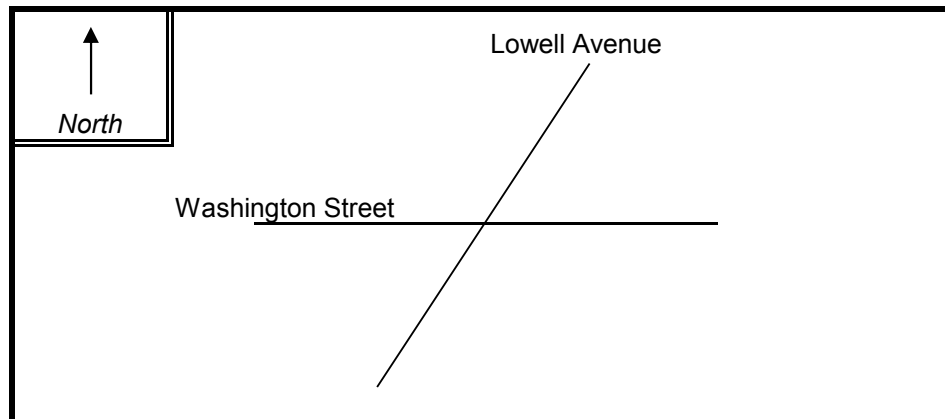
DISTRICT : 6 UNSIGNALIZED : 0.53 SIGNALIZED : X
0.70

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

MINOR STREET(S) : Lowell Avenue

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	421	347	693	677		2,138

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

23,756

TOTAL # OF CRASHES :

15

OF
YEARS :

5

AVERAGE # OF
CRASHES PER YEAR (A) :

3.00

CRASH RATE CALCULATION :

0.35

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

Comments : MassDOT Accident Data (2009-2013)

Project Title & Date: _____

CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Washington Street

MINOR STREET(S) : Washington Terrrace

A schematic map showing the intersection of Washington Terrace and Washington Street. Washington Terrace is a vertical street, and Washington Street is a horizontal street. A north arrow is located in the top left corner, pointing upwards and labeled "North".

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		5	620	666		

0.20

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

Project Title & Date:

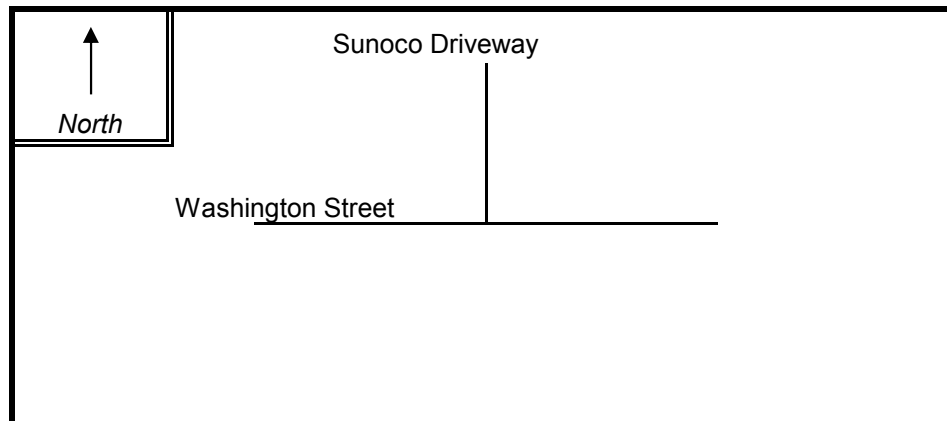
CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Washington Street

MINOR STREET(S) : Sunoco Driveway



APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		26	613	648		

0.20

Project Title & Date:

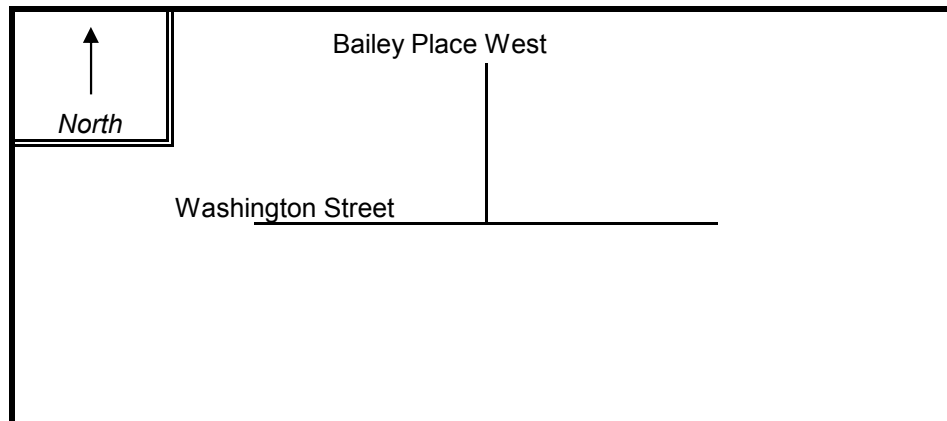
CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Washington Street

MINOR STREET(S) : Bailey Place West



APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		7	618	718		
" K " FACTOR :	0.090	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :				14,922
TOTAL # OF CRASHES :	2	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (A) :		0.40

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

Project Title & Date:

CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Washington Street

MINOR STREET(S) : Bailey Place East

A schematic map showing the intersection of Bailey Place East and Washington Street. Bailey Place East is a vertical street, and Washington Street is a horizontal street. A north arrow is located in the top left corner, pointing upwards and labeled 'North'.

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		77	600	664		

0.20

Project Title & Date:



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton COUNT DATE : 2/14/2006

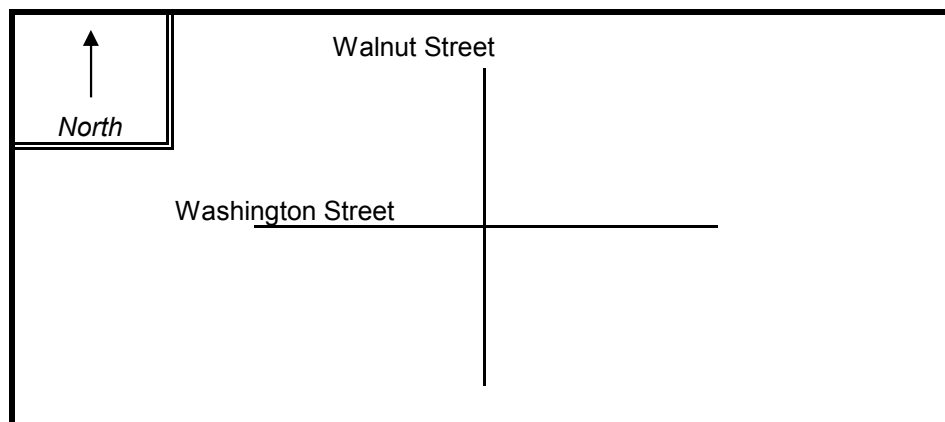
DISTRICT : 6 UNSIGNALIZED : 0.53 SIGNALIZED : X
0.70

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

MINOR STREET(S) : Walnut Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	688	403	576	781		2,448

" K " FACTOR :

0.090

INTERSECTION ADT (V) = TOTAL DAILY
APPROACH VOLUME :

27,200

TOTAL # OF CRASHES :

28

OF
YEARS :

5

AVERAGE # OF
CRASHES PER YEAR (A) :

5.60

CRASH RATE CALCULATION :

0.56

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

Comments : MassDOT Accident Data (2009-2013)

Project Title & Date: _____

CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

Project Title & Date:

CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Walnut Street

MINOR STREET(S) : Alley Driveway

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	490	372	1			

0.00

Project Title & Date:

CITY/TOWN : Newton COUNT DATE : 2/14/2006

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

0.53 0.70

MAJOR STREET : Walnut Street

MINOR STREET(S) : Foster Street

Walnut Street

Foster Street

North

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	466	376				

0.80

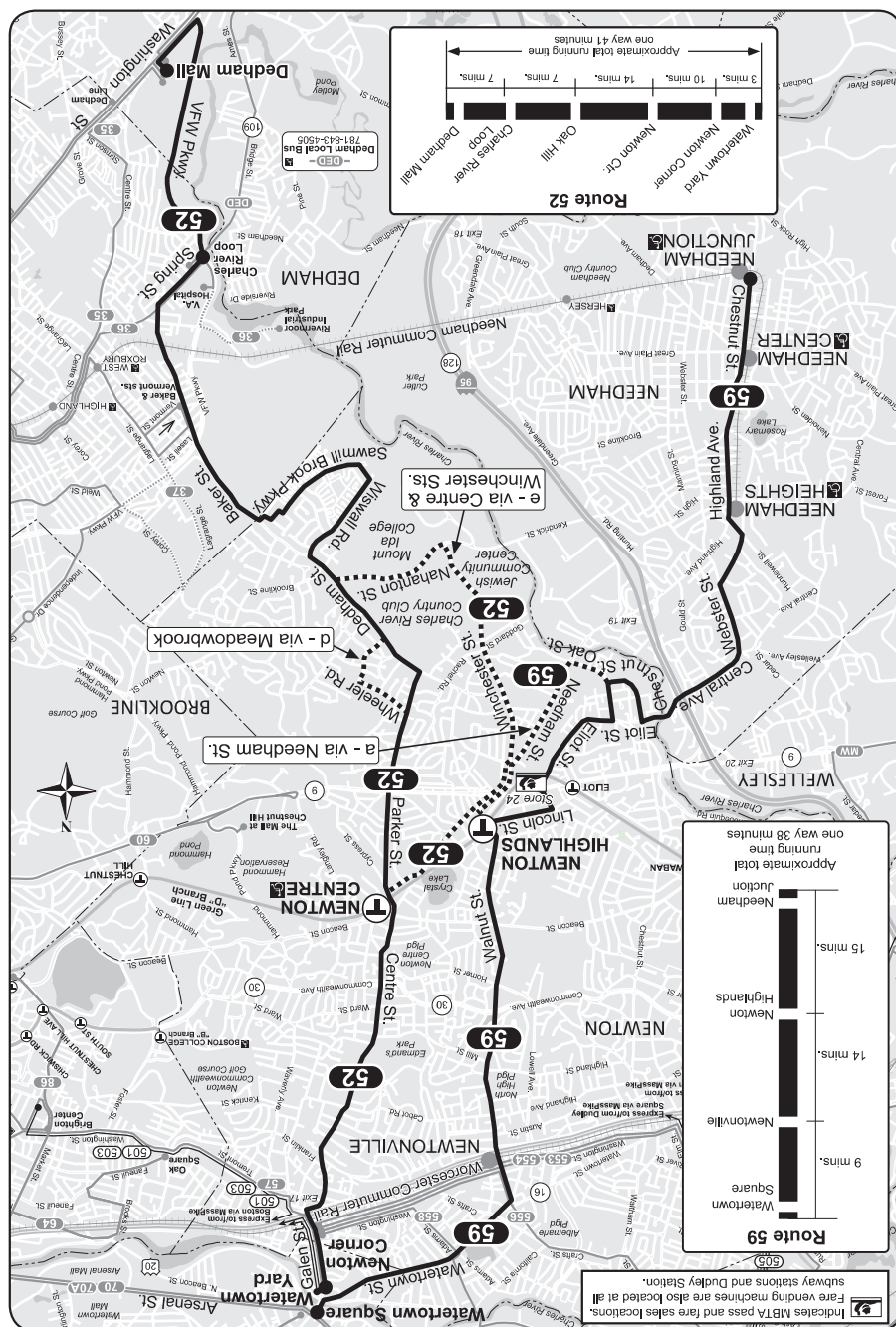
$$\frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date:





Crash Date	Crash Time	Crash Severity	Total Vehicles	Total Injured	Total Fatals	Collision manner	Road Surface	Lighting	Weather	Street	Intersection	Distance From Nearest Intersection	Vehicles Travel Directions	Most Harmful Events	Vehicle Action Prior to Crash	Vehicle Configuration	Non Motorist Type
Friday, June 05, 2009	3:22 PM	Property damage only (none injured)	2	0	0	Angle	Dry	Daylight	Cloudy	CENTRAL AVENUE / WASHINGTON STREET	CENTRAL AVENUE / WASHINGTON STREET		V1:Westbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Turning left / V2:Travelling straight ahead	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Monday, August 03, 2009	3:35 PM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	Dry	Daylight	Clear			CENTRAL AVENUE / WASHINGTON STREET	V1:Not reported / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Entering traffic lane / V2:Entering traffic lane	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Wednesday, December 02, 2009	5:59 PM	Property damage only (none injured)	2	0	0	Angle	Dry	Dark - lighted roadway	Clear/Clear	CENTRAL AVENUE / WASHINGTON STREET	CENTRAL AVENUE / WASHINGTON STREET		V1:Westbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Turning right	V1: Passenger car / V2:Passenger car	
Monday, January 18, 2010	8:04 PM	Property damage only (none injured)	2	0	0	Rear-end	Snow	Dark - lighted roadway	Clear	WASHINGTON STREET / CENTRAL AVENUE	WASHINGTON STREET / CENTRAL AVENUE		V1:Eastbound / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Slowing or stopped in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Tuesday, June 08, 2010	7:00 PM	Property damage only (none injured)	2	0	0	Angle	Dry	Daylight	Clear			CENTRAL AVENUE / WASHINGTON STREET	V1:Northbound / V2:Eastbound	V1: Not reported / V2: Not reported	V1: Slowing or stopped in traffic / V2:Entering traffic	V1: Not reported / V2:Not reported	
Tuesday, December 11, 2012	12:57 PM	Property damage only (none injured)	2	0	0	Angle	Dry	Daylight	Clear	CENTRAL AVE / WASHINGTON ST	CENTRAL AVE / WASHINGTON ST		V1:Eastbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Turning left	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Wednesday, January 02, 2013	5:12 PM	Property damage only (none injured)	2	0	0	Sideswipe, opposite direction	Dry	Dark - lighted roadway	Clear			WASHINGTON ST	V1:Eastbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Travelling straight ahead	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Sunday, June 02, 2013	2:33 PM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	Dry	Daylight	Clear			WASHINGTON STREET / 795 CENTRAL STREET	V1:Westbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Changing lanes	V1: Passenger car / V2:Passenger car	
Saturday, September 21, 2013	7:33 PM	Non-fatal injury	1	2	0	Single vehicle crash	Dry	Dark - lighted roadway	Clear/Clear			WASHINGTON ST	V1:Westbound	V1: Collision with pedestrian	V1: Travelling straight ahead	V1: Passenger car	P2:Pedestrian / P3:Pedestrian
Walnut Street at Site Driveway/ 246 Walnut Street Driveway																	
Tuesday, April 05, 2011	5:16 PM	Property damage only (none injured)	2	0	0	Unknown	Wet	Daylight	Rain			WALNUT STREET	V1:Westbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Backing / V2:Travelling straight ahead	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Wednesday, November 07, 2012	12:28 PM	Property damage only (none injured)	3	0	0	Rear-end	Dry	Daylight	Clear			WALNUT ST	V1:Northbound / V2:Northbound / V3:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V3:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Thursday, March 28, 2013	3:35 PM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	Wet	Daylight	Cloudy/Rain			WALNUT ST	V1:Southbound / V2:Southbound	V1: Collision with parked motor vehicle / V2: Collision with parked motor vehicle	V1: Parked / V2:Making U-turn	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	
Friday, October 18, 2013	12:19 PM	Property damage only (none injured)	1	0	0	Angle	Dry	Daylight	Clear			WALNUT ST	V1:Eastbound	V1: Collision with motor vehicle in traffic	V1: Entering traffic lane	V1: Passenger car	
Walnut Street at Foster Street																	
Sunday, September 05, 2010	12:45 PM	Not Reported	2	0	0	Sideswipe, same direction	Dry	Daylight	Clear			WALNUT ST	V1:Northbound / V2:Northbound	V1: Collision with parked motor vehicle / V2: Collision with parked motor vehicle	V1: Parked / V2:Slowing or stopped in traffic	V1: Passenger car / V2:Passenger car	
Saturday, November 13, 2010	3:45 PM	Property damage only (none injured)	2	0	0	Rear-end	Dry	Daylight	Clear			218 WALNUT STREET	V1:Northbound / V2:Northbound	V1: Not reported / V2: Not reported	V1: Changing lanes / V2:Travelling straight ahead	V1: Not reported / V2:Not reported	
Sunday, April 22, 2012	2:26 PM	Not Reported	2	0	0	Not reported	Wet	Daylight	Rain			WALNUT ST	V1:Southbound / V2:Not reported	V1: Collision with parked motor vehicle / V2: Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2:Parked	V1: Passenger car / V2:Passenger car	
Monday, August 05, 2013	4:09 PM	Non-fatal injury	2	1	0	Angle	Dry	Daylight	Clear	FOSTER ST / WALNUT ST	FOSTER ST / WALNUT ST		V1:Northbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Turning left / V2:Travelling straight ahead	V1: Passenger car / V2:MOPED	



Public Transportation Schedules



Route 52 Dedham Mall or Charles River Loop - Watertown Yard
Route 59 Needham Junction - Watertown Square

Weekday										Saturday										Sunday									
59					59					59					59					59					59				
Inbound		Outbound			Inbound		Outbound			Inbound		Outbound			Inbound		Outbound			Inbound		Outbound							
Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive						
Dedham Mall	Charles River	Newton Center	Newton Highlands	Needham Junction	Dedham Mall	Charles River	Newton Center	Newton Highlands	Needham Junction	Dedham Mall	Charles River	Newton Center	Newton Highlands	Needham Junction	Dedham Mall	Charles River	Newton Center	Newton Highlands	Needham Junction	Dedham Mall	Charles River	Newton Center	Newton Highlands						
.....	6:15A	6:33A	6:43A	d 7:00A	d 7:10A	7:31A	6:20A	6:38A	6:52A	a 6:05A	6:19A	6:38A	7:05A	7:25A	7:40A	6:20	6:31	6:48	7:50A	8:08A	8:20A	7:05A						
.....	6:45	7:03	7:13	d 7:25	7:37	7:59	a 6:55	7:14	7:31	6:35	6:48	7:07	8:35	8:55	9:10	7:50	8:04	8:21	9:20	9:38	9:50	8:35						
.....	bs 7:05	7:26	d 8:05	8:19	8:42	8:46A	7:30	7:53	8:17	a 7:10	7:30	7:53	10:05	10:25	10:40	9:20	9:37	9:55	10:50	11:08	11:22	10:05						
.....	7:20	7:42	7:56	e 8:30	8:44	9:08	8:05	8:28	8:43	a 7:45	8:08	8:31	11:35	11:55	12:14P	10:50	11:07	11:25	11:35						
.....	d 7:45	8:07	8:19	9:00	9:09	9:26	9:32	a 8:40	9:01	9:21	8:20	8:40	9:03						
.....	d 8:15	8:37	8:49	9:45	9:54	10:10	10:16	a 9:50	10:10	10:25	a 9:30	9:46	10:08	2:35	2:54	3:10	1:50	2:07	2:27	1:50	2:06	2:21	2:35						
9:00	9:13	9:27	9:35	e 11:15	11:24	11:45	11:49	10:35	10:54	11:10	10:05	10:21	10:42	4:05	4:23	4:39	4:50	5:05	5:24	4:50	5:08	5:24	4:05						
e 10:30	10:36	10:56	11:06	a 11:20	11:40	11:55	a 11:20	11:36	11:57	11:20	11:36	11:57	7:05	7:22	7:35	6:20	6:35	6:54	6:20	6:36	6:51	5:35						
12:00N	12:11P	12:30P	12:39P	12:45P	12:53P	1:08P	1:14P	12:05P	12:25P	12:42P	a 12:05P	12:21P	12:43P	12:05P	12:25P	12:42P	12:20P	12:37P	1:00P	12:20P	12:39P	12:54P	1:05P						
d 1:30P	1:34	1:53	2:11	ds 2:47	3:00	3:23	a 12:50	1:10	1:25	12:50	1:06	1:27	2:35	2:54	3:10	1:50	2:07	2:27	1:50	2:06	2:21	2:35						
d 2:20	2:24	2:43	3:00	e 3:00	3:12	3:33	3:41	1:35	1:55	2:13	a 1:30	1:46	2:08	3:01	3:20	3:37	3:20	3:37	3:57	3:20	3:39	3:56	4:05						
d 3:05	3:09	3:28	3:43	3:50	4:01	4:21	4:29	3:10	3:33	3:50	a 2:20	2:38	3:01	4:05	4:24	4:42	4:50	5:05	5:24	4:50	5:08	5:24	4:05						
e 3:50	3:54	4:16	4:29	e 4:35	4:47	5:08	5:16	a 3:45	4:05	4:24	a 3:30	3:49	4:12	5:16	5:38	5:58	5:20	5:34	5:59	5:20	5:38	5:56	6:05						
4:25	4:32	4:48	5:02	5:10	5:25	5:47	5:52	a 4:20	4:43	5:00	a 4:05	4:24	4:50	6:05	6:25	6:41	5:10	5:34	5:59	5:20	5:38	5:56	6:05						
e 4:45	4:49	5:12	5:25	e 5:45	5:57	6:18	6:26	a 4:55	5:18	5:38	a 4:40	4:59	5:20	6:25	6:41	6:58	6:05	6:25	6:41	6:05	6:25	6:41	6:58						
5:30	5:39	5:55	6:09	6:20	6:32	6:52	6:59	a 5:30	5:54	6:14	a 4:40	4:59	5:20	6:40	7:00	7:14	6:40	7:00	7:14	6:40	7:00	7:14	6:58						
e 6:10	6:14	6:37	6:50	6:55	7:05	7:23	6:40	7:00	7:14	5:40	6:03	6:29	7:00	7:15	7:28	6:20	6:35	6:54	6:20	6:36	6:51	5:35						
e 6:45	6:49	7:12	7:22	7:30	7:39	7:57	a 7:15	7:34	7:48	a 6:20	6:39	7:00	7:15	7:30	7:45	6:20	6:35	6:54	6:20	6:36	6:51	5:35						
b - To Newton Corner d - Via Meadowbrook & Wheeler Roads e - Via Centre & Winchester Streets s - Does NOT run during school vacation										NOTE: Approximate running time from Watertown Square to Newtonville Square is 7 minutes. Approximate running time from Needham Junction to Newtonville Square is 25 minutes. Approximate running time from Watertown Square to Homer and Walnut Streets is 11 minutes. Approximate running time from Needham Junction to Homer and Walnut Streets is 18 minutes.										All buses are accessible to persons with disabilities  +  +  +  Fare Local Bus Bus + Bus Rapid Transit Bus + Rapid Transit CharlieCard \$1.60 \$1.60 \$2.10 \$2.10 CharlieTicket \$2.10 \$2.10 \$2.65 \$4.75 Cash-on-Board \$2.10 \$4.20 \$2.65 \$4.75 Student CharlieCard** \$0.80 \$0.80 \$1.05 \$1.05 Senior/TAP CharlieCard** \$0.80 \$0.80 \$1.05 \$1.05 Voucher CharlieCard** \$0.80 \$0.80 \$1.05 \$1.									

Route 505 Express Bus-Central Square, Waltham - Downtown Boston
Route 553 Roberts - Downtown Boston
Route 554 Waverley Square - Downtown Boston

505•553•554

Spring March 19, 2016 - June 24, 2016

505 Express-Central Square, Waltham-Downtown Boston

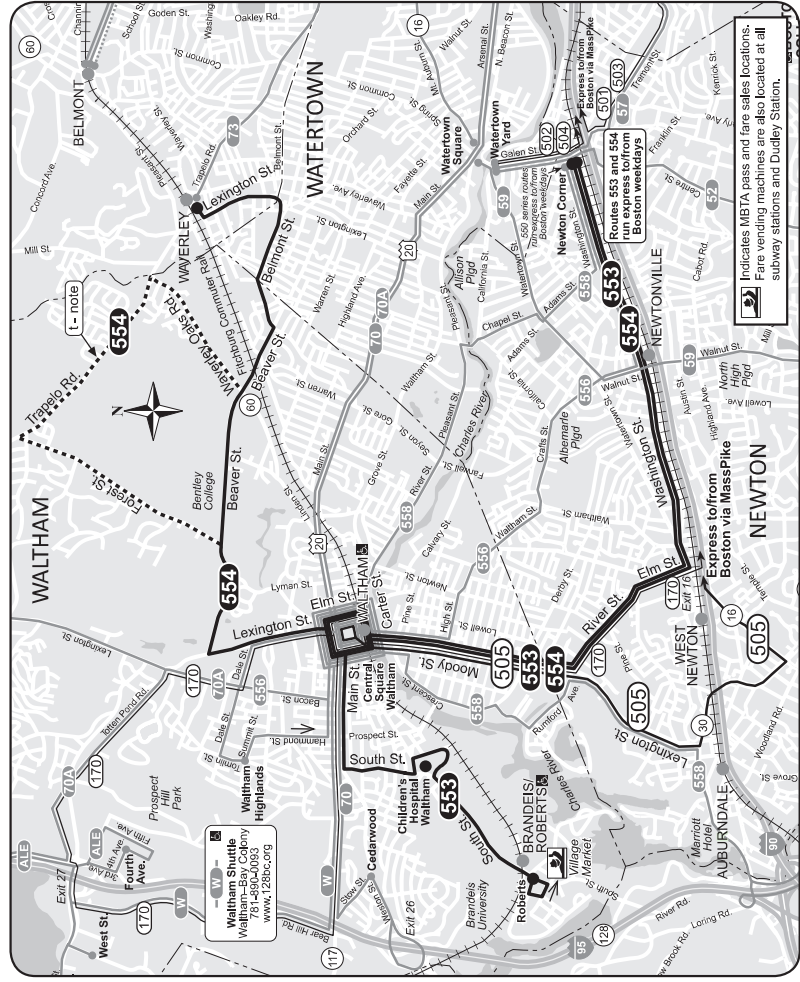
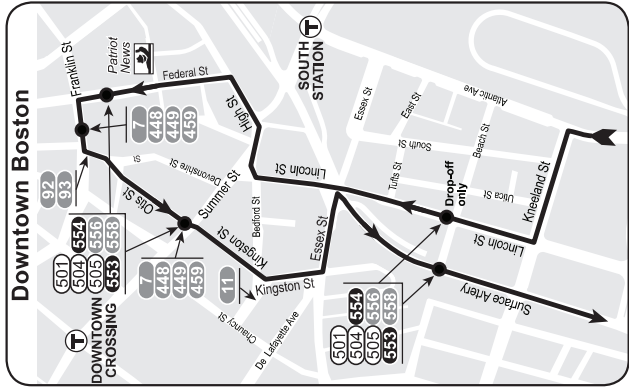
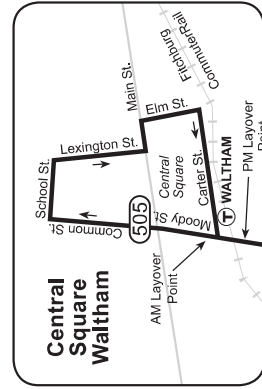
553 Roberts-Downtown Boston

554 Waverley Square-Downtown Boston

Serving

- Central Square, Waltham
- Newtonville
- Newton Courthouse
- Brandeis University
- Bentley College

massDOT
 Massachusetts Bay Transportation Authority
 Information 617-222-3200 • 1-800-392-6100
 (TTY) 617-222-5146 • www.mbta.com



505				Weekday				553 & 554				Weekday				553				Saturday											
Inbound				Outbound				Inbound				Outbound				Inbound				Outbound											
Leave	Arrive	Arrive	Franklin	Leave	Arrive	Arrive	Franklin	Leave	Waverley Square	Leave	Waverley Square	Leave	Waverley Square	Leave	Newton Corner	Leave	Newton Corner	Leave	Roberts	Leave	Roberts	Leave	Central St. Waltham	Arrive	Newton Corner						
5:55A	6:11A	6:26A	6:02A	6:31A	6:48A	6:58A	6:28A	6:25A	7:00A	6:35A	6:57A	7:21A	6:15A	6:04A	6:20A	6:41A	6:30A	6:38A	6:30A	6:38A	6:30A	6:38A	6:30A	6:38A	6:56						
6:10	6:26	6:44	6:31	6:48	7:12	7:22	6:58A	6:50	7:00A	7:00	7:22	7:46	6:15	6:28	6:45	7:07	7:15	7:23	7:15	7:23	7:15	7:23	7:15	7:23	7:41						
6:25	6:44	7:02	6:55	7:20	7:30	7:40	7:10	7:20	7:30A	7:33	7:55	8:18	6:20	6:34	6:50	7:12	8:00	8:10	8:00	8:10	8:00	8:10	8:00	8:10	8:29						
6:40	7:00	7:18	7:03	7:21	7:38	7:50	7:25	7:45	7:30	7:44	8:07	8:32	6:43	6:57	7:16	7:38	8:45	8:55	8:45	8:55	8:45	8:55	8:45	8:55	9:14						
6:53	7:13	7:33	7:21	7:38	7:50	8:03	7:45	7:45	7:30	7:58	8:20	8:43	6:50	7:07	7:24	7:46	9:30	9:40	9:30	9:40	9:30	9:40	9:30	9:40	10:03						
7:05	7:25	7:50	7:45	8:03	8:15	8:28	7:55	7:45	7:30	7:58	8:20	8:43	6:50	7:07	7:24	7:46	10:15	10:25	10:15	10:25	10:15	10:25	10:15	10:25	10:46						
7:14	7:38	8:04	8:08	8:19	8:37	8:49	8:10	8:45	8:10	8:24	8:47	9:10	7:45	7:55	8:15	8:39	11:00	11:12	11:00	11:12	11:00	11:12	11:00	11:12	11:33						
7:23	7:47	8:13	8:19	8:37	8:49	9:11	8:19	8:45	8:10	8:28	8:50	9:23	8:10	8:27	8:48	9:04	11:45	11:58	11:45	11:58	11:45	11:58	11:45	11:58	12:21P						
7:31	7:54	8:20	8:41	8:59	9:11	9:40	8:29	9:45	9:10	9:22	9:42	10:01	8:40	8:55	9:15	9:36	12:30P	12:43P	12:30P	12:43P	12:30P	12:43P	12:30P	12:43P	1:07P						
7:40	8:03	8:29	9:10	9:28	9:40	10:05	9:35	10:45	10:10	10:22	10:42	11:01	9:16	9:31	9:53	10:07	1:15	1:26	1:15	1:26	1:15	1:26	1:15	1:26	1:50						
7:49	8:12	8:38	9:28	9:46	10:08	10:48	10:18	11:40	11:10	11:22	11:42	12:01P	10:10	10:23	10:45	10:59	2:00	2:12	2:00	2:12	2:00	2:12	2:00	2:12	2:34						
7:58	8:21	8:47	9:37	9:55	10:17	10:57	10:27	12:40P	12:10P	12:22P	12:42P	1:01P	11:10	11:23	11:45	11:59	2:45	2:57	2:45	2:57	2:45	2:57	2:45	2:57	3:19						
8:08	8:31	8:57	9:47	10:05	10:27	11:07	10:37	11:40	11:10	11:22	11:42	12:01P	11:10	11:23	11:45	11:59	3:30	3:42	3:30	3:42	3:30	3:42	3:30	3:42	4:04						
8:18	8:41	9:06	9:56	10:14	10:36	11:16	10:46	12:40P	12:10P	12:22P	12:42P	1:01P	11:10	11:23	11:45	11:59	4:15	4:27	4:15	4:27	4:15	4:27	4:15	4:27	4:49						
8:34	8:57	9:21	10:11	10:29	10:51	11:31	11:01	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	5:00	5:12	5:00	5:12	5:00	5:12	5:00	5:12	5:35						
8:50	9:07	9:30	10:20	10:38	11:00	11:40	11:10	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	5:45	5:56	5:45	5:56	5:45	5:56	5:45	5:56	6:20						
9:06	9:22	9:42	10:32	10:50	11:12	11:52	11:22	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	6:30	6:40	6:30	6:40	6:30	6:40	6:30	6:40	7:01						
9:45	10:00	10:18	10:48	11:00	11:18	11:38	11:08	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	7:15	7:25	7:15	7:25	7:15	7:25	7:15	7:25	7:46						
10:15	10:30	10:48	11:00	11:18	11:38	11:58	11:28	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	553 Saturday														
3:57P	4:09P	4:30P	3:10P	3:31P	3:51P	4:11P	3:41P	12:40P	12:10P	12:22P	12:42P	1:01P	12:10P	12:25P	12:47P	1:03P	Outbound														
4:30	4:43	5:07	3:40	4:07	4:27	4:47	4:37	1:40	1:53	2:16	2:36	2:56	2:10	2:25	2:49	3:07	Leave	Arrive	Leave	Arrive	Leave	Arrive	Leave	Arrive	Roberts						
4:53	5:06	5:30	4:15	4:35	4:55	5:15	5:05	2:40	2:53	3:16	3:36	3:56	2:40	2:55	3:23	3:41	Newton Corner	Central St. Waltham	Newton Corner	Central St. Waltham	Newton Corner	Central St. Waltham	Newton Corner	Central St. Waltham	6:54A						
5:10	5:23	5:47	4:30	4:50	5:10	5:30	5:20	3:45	3:58	4:21	4:41	5:01	3:40	3:55	4:23	4:41	6:30A	6:42A	6:30A	6:42A	6:30A	6:42A	6:30A	6:42A	7:41						
5:29	5:42	6:06	4:45	5:05	5:25	5:45	5:35	4:45	4:58	5:21	5:41	6:01	4:35	4:51	5:18	5:37	7:15	7:28	7:15	7:28	7:15	7:28	7:15	7:28	8:26						
5:49	6:02	6:26	5:15	5:35	5:55	6:15	6:05	5:50	6:03	6:26	6:46	7:06	5:04	5:33	6:06	6:23	8:00	8:13	8:00	8:13	8:00	8:13	8:00	8:13	9:14						
6:02	6:15	6:35	5:15	5:35	5:55	6:15	6:05	6:45	6:58	7:21	7:41	8:01	5:35	6:01	6:28	6:45	8:45	9:00	8:45	9:00	8:45	9:00	8:45	9:00	9:59						
6:25	6:37	6:55	6:15	6:35	6:55	7:15	7:05	6:45	6:58	7:22	7:42	8:02	6:10	6:37	7:04	7:19	9:30	9:45	9:30	9:45	9:30	9:45	9:30	9:45	10:49						
6:38	6:50	7:08	6:55	7:07	7:25	7:43	7:33	6:45	6:58	7:22	7:42	8:02	6:40	6:56	7:22	7:37	10:15	10:33	10:15	10:33	10:15	10:33	10:15	10:33	11:34						
6:51	7:03	7:21	7:20	7:40	7:56	8:12	8:02	6:50	7:50	8:07	8:27	8:47	c 7:00	7:22	7:47	7:59	11:00	11:18	11:00	11:18	11:00	11:18	11:00	11:18	12:22P						
No Route 505 service on weekends																															

556•558

Spring March 19, 2016 - June 24, 2016

556 Waltham Highlands-Downtown Boston

558 Riverside-Downtown Boston

Serving

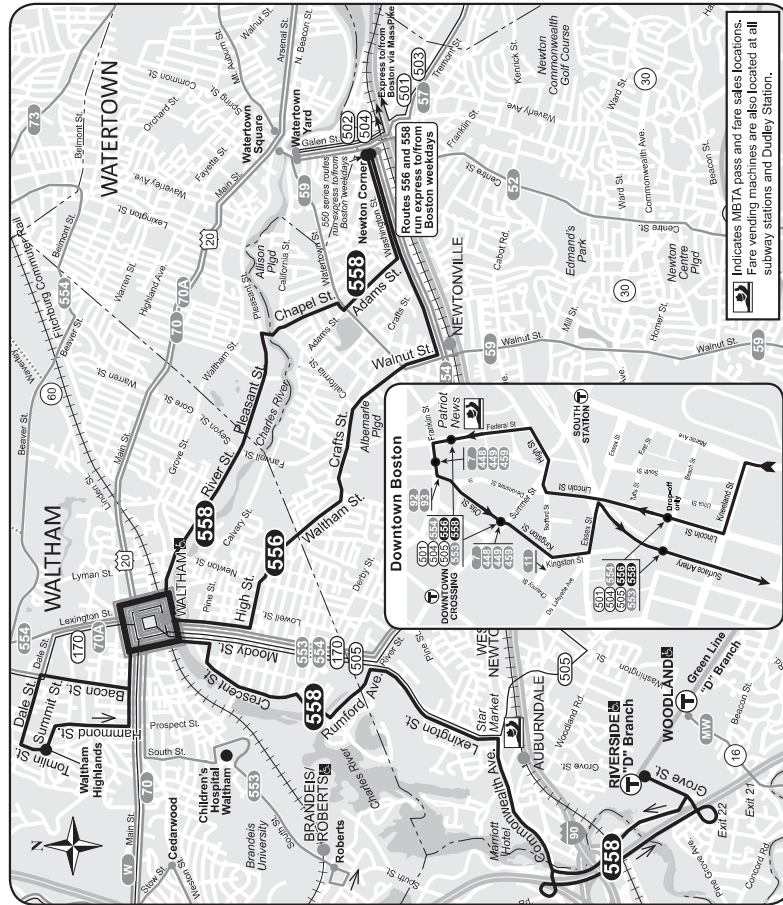
- Central Square, Waltham
- Newtonville
- Marriott Hotel
- Fitchburg Commuter Rail
- Worcester Commuter Rail

MassDOT
Massachusetts Department of Transportation

Massachusetts Bay Transportation Authority

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(TTY) 617-222-5146 • www.mbta.com

Route 556 Waltham Highlands - Downtown Boston
Route 558 Riverside - Downtown Boston



556 & 558

Weekday

Inbound					Outbound				
Leave Riverside	Leave Waltham Highlands	Arrive Central Sq. Waltham	Arrive Newton Corner	Arrive Downtown Boston	Leave Downtown Boston	Depart Newton Corner	Arrive Central Sq. Waltham	Arrive Waltham Highlands	Arrive Riverside
6:25A	6:15A	6:19A	6:35A	....	....	6:45A	6:59A	7:04A	....
....	....	6:37	6:55	....	....	7:00	7:13	....	7:30A
....	6:45	6:49	7:10	7:28A	7:05A	7:18	7:32	....	7:50
....	7:15	7:19	7:43	8:05	7:25	7:40	8:03	8:08	....
7:35	....	7:51	8:13	8:36	8:10	8:23	8:40	....	8:57
....	7:45	7:50	8:16	8:42	8:25	8:41	9:00	9:05	....
8:00	....	8:16	8:38	9:01	....	9:45	10:01	10:06	....
....	8:15	8:20	8:45	9:11	....	10:45	11:01	11:08	....
9:05	....	9:20	9:35	9:53	....	11:45	12:02P	12:09P	....
....	9:15	9:19	9:38	....	....	....	....	....	....
....	10:15	10:19	10:38	....	....	....	....	....	....
....	11:15	11:19	11:38	....	....	....	....	....	....
....	12:15P	12:19P	12:38P	....	12:15P	12:29P	12:48P	....	1:03P
....	1:15	1:19	1:40	....	....	12:45	1:02	1:09P	....
1:15P	....	1:29	1:45	....	....	1:45	2:02	2:08	....
....	2:15	2:19	2:40	....	....	1:50	2:03	....	2:20
2:25	....	2:39	2:55	....	....	2:45	3:05	3:12	....
....	3:15	3:19	3:41	....	....	3:00	3:13	....	3:31
3:35	....	3:47	4:07	....	....	3:45	4:05	4:12	....
....	4:15	4:19	4:42	5:01P	4:25	4:44	5:12	5:19	....
4:48	....	5:03	5:23	5:48	4:45	5:02	5:26	....	5:46
....	5:22	5:27	5:52	6:10	4:55	5:24	5:53	6:00	....
6:00	....	6:15	6:30	6:46	5:14	5:41	6:04	....	6:23
....	6:32	6:36	6:54	7:08	5:25	5:56	6:23	6:29	....
7:12	....	7:23	7:35	7:51	6:00	6:24	6:47	....	7:06
....	7:20	7:24	7:41	7:55	6:25	6:44	7:11	7:17	....

Route 558 indicated by shaded areas

Route 556

Waltham Highlands-Downtown Boston

Route 558

Riverside-Downtown Boston

No service
on weekends

All buses are accessible to persons with disabilities

Fare	Local Bus	Inner X-Bus Trip	Inner X-Bus + Local Bus Trip	Inner X-Bus + Subway Trip
CharlieCard	\$1.60	\$3.65	\$3.65	\$3.65
CharlieTicket	\$2.10	\$4.75	\$6.85	\$7.40
Cash-on-Board	\$2.10	\$4.75	\$6.85	\$7.40
Student CharlieCard*	\$0.80	\$2.35	\$2.35	\$2.35
Senior/TAP CharlieCard**	\$0.80	\$2.35	\$2.35	\$2.35
VALID PASSES: Inner Express Bus (\$115/mo.) Outer Express Bus (\$168/mo.) commuter rail, and boat passes. FREE PASSES: Children 11 and under ride free when accompanied by an adult; Blind Adults 65 and older ride free when accompanied by a sighted person. * Requires Student CharlieCard, available to students through participating middle schools and high schools. ** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities. Local bus fare applies if your trip does not include Masspike				

Spring 2016 Holidays
April 18: see Weekday May 30: see Sunday

FRAMINGHAM/WORCESTER LINE Train Schedule Effective May 23, 2016

Monday to Friday

Inbound to Boston

ZONE	STATION	TRAIN #	SATURDAY TRAIN #										SUNDAY TRAIN #																
			500	502	580	504	582	506	508	584	510	552	586	512	514	516	518	522	588	590	524	526	592	528	530	532	534	536	538
8	Worcester	6	4:45	5:15	-	5:55	-	6:30	7:00	-	7:30	8:05	-	8:40	10:40	12:05	2:15	3:45	-	5:20	6:05	-	7:15	8:00	8:30	9:35	11:20	12:20	
8	Grafton	6	4:58	5:28	-	6:08	-	6:43	7:13	-	7:43	-	-	8:53	10:53	12:18	2:28	3:58	-	5:33	6:18	-	7:28	8:13	8:43	9:48	f11:33	f12:33	
7	Westborough	6	5:02	5:32	-	6:12	-	6:47	7:17	-	7:47	-	-	8:57	10:57	12:22	2:32	4:02	-	-	5:37	6:22	-	7:32	8:17	8:47	9:52	f11:37	f12:37
6	Southborough	6	5:11	5:41	-	6:21	-	6:56	7:26	-	7:56	-	-	9:06	11:06	12:31	2:41	4:11	-	-	5:46	6:31	-	7:41	8:26	8:56	10:01	f11:46	f12:46
6	Ashland	6	5:15	5:45	-	6:25	-	7:00	7:30	-	8:00	-	-	9:10	11:10	12:35	2:45	4:15	-	-	5:50	6:35	-	7:45	8:30	9:00	10:05	f11:50	f12:50
5	Frammingham	6	5:26	5:56	6:05	6:36	6:46	7:11	7:42	7:50	8:11	-	8:40	9:21	11:21	12:46	2:56	4:26	4:47	5:40	6:01	6:46	7:05	7:56	8:41	9:11	10:16	f12:01	f13:01
4	West Natick	6	5:31	6:01	6:10	6:41	6:51	7:16	7:49	7:55	8:16	-	8:45	9:26	11:26	12:51	3:01	-	4:52	-	6:06	-	7:10	8:01	8:46	9:16	10:21	f12:06	f13:06
4	Natick Center	6	5:36	6:05	6:15	-	6:56	7:21	-	8:00	8:20	-	8:50	9:31	11:31	12:56	3:06	-	4:57	-	6:11	-	7:15	8:06	8:51	9:21	10:26	f12:11	f13:11
3	Wellesley Square	6	5:41	-	6:20	-	7:01	7:26	-	8:05	8:25	-	8:55	9:36	11:35	1:00	3:10	-	5:01	-	6:15	-	7:19	8:10	8:55	9:25	10:30	f12:15	f13:15
3	Wellesley Hills	6	5:45	-	6:24	-	7:05	7:30	-	8:09	8:29	-	8:59	9:40	11:39	1:04	3:14	-	5:05	-	6:19	-	7:23	8:14	8:59	9:29	10:34	f12:19	f13:19
3	Wellesley Farms	6	5:48	-	6:27	-	7:08	7:34	-	8:12	8:32	-	9:02	9:43	11:42	1:07	3:17	-	5:08	-	6:22	-	7:26	8:17	9:02	9:32	10:37	f12:22	f13:22
2	Auburndale	6	5:53	-	6:32	-	7:13	7:39	-	8:17	-	-	9:07	f9:48	f11:47	f11:12	-	-	-	-	-	-	f7:31	-	f9:07	-	-	f12:27	f13:27
2	West Newton	6	5:56	-	6:35	-	7:16	7:42	-	8:20	-	-	9:10	f9:51	f11:50	f11:15	-	-	-	-	-	f7:34	-	f9:10	-	-	f12:30	f13:30	
1	Newtonville	6	5:59	-	6:38	-	7:19	7:46	-	8:23	-	-	9:13	f9:54	f11:53	f11:18	-	-	-	-	-	f7:37	-	f9:13	-	-	f12:33	f13:33	
1A	Yawkey	6	L 6:07	L 6:22	L 6:48	L 7:00	L 7:27	L 7:56	L 8:09	L 8:33	L 8:46	L 8:57	L 9:23	L 10:02	L 12:01	L 1:26	L 3:30	L 4:46	L 5:21	L 6:07	L 6:35	L 7:08	L 7:45	L 8:30	L 9:21	L 9:45	L 10:50	L 12:41	L 1:41
1A	Back Bay	6	L 6:12	L 6:27	L 6:53	L 7:05	L 7:32	L 8:01	L 8:14	L 8:38	L 8:51	L 9:02	L 9:28	L 10:07	L 12:06	L 1:31	L 3:35	L 4:51	L 5:26	L 6:12	L 6:40	L 7:13	L 7:50	L 8:35	L 9:26	L 9:50	L 10:55	L 12:46	L 1:46
1A	South Station	6	6:18	6:33	6:59	7:11	7:38	8:07	8:20	8:44	8:57	9:07	9:34	10:12	12:11	1:36	3:40	4:56	5:31	6:17	6:45	7:18	7:55	8:40	9:31	9:55	11:00	12:51	1:51

Trains in purple box indicate peak period trains.

Monday to Friday

Outbound from Boston

ZONE	STATION	TRAIN #	SATURDAY TRAIN #																										
			Bikes Allowed												Bikes Allowed														
			501	581	583	503	585	505	587	507	509	511	515	517	589	519	591	521	593	523	525	527	529	551	531	533	535	537	539
1A	South Station	6	4:55	5:00	5:30	5:45	6:48	7:15	7:26	8:55	10:15	11:55	2:00	3:30	3:40	4:25	4:35	5:05	5:15	5:40	5:50	6:20	6:45	7:35	7:45	8:30	9:35	10:30	11:30
1A	Back Bay	6	5:00	5:05	5:35	5:50	6:53	7:21	7:32	9:01	10:21	12:01	2:06	3:36	3:46	4:31	4:41	5:11	5:21	5:46	5:56	6:26	6:51	7:41	7:51	8:36	9:41	10:36	11:36
1A	Yawkey	6	5:05	5:10	5:40	5:55	6:58	-	7:37	9:06	10:26	12:06	2:11	3:41	3:51	4:36	4:46	5:16	5:26	5:51	6:01	6:31	6:56	7:46	7:56	8:41	9:46	10:41	11:41
1	Newtonville	-	f15:19	-	-	-	-	-	-	-	f10:35	f12:15	f12:20	-	4:00	-	4:55	-	5:35	-	6:11	-	7:05	-	f8:05	f8:50	f9:55	f10:50	f11:50
2	West Newton	-	f15:23	-	-	-	-	-	-	-	f10:39	f12:19	f12:24	-	4:04	-	4:59	-	5:39	-	6:15	-	7:09	-	f8:09	f8:54	f9:59	f10:54	f11:54
2	Auburndale	-	f15:26	-	-	-	-	-	-	-	f10:42	f12:22	f12:27	-	4:07	-	5:02	-	5:42	-	6:18	-	7:12	-	f8:12	f8:57	f10:02	f10:57	f11:57
3	Wellesley Farms	-	5:29	5:53	6:08	7:11	-	7:50	9:19	10:45	12:25	2:30	-	4:10	-	5:05	-	5:45	-	6:23	6:45	7:15	-	8:15	9:00	10:05	11:00	12:00	
3	Wellesley Hills	-	5:32	5:56	6:11	7:14	-	7:53	9:22	10:48	12:28	2:33	-	4:13	-	5:08	-	5:48	-	6:26	6:48	7:18	-	8:18	9:03	10:08	11:03	12:03	
3	Wellesley Square	-	5:36	6:00	6:15	7:18	-	7:57	9:26	10:52	12:32	2:37	-	4:17	-	5:12	-	5:52	-	6:30	6:52	7:22	-	8:22	9:07	10:12	11:07	12:07	
4	Natick Center	-	5:40	6:04	6:19	7:22	-	8:01	9:30	10:56	12:36	2:41	-	4:21	-	5:16	-	5:56	-	6:34	6:56	7:26	-	8:26	9:11	10:16	11:11	12:11	
4	West Natick	6	5:24	5:45	6:09	6:24	7:27	-	8:05	9:34	11:01	12:41	2:46	4:01	4:26	5:00	5:21	5:37	6:01	6:12	6:39	7:01	7:31	-	8:31	9:16	10:21	11:16	12:16
5	Frammingham	6	5:28	5:50	6:14	6:29	7:32	7:46	8:10	9:39	11:06	12:46	2:51	4:06	4:32	5:05	5:27	5:45	6:07	6:20	6:44	7:06	7:36	-	8:36	9:21	10:26	11:21	12:21
6	Ashland	6	5:34	-	-	6:35	-	7:52	-	9:45	11:12	12:52	2:57	4:12	-	5:11	-	5:52	-	6:27	6:50	7:12	7:42	-	8:42	9:27	10:32	11:27	12:27
6	Southborough	6	5:39	-	-	6:40	-	7:57	-	9:50	11:17	12:57	3:02	4:17	-	5:16	-	5:57	-	6:32	6:55	7:17	7:47	-	8:47	9:32	10:37	11:32	12:32
7	Westborough	6	5:48	-	-	6:49	-	8:06	-	9:59	11:26	1:06	3:11	4:26	-	5:25	-	6:06	-	6:41	7:04	7:26	7:56	-	8:56	9:41	10:46	11:41	12:41
8	Grafton	6	5:53	-	-	6:54	-	8:11	-	10:04	11:31	1:11	3:16	4:31	-	5:30	-	6:11	-	6:46	7:09	7:31	8:01	-	9:01	9:46	10:51	11:46	12:46
8	Worcester	6	6:06	-	-	7:07	-	8:24	-	10:17	11:45	1:24	3:30	4:44	-	5:43	-	6:25	-	7:00	7:23	7:45	8:14	8:40	9:15	10:00	11:05	12:00	1:00

Trains in purple box indicate peak period trains.

Keep in Mind

This schedule will be effective from May 23, 2016, and will replace the schedule of December 14, 2015.

Holiday Service:

Saturday service: Presidents' Day, 4th of July

Sunday service: New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, Christmas Day.

For additional holiday travel information and service modifications, please check MBTA.com or call 617-222-3200.



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Make your train on time. Download the official MBTA Commuter Rail mobile app. Get schedule info, train progress, and alerts easily and conveniently.

179-16

Times in purple with "M" indicate a flag stop: Passengers must advise the conductor they wish to stop. Passengers waiting to board must be visible on the platform for the train to stop.

Times in blue indicate an early departure (L stop): The train may leave ahead of schedule at these stops.



Bikes: Bicycles are allowed on trains with the bicycle symbol shown below the train number.



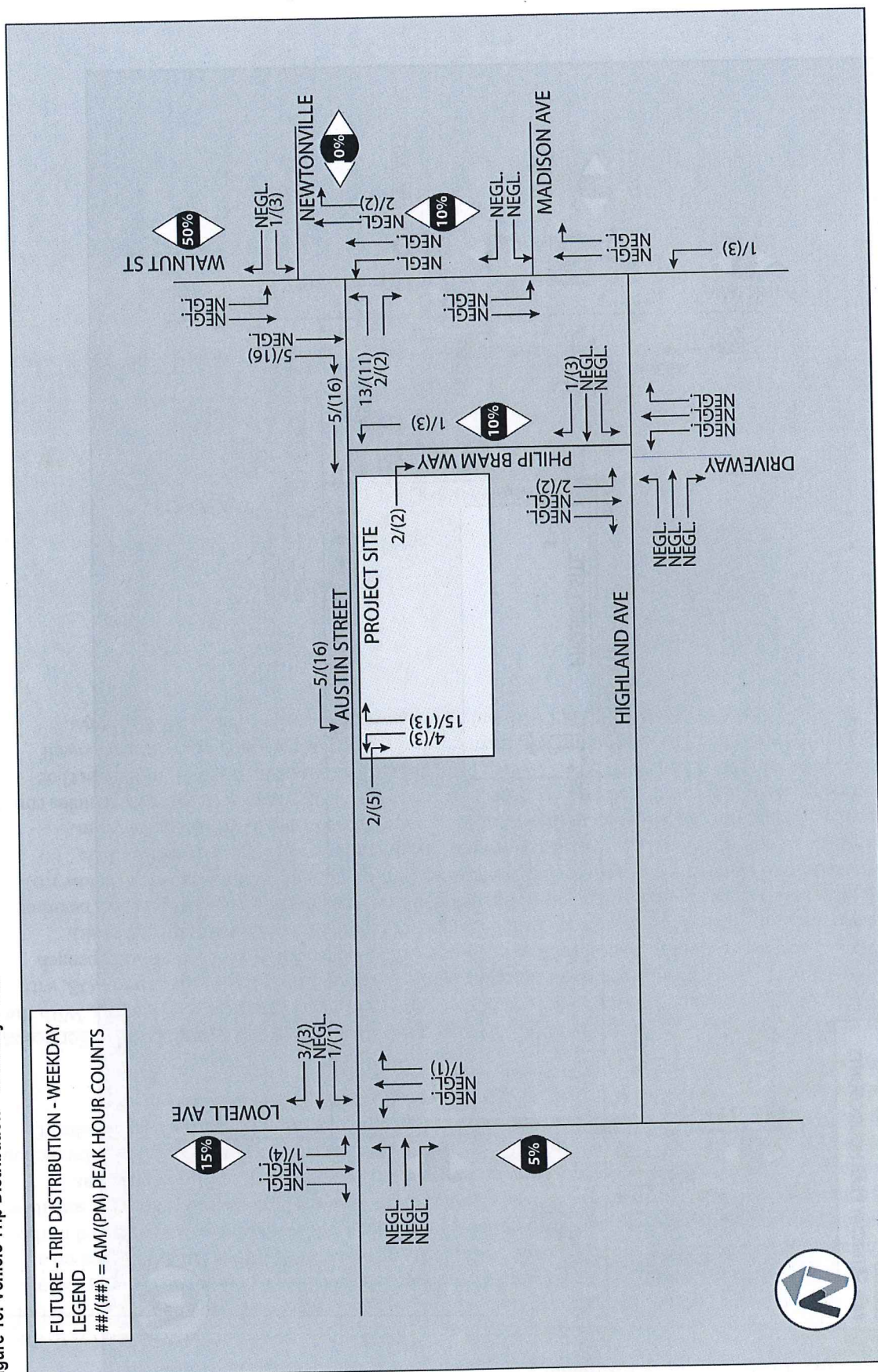


Planned/Approved Developments

28 AUSTIN STREET – TRANSPORTATION IMPACT STUDY

Austin Street Partners LLC

Figure 13: Vehicle Trip Distribution – Weekday Peak



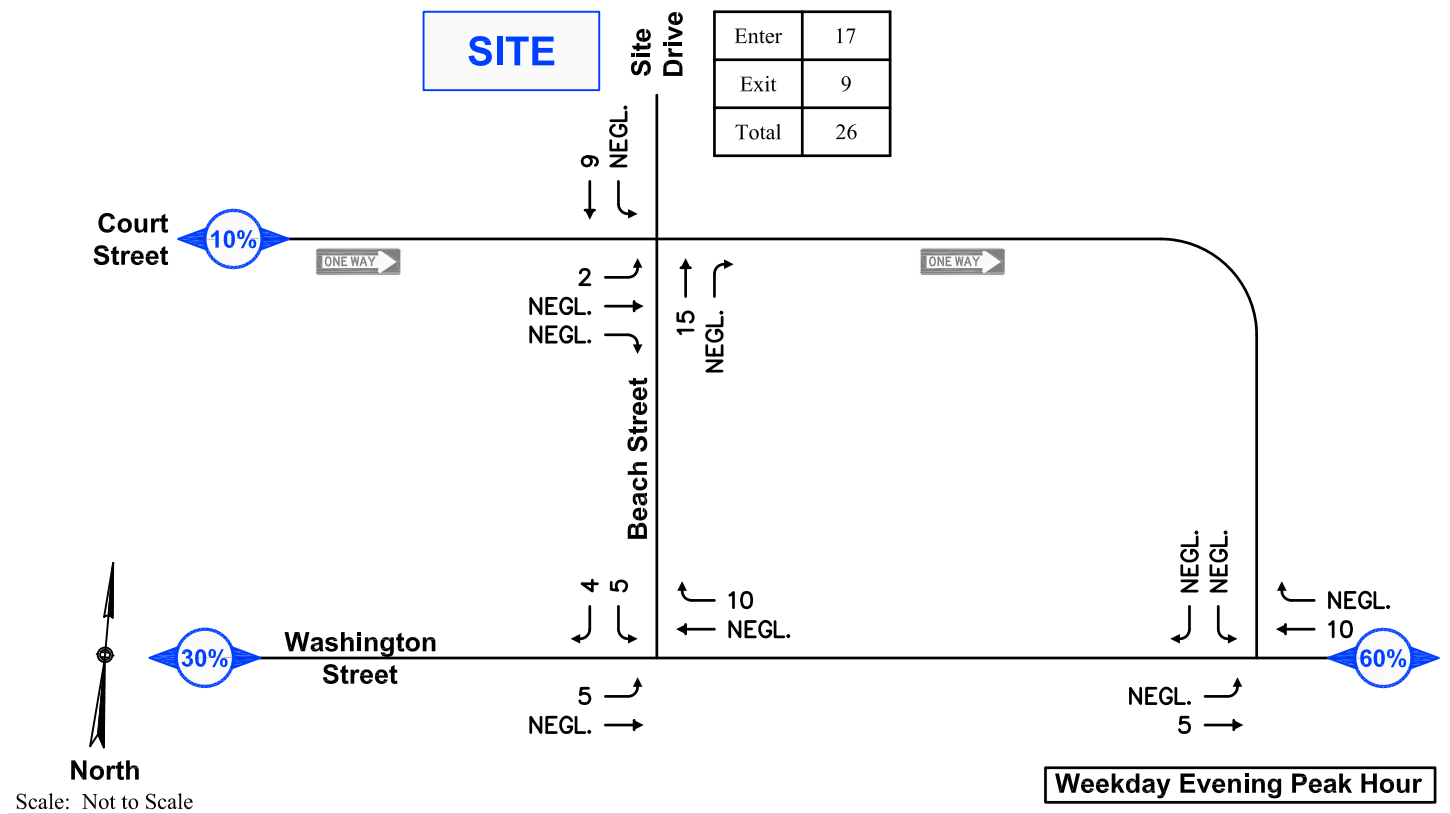
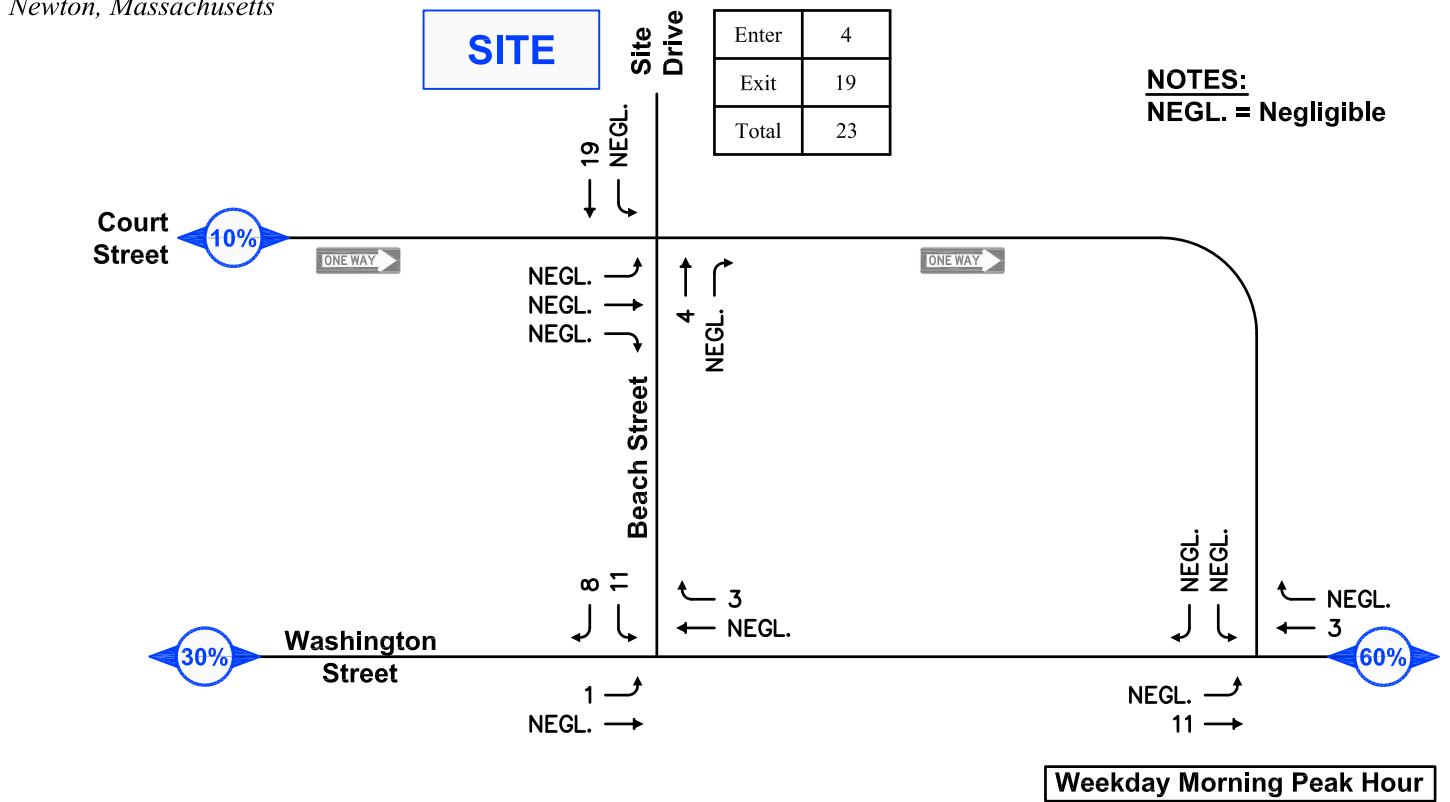
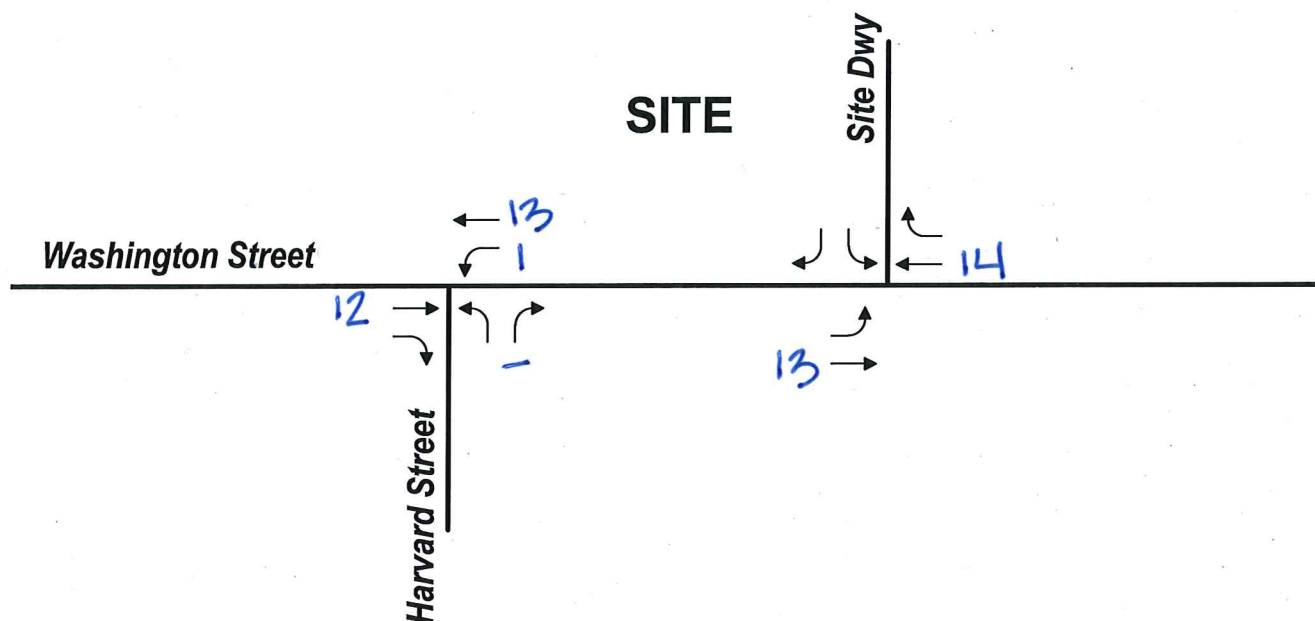


Figure 3

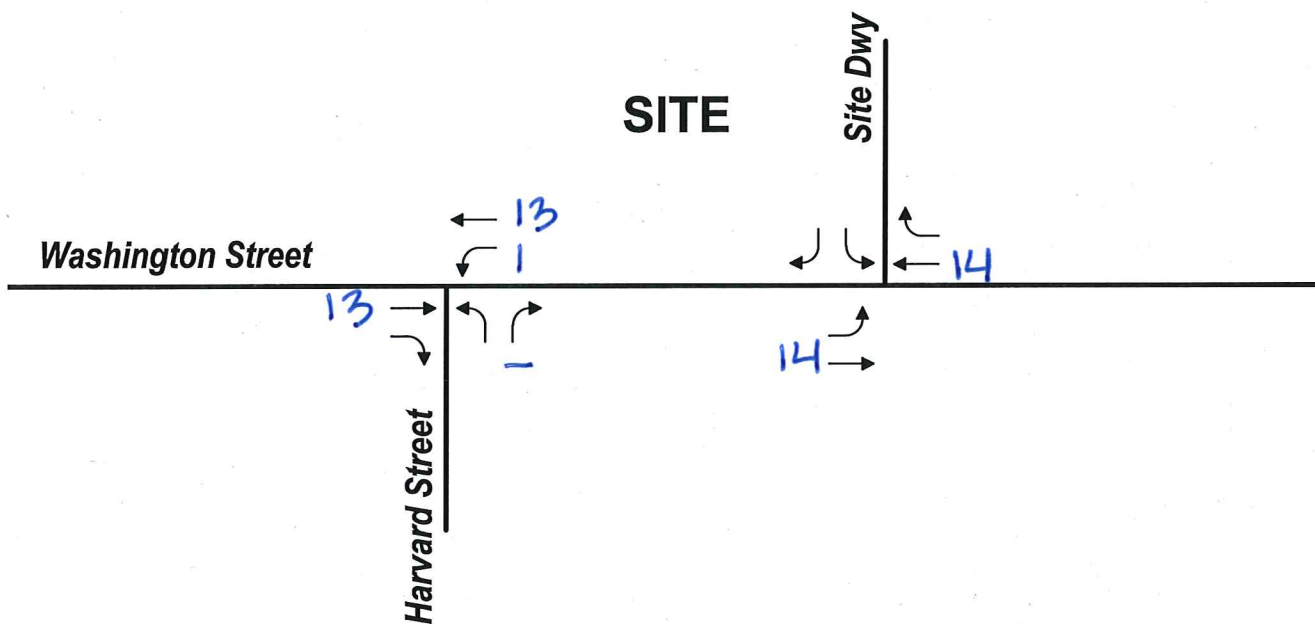
WEEKDAY EVENING PEAK HOUR

neg = Negligible



SATURDAY MIDDAY PEAK HOUR

neg = Negligible



Vanasse Hangen Brustlin, Inc.

Site Generated Trips May 2014



Not to Scale

Garden Remedies
Newton, Massachusetts



Trip Generation

ITE TRIP GENERATION WORKSHEET

(9th Edition, Updated 2012)

LANDUSE: Apartment

LANDUSE CODE: 220

Independent Variable --- Number of Units

JOB NAME: Newtonville

JOB NUMBER: 13263.00

Peak Hour Traffic on Adjacent Street: 171 units

WEEKDAY

RATES:	# Studies	R ²	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	88	0.87	6.65	1.27	12.50	210	0	1,000	50%	50%
AM PEAK (ADJACENT ST)	78	0.83	0.51	0.10	1.02	235	0	1,100	20%	80%
PM PEAK (ADJACENT ST)	90	0.77	0.62	0.10	1.64	233	0	1,100	65%	35%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,137	569	569	1160	580	580
AM PEAK (ADJACENT ST)	87	17	70	88	18	70
PM PEAK (ADJACENT ST)	106	69	37	112	73	39

SATURDAY

RATES:	# Studies	R ²	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	15	0.85	6.39	2.84	8.40	175	65	360	50%	50%
PEAK OF GENERATOR	14	0.56	0.52	0.26	1.05	178	65	360	Peak Distribution Not Available	

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,093	546	546	1086	543	543
PEAK OF GENERATOR	89	N/A	N/A	89	N/A	N/A

SUNDAY

RATES:	# Studies	R ²	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	14	0.82	5.86	3.21	7.53	182	90	360	50%	50%
PEAK OF GENERATOR	13	--	0.51	0.26	1.43	186	90	360	Peak Distribution Not Available	

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,002	546	546	997	498	498
PEAK OF GENERATOR	87	N/A	N/A	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET

(9th Edition, Updated 2012)

LANDUSE: Shopping Center (non-Christmas)

LANDUSE CODE: 820

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

JOB NAME: Newtonville

FLOOR AREA (KSF): 43.985

JOB NUMBER: 13263.00

WEEKDAY

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	302	0.79	42.70	12.50	270.89	331	0	1,600	50%	50%
AM PEAK (ADJACENT ST)	104	0.56	0.96	0.10	9.05	310	0	1,600	62%	38%
PM PEAK (ADJACENT ST)	426	0.81	3.71	0.68	29.27	376	0	2,500	48%	52%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,878	939	939	3,982	1,991	1,991
AM PEAK (ADJACENT ST)	42	26	16	94	59	36
PM PEAK (ADJACENT ST)	163	78	85	346	166	180

SATURDAY

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	123	0.82	49.97	16.70	227.50	450	0	1,600	50%	50%
PEAK OF GENERATOR	128	0.83	4.82	1.46	18.32	458	0	1,600	52%	48%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	2,198	1,099	1,099	5,507	2,754	2,754
PEAK OF GENERATOR	212	110	102	513	267	246

SUNDAY

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	77	0.52	25.24	4.15	148.15	439	0	1,600	50%	50%
PEAK OF GENERATOR	39	N/A	3.12	0.39	12.40	369	0	1,300	49%	51%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,110	555	555	4902	2451	2451
PEAK OF GENERATOR	137	67	70	N/A	N/A	N/A

SHARED TRIPS ¹

RETAIL - RESIDENTIAL																					
WEEKDAY MORNING							WEEKDAY EVENING							SATURDAY MIDDAY							
RETAIL	EXIT ->	%	#	BALANCED	#	%	RETAIL	EXIT ->	%	#	BALANCED	#	%	RETAIL	EXIT ->	%	#	BALANCED	#	%	RETAIL
	EXIT ->	14%	36	0	18	2%		EXIT ->	26%	180	34	73	46%		EXIT ->	26%	246	27	58	46%	-> ENTER
	ENTER <-	17%	59	1	70	1%		ENTER <-	10%	166	16	39	42%		ENTER <-	10%	267	13	31	42%	<- EXIT

TOTAL SHARED TRIPS - WEEKDAY MORNING

	ENTER	EXIT	TOTAL
RETAIL	1	0	1
RES	0	1	1

TOTAL SHARED TRIPS - WEEKDAY EVENING

	ENTER	EXIT	TOTAL
RETAIL	16	34	50
RES	34	16	50

TOTAL SHARED TRIPS - SATURDAY MIDDAY

	ENTER	EXIT	TOTAL
RETAIL	13	27	40
RES	27	13	40

¹ Internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rates



Sight Distance Worksheets

Stopping Sight Distance and Intersection Sight Distance [v0.97]

Section I					
Project Information					
Project Number:	13263.00		Analyst:	VHB	
City/Town, State:	Newton, MA		Client:		
Location:	Washington Street Washington Terrace				
Street Names and Directions					
Major Street name:	Washington Street	EB/WB	▶		
Minor Street name:	Washington Terrace	NB/SB	▶		
Minor Street intersects from the: north					
The minor street predominantly serves...					
Sight distance location intersection is...	Passenger Cars				
Total number of lanes on Major Street is...	Existing				
Grade Information [enter down slope as a negative number]	4				
Major Street Approach Grade:	0.00%	EB			
	0.00%	WB			
Minor Street Approach Grade:	0.00%	NB			
	0.00%	SB			
Major Street Speed Information					
Observed *					
	35	EB	23		
	35	WB	30		
* note: off-peak 85th percentile speeds					
Section II					
ISD and SSD Observations					
Instructions on how to observe and measure ISD and SSD are included on subsequent pages.					
<p>ISD - Intersection sight distance is the distance that is based on the time required for perception, reaction and completion of the desired critical exiting maneuver (typically, a left turn) once the driver on a minor street approach (or a site drive) decides to execute the maneuver. Calculation for the critical ISD includes the time to [1] turn left, and to clear the near half of the intersection without conflicting with the vehicles approaching from the left; and [2] upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a desirable visibility criterion for the safe operation of an unsignalized intersection.</p> <p>SSD - Stopping sight distance is the distance required for a vehicle approaching an intersection from either direction to perceive, react, and come to a complete stop before colliding with the exiting vehicle from a driveway. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.</p>					
Limiting Factors:					
Observed ISD:	35	looking left [east]			
(rounded to nearest 5 feet)	120	looking right [west]			
Observed SSD:	400	traveling EB			
(rounded to nearest 5 feet)	500	traveling WB			

Section III						
ISD and SSD Calculations (rounded up to the next highest 5 feet) [sources: SSD - AASHTO, pp.110-117; ISD - AASHTO, pp. 650 - 664]						
Cases are described in detail on subsequent pages. In summary..						
B1:	left turn from minor road, from stop control					
B2:	right turn from minor road, from stop control					
B3:	crossing maneuver from minor road, from stop control, assuming left- and right turns are not permitted [otherwise, case B1 or B2 would supercede]					
Desirable Calculated...		340	No	Condition Met?		
... ISD, case B1:		295	No			
... ISD, case B2:		295	No			
... ISD, case B3:						
[note: If number of lanes crossed exceeds 6, or if grades are steep, consult the manual]						
Minimum Calculated ...		200	No	Condition Met?		
... ISD, case B1:		200	No			
... ISD, case B2:		200	No			
... ISD, case B3:						
[note: minimum ISD is equal to required SSD]						
Calculated ...		140	Yes	Condition Met?		
... SSD:		200	Yes			
		traveling EB				
		traveling WB				
Section IV						
AASHTO Guidance						
Refer to AASHTO for specific guidance on SSD and ISD if presented with an unusual/atypical case.						
Adequate ISD is not needed at signalized intersections, assuming traffic signal heads are visible on all approaches.						
Any object that would obstruct the driver's view should be removed or lowered, if practical. Such objects include buildings, parked cars, highway structures, hedges/vegetation/trees/bushes/unmowed lawn, walls, fences, and terrain.						
For ISD, an object should be considered an obstruction if it obstructs the vision of a driver whose eye height is 3.5 feet above the roadway surface and the object to be seen is 3.5 feet above the surface of the intersecting road.						
Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades, it is desirable to provide SSD that exceeds those values indicated above (refer to page 114 of AASHTO).						

Stopping Sight Distance and Intersection Sight Distance Calculator [v0.97]

Section I		Section III	
Project Information		ISD and SSD Calculations (rounded up to the next highest 5 feet) [sources: SSD - AASHTO, pp.110-117; ISD - AASHTO, pp. 650 - 664]	
Project Number:	13263.00	Cases are described in detail on subsequent pages. In summary...	
City/Town, State:	Newton, MA	B1: left turn from minor road, from stop control	
Location:	Walnut Street Site Driveway	B2: right turn from minor road, from stop control	
		B3: crossing maneuver from minor road, from stop control, assuming left- and right turns are not permitted [otherwise, case B1 or B2 would supercede]	
Street Names and Directions		Desirable Calculated...	
Major Street name:	Walnut Street	Condition Met?	
Minor Street name:	Site Driveway	No	
Minor Street intersects from the:		No	
		No	
The minor street predominantly serves...		[note: if number of lanes crossed exceeds 6, or if grades are steep, consult the manual]	
Sight distance location intersection is...		...	
Total number of lanes on Major Street is...		...	
Grade Information [enter down slope as a negative number]		...	
Major Street Approach Grade:		...	
Minor Street Approach Grade:		...	
Major Street Speed Information		Minimum Calculated ...	
		Condition Met?	
		No	
		No	
		No	
		[note: minimum ISD is equal to required SSD]	
Section II		Calculated ...	
		Condition Met?	
		Yes	
		Yes	
Section IV		AASHTO Guidance	
		Refer to AASHTO for specific guidance on SSD and ISD if presented with an unusual/atypical case.	
		Adequate ISD is not needed at signalized intersections, assuming traffic signal heads are visible on all approaches.	
		Any object that would obstruct the driver's view should be removed or lowered, if practical. Such objects include buildings, parked cars, highway structures, hedges/vegetation/trees/bushes/unmowed lawn, walls, fences, and terrain.	
		For ISD, an object should be considered an obstruction if it obstructs the vision of a driver whose eye height is 3.5 feet above the roadway surface and the object to be seen is 3.5 feet above the surface of the intersecting road.	
		Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades, it is desirable to provide SSD that exceeds those values indicated above (refer to page 114 of AASHTO).	
Section I		Section II	
ISD and SSD Observations		Instructions on how to observe and measure ISD and SSD are included on subsequent pages.	
		ISD - Intersection sight distance is the distance that is based on the time required for perception, reaction and completion of the desired critical exiting maneuver [typically, a left turn] once the driver on a minor street approach [or a site drive] decides to execute the maneuver. Calculation for the critical ISD includes the time to [1] turn left, and to clear the near half of the intersection without conflicting with the vehicles approaching from the left; and [2] upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a desirable visibility criterion for the safe operation of an unsignalized intersection.	
		SSD - Stopping sight distance is the distance required for a vehicle approaching an intersection from either direction to perceive, react, and come to a complete stop before colliding with the exiting vehicle from a driveway. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.	
Limiting Factors:		Observed *	
Observed ISD:		25	
(rounded to nearest 5 feet)		25	
Observed SSD:		26	
(rounded to nearest 5 feet)		24	
		* note: off-peak 85th percentile speeds	



Signal Warrant Analysis

2003 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Washington Street at Washington Terrace

Major Street Direction: Eastbound-Westbound

Year: 2023 Condition: Build

Operating speed on major roadway: 35 mph

Number of approaches: 3

Required approach volumes

Warrant 1	EIGHT-HOUR VEHICULAR VOLUME	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	600	600
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	900	900
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 2 Lane(s) on each approach	480	720
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME

Major Street : 2 Lane(s) on each approach
Minor Street : 1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME

Major Street : 2 Lane(s) on each approach
Minor Street : 1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Eastbound	Westbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM				0	No	No	No	No	No
7:00 - 8:00 AM				0	No	No	No	No	No
8:00 - 9:00 AM	65	795	480	1275	No	No	No	No	No
9:00 - 10:00 AM				0	No	No	No	No	No
10:00 - 11:00 AM				0	No	No	No	No	No
11:00 - 12:00 AM				0	No	No	No	No	No
12:00 - 1:00 PM				0	No	No	No	No	No
1:00 - 2:00 PM				0	No	No	No	No	No
2:00 - 3:00 PM				0	No	No	No	No	No
3:00 - 4:00 PM				0	No	No	No	No	No
4:00 - 5:00 PM				0	No	No	No	No	No
5:00 - 6:00 PM	125	675	670	1345	No	Yes	Yes	Yes	No
6:00 - 7:00 PM				0	No	No	No	No	No
					No	No	No	No	No
					1			2	3
Warrants Met?					NO			No	No

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
Peak Four Hour Pedestrian Volumes:
(non-concurrent)

Warrant 5, School Crossing:
See MUTCD for details.

Warrant 6, Coordinated Signal System:
See MUTCD for details.

Warrant 7, Crash Experience: No
of accidents "correctable by
signalization" occurring in the last 12 months: 0

Warrant 8, Roadway Network:
See MUTCD for details.

Source: Manual on Uniform Traffic Control Devices (MUTCD); 2003 Edition [2003]

2003 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Washington Street at Washington Terrace

Major Street Direction: Eastbound-Westbound ▼

Year: 2016 Condition: Existing

Operating speed on major roadway: 35 mph

Number of approaches: 2

Required approach volumes

Warrant 1	EIGHT-HOUR VEHICULAR VOLUME	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	600	600
	Minor Street : Lane(s) on each approach	200	200
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	900	900
	Minor Street : 0 Lane(s) on each approach	100	100
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 2 Lane(s) on each approach	480	720
	Minor Street : 0 Lane(s) on each approach	160	80

Warrant 2 FOUR HOUR VEHICULAR VOLUME

Major Street : 2 Lane(s) on each approach
Minor Street : 0 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME

Major Street : 2 Lane(s) on each approach
Minor Street : 0 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Eastbound	Westbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM		204	98	302	No	No	No	0	0
7:00 - 8:00 AM		454	351	805	No	No	No	0	0
8:00 - 9:00 AM		548	398	946	No	No	No	0	0
9:00 - 10:00 AM		365	334	699	No	No	No	0	0
10:00 - 11:00 AM		330	344	674	No	No	No	0	0
11:00 - 12:00 AM		327	340	667	No	No	No	0	0
12:00 - 1:00 PM		343	418	761	No	No	No	0	0
1:00 - 2:00 PM		288	387	675	No	No	No	0	0
2:00 - 3:00 PM		358	456	814	No	No	No	0	0
3:00 - 4:00 PM		360	578	938	No	No	No	0	0
4:00 - 5:00 PM		401	592	993	No	No	No	0	0
5:00 - 6:00 PM		497	640	1137	No	No	No	0	0
6:00 - 7:00 PM		475	512	987	No	No	No	0	0
					No	No	No	No	No
					Warrants Met?			1	2
								NO	3
								No	No

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

Peak Four Hour Pedestrian Volumes: 11

(non-concurrent) 28

34

29

Warrant 5, School Crossing:

See MUTCD for details.

Warrant 7, Crash Experience: No

of accidents "correctable by signalization" occurring in the last 12 months: 0

Warrant 6, Coordinated Signal System:
See MUTCD for details.

Warrant 8, Roadway Network:
See MUTCD for details.

Source: Manual on Uniform Traffic Control Devices (MUTCD); 2003 Edition [2003]



Intersection Capacity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations		↔			↔		↔	↔			↔		
Volume (vph)	25	555	135	55	370	10	120	205	150	10	240	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3385	0	0	3436	0	1787	1730	0	0	1738	0	
Flt Permitted		0.922			0.710		0.294				0.455		
Satd. Flow (perm)	0	3125	0	0	2454	0	552	1730	0	0	792	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		29			2			30			6		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	23		3	3		23	4		22	22		4	
Confl. Bikes (#/hr)								3					
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.72	0.72	0.72	0.87	0.87	0.87	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	7%	7%	7%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	804	0	0	493	0	167	493	0	0	327	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effect Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.44			0.44		0.30	0.24			0.24		
v/c Ratio		0.59			0.46		0.70	1.12			1.68		
Control Delay		25.4			24.5		48.0	116.5			353.3		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		25.4			24.5		48.0	116.5			353.3		
LOS		C			C		D	F			F		
Approach Delay		25.4			24.5			99.2			353.3		
Approach LOS		C			C			F			F		
Queue Length 50th (ft)		239			141		92	~430			~364		
Queue Length 95th (ft)		303			187		116	#445			#524		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1374			1067		237	440			195		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.59			0.46		0.70	1.12			1.68		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 104.8

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.68

Intersection Signal Delay: 93.5

Intersection LOS: F

Intersection Capacity Utilization 85.8%

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: 1: Lowell Avenue & Washington Street











↔ ø1	↔ ø2	↔ ø3	↔ ø4
50 s	23 s	11 s	30 s

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	745	455	5	5	10
Conflicting Peds, #/hr	19	0	0	19	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	91	91	70	70
Heavy Vehicles, %	2	2	3	3	21	21
Mvmt Flow	11	801	500	5	7	14
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	925	272
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	422	-
Critical Hdwy	4.14	-	-	-	7.22	7.32
Critical Hdwy Stg 1	-	-	-	-	6.22	-
Critical Hdwy Stg 2	-	-	-	-	6.22	-
Follow-up Hdwy	2.22	-	-	-	3.71	3.51
Pot Cap-1 Maneuver	1056	-	-	-	235	672
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1039	-	-	-	231	661
Mov Cap-2 Maneuver	-	-	-	-	231	-
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	566	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.2		0		14.3	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1039	-	-	-	408	
HCM Lane V/C Ratio	0.01	-	-	-	0.053	
HCM Control Delay (s)	8.5	0.1	-	-	14.3	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	750	445	0	5	15
Conflicting Peds, #/hr	21	0	0	21	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	91	91	64	64
Heavy Vehicles, %	2	2	3	3	0	0
Mvmt Flow	2	806	489	0	8	23
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	489	0	-	0	897	266
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	408	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1070	-	-	-	283	738
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1051	-	-	-	282	725
Mov Cap-2 Maneuver	-	-	-	-	282	-
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	644	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		12.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1051	-	-	-	521	
HCM Lane V/C Ratio	0.002	-	-	-	0.06	
HCM Control Delay (s)	8.4	0	-	-	12.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	750	445	15	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	75	75
Heavy Vehicles, %	3	3	4	4	0	0
Mvmt Flow	5	815	484	16	3	0
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	500	0	-	0	910	250
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	418	-
Critical Hdwy	4.16	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.23	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1053	-	-	-	278	756
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	638	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1053	-	-	-	275	756
Mov Cap-2 Maneuver	-	-	-	-	275	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	632	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		18.2	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1053	-	-	-	275	
HCM Lane V/C Ratio	0.005	-	-	-	0.01	
HCM Control Delay (s)	8.4	0	-	-	18.2	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	745	460	5	0	2
Conflicting Peds, #/hr	17	0	0	17	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	50	50
Heavy Vehicles, %	3	3	4	4	0	0
Mvmt Flow	5	819	505	5	0	4
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	511	0	-	0	928	272
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	420	-
Critical Hdwy	4.16	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.23	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1043	-	-	-	271	732
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	637	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1028	-	-	-	269	722
Mov Cap-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	631	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		10	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1028	-	-	-	722	
HCM Lane V/C Ratio	0.005	-	-	-	0.006	
HCM Control Delay (s)	8.5	0	-	-	10	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations													
Volume (vph)	40	615	90	180	350	50	95	385	245	25	315	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3410	0	0	3359	0	1752	1845	1568	0	1736	0	
Flt Permitted		0.865			0.522		0.161				0.785		
Satd. Flow (perm)	0	2956	0	0	1777	0	295	1845	1444	0	1363	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			8				280		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		212			406			348			228		
Travel Time (s)		4.8			9.2			7.9			5.2		
Confl. Peds. (#/hr)	24		17	17		24	22		73	73		22	
Confl. Bikes (#/hr)									3			1	
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.85	0.85	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	8%	8%	8%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	809	0	0	691	0	112	453	288	0	424	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		38.2			48.2		43.6	42.6	42.6		30.0		
Actuated g/C Ratio		0.29			0.37		0.33	0.32	0.32		0.23		
v/c Ratio		0.94			1.53dl		0.58	0.76	0.44		1.36		
Control Delay		63.9			65.7		44.4	49.7	6.3		220.7		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		63.9			65.7		44.4	49.7	6.3		220.7		
LOS		E			E		D	D	A		F		
Approach Delay		63.9			65.7			34.4			220.7		
Approach LOS		E			E			C			F		
Queue Length 50th (ft)		354			246		69	350	5		~487		
Queue Length 95th (ft)		#484			#320		110	444	55		#648		
Internal Link Dist (ft)		132			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		864			725		208	616	668		312		
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		0.94			0.95		0.54	0.74	0.43		1.36		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 131.8

Natural Cycle: 135

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.36

Intersection Signal Delay: 79.2

Intersection LOS: E

Intersection Capacity Utilization 89.1%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

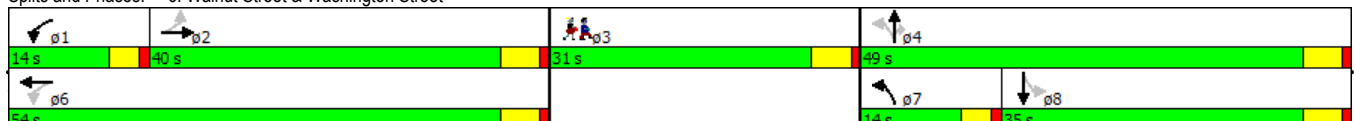
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street



Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	55	830	545	30	30	35
Conflicting Peds, #/hr	21	0	0	21	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	83	83	76	76
Heavy Vehicles, %	3	3	4	4	5	5
Mvmt Flow	61	922	657	36	39	46
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	695	0	-	0	1260	369
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	583	-
Critical Hdwy	4.16	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.23	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	890	-	-	-	158	620
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	874	-	-	-	135	608
Mov Cap-2 Maneuver	-	-	-	-	135	-
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	439	-
Approach	EB		WB		SB	
HCM Control Delay, s	1.1		0		29.3	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	874	-	-	-	232	
HCM Lane V/C Ratio	0.07	-	-	-	0.369	
HCM Control Delay (s)	9.4	0.6	-	-	29.3	
HCM Lane LOS	A	A	-	-	D	
HCM 95th %tile Q(veh)	0.2	-	-	-	1.6	

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	0	2	0	0	0	2	460	15	5	360	5
Conflicting Peds, #/hr	1	0	7	7	0	1	21	0	55	55	0	21
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	35	35	35	92	92	92	96	96	96	87	87	87
Heavy Vehicles, %	14	14	14	2	2	2	3	3	3	10	10	10
Mvmt Flow	14	0	6	0	0	0	2	479	16	6	414	6
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	933	941	479	936	936	549	427	0	0	502	0	0
Stage 1	435	435	-	498	498	-	-	-	-	-	-	-
Stage 2	498	506	-	438	438	-	-	-	-	-	-	-
Critical Hdwy	7.24	6.64	6.34	7.12	6.52	6.22	4.13	-	-	4.2	-	-
Critical Hdwy Stg 1	6.24	5.64	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.24	5.64	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.626	4.126	3.426	3.518	4.018	3.318	2.227	-	-	2.29	-	-
Pot Cap-1 Maneuver	235	251	563	245	265	535	1127	-	-	1022	-	-
Stage 1	577	560	-	554	544	-	-	-	-	-	-	-
Stage 2	533	520	-	597	579	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	221	245	534	228	259	508	1075	-	-	975	-	-
Mov Cap-2 Maneuver	221	245	-	228	259	-	-	-	-	-	-	-
Stage 1	572	552	-	549	539	-	-	-	-	-	-	-
Stage 2	507	515	-	559	571	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	19.7			0			0			0.1		
HCM LOS	C			A								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1075	-	-	265	-	975	-	-				
HCM Lane V/C Ratio	0.002	-	-	0.075	-	0.006	-	-				
HCM Control Delay (s)	8.4	0	-	19.7	0	8.7	0	-				
HCM Lane LOS	A	A	-	C	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	-	0	-	-				

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	5	460	370	1
Conflicting Peds, #/hr	24	2	18	0	0	18
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	88	88
Heavy Vehicles, %	2	2	3	3	10	10
Mvmt Flow	0	0	5	495	420	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	950	463	446	0	-	0
Stage 1	445	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	289	599	1109	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	276	578	1092	-	-	-
Mov Cap-2 Maneuver	276	-	-	-	-	-
Stage 1	633	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1092	-	-	-	-	
HCM Lane V/C Ratio	0.005	-	-	-	-	
HCM Control Delay (s)	8.3	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	5	455	370	15
Conflicting Peds, #/hr	0	0	15	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	92	92
Heavy Vehicles, %	2	2	3	3	8	8
Mvmt Flow	0	0	5	479	402	16
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	899	425	418	0	-	0
Stage 1	410	-	-	-	-	-
Stage 2	489	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	309	629	1136	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	307	621	1122	-	-	-
Mov Cap-2 Maneuver	307	-	-	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	612	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1122	-	-	-	-	
HCM Lane V/C Ratio	0.005	-	-	-	-	
HCM Control Delay (s)	8.2	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations		↔			↔		↔	↔			↔		
Volume (vph)	20	520	155	145	505	25	145	175	100	15	295	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3434	0	0	3511	0	1752	1730	0	0	1848	0	
Flt Permitted		0.917			0.573		0.266				0.955		
Satd. Flow (perm)	0	3151	0	0	2034	0	490	1730	0	0	1768	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		38			4			23			5		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	18		3	3		18	2		6	6		2	
Confl. Bikes (#/hr)			1			3			1			1	
Peak Hour Factor	0.86	0.86	0.86	0.88	0.88	0.88	0.93	0.93	0.93	0.94	0.94	0.94	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	808	0	0	767	0	156	296	0	0	367	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effect Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.46			0.46		0.31	0.25			0.25		
v/c Ratio		0.56			0.83		0.68	0.65			0.82		
Control Delay		22.4			35.3		44.2	40.8			52.7		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		22.4			35.3		44.2	40.8			52.7		
LOS		C			D		D	D			D		
Approach Delay		22.4			35.3			41.9			52.7		
Approach LOS		C			D			D			D		
Queue Length 50th (ft)		150			178		58	136			190		
Queue Length 95th (ft)		286			#400		#179	#309			#449		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1453			926		230	453			450		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.56			0.83		0.68	0.65			0.82		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 100.2

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 34.9

Intersection LOS: C

Intersection Capacity Utilization 89.7%

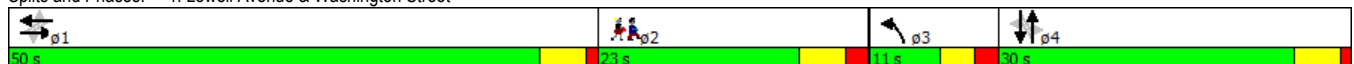
ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Lowell Avenue & Washington Street



Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	615	675	5	0	5
Conflicting Peds, #/hr	27	0	0	27	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	87	87	42	42
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	6	741	776	6	0	12
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	782	0	-	0	1162	418
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	383	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	838	-	-	-	191	589
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	665	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	819	-	-	-	189	576
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	657	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.2		0		11.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	819	-	-	-	576	
HCM Lane V/C Ratio	0.007	-	-	-	0.021	
HCM Control Delay (s)	9.4	0.1	-	-	11.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	615	660	0	10	20
Conflicting Peds, #/hr	30	0	0	30	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	87	87	65	65
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	1	741	759	0	15	31
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	759	0	-	0	1132	409
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	373	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	855	-	-	-	200	597
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	672	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	834	-	-	-	200	582
Mov Cap-2 Maneuver	-	-	-	-	200	-
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	671	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		16.6	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	834	-	-	-	356	
HCM Lane V/C Ratio	0.001	-	-	-	0.13	
HCM Control Delay (s)	9.3	0	-	-	16.6	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0.4	

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	600	655	65	1	5
Conflicting Peds, #/hr	39	0	0	39	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	86	86	50	50
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	28	674	762	76	2	10
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	837	0	-	0	1192	458
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	799	-	-	-	183	555
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	773	-	-	-	172	537
Mov Cap-2 Maneuver	-	-	-	-	172	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	619	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.7		0		14.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	773	-	-	-	397	
HCM Lane V/C Ratio	0.036	-	-	-	0.03	
HCM Control Delay (s)	9.8	0.3	-	-	14.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	595	665	5	25	55
Conflicting Peds, #/hr	46	0	0	46	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	87	87	77	77
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	6	669	764	6	32	71
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	771	0	-	0	1114	432
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	346	-
Critical Hdwy	4.12	-	-	-	6.82	6.92
Critical Hdwy Stg 1	-	-	-	-	5.82	-
Critical Hdwy Stg 2	-	-	-	-	5.82	-
Follow-up Hdwy	2.21	-	-	-	3.51	3.31
Pot Cap-1 Maneuver	846	-	-	-	204	574
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	691	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	814	-	-	-	201	552
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	682	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.2		0		19.2	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	814	-	-	-	357	
HCM Lane V/C Ratio	0.007	-	-	-	0.291	
HCM Control Delay (s)	9.5	0.1	-	-	19.2	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	1.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations		↔↔			↔↔		↔	↑	↔		↔↔		
Volume (vph)	20	535	65	210	530	55	115	390	195	35	340	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3498	0	0	3439	0	1770	1863	1583	0	1848	0	
Flt Permitted		0.901			0.518		0.167				0.772		
Satd. Flow (perm)	0	3156	0	0	1804	0	306	1863	1497	0	1429	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		9			6				217		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		212			406			348			228		
Travel Time (s)		4.8			9.2			7.9			5.2		
Confl. Peds. (#/hr)	44		6	6		44	48		47	47		48	
Confl. Bikes (#/hr)			1			1			1				
Peak Hour Factor	0.87	0.87	0.87	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	713	0	0	837	0	128	433	217	0	426	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		39.0			49.0		43.9	42.9	42.9		30.0		
Actuated g/C Ratio		0.29			0.37		0.33	0.32	0.32		0.23		
v/c Ratio		0.77			1.27dl		0.64	0.72	0.34		1.31		
Control Delay		48.8			118.6		47.6	47.6	5.6		203.1		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		48.8			118.6		47.6	47.6	5.6		203.1		
LOS		D			F		D	D	A		F		
Approach Delay		48.8			118.6			35.9			203.1		
Approach LOS		D			F			D			F		
Queue Length 50th (ft)		295			~390		80	329	0		~481		
Queue Length 95th (ft)		355			#562		132	454	57		#693		
Internal Link Dist (ft)		132			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		932			730		211	616	640		324		
Starvation Cap Reductn		0			0		0	0	0		0		
Spillback Cap Reductn		0			0		0	0	0		0		
Storage Cap Reductn		0			0		0	0	0		0		
Reduced v/c Ratio		0.77			1.15		0.61	0.70	0.34		1.31		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 132.9

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 90.2

Intersection LOS: F

Intersection Capacity Utilization 99.0%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

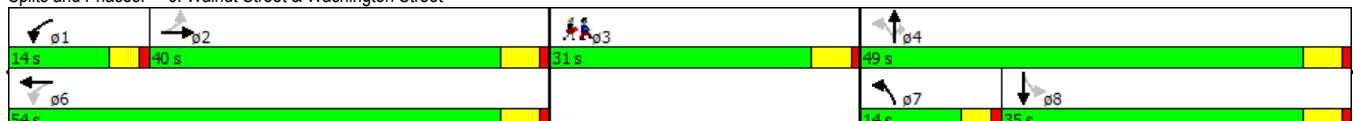
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street



Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	40	725	760	25	20	35
Conflicting Peds, #/hr	32	0	0	32	0	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	97	97	87	87
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	43	780	784	26	23	40
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	812	0	-	0	1275	440
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	476	-
Critical Hdwy	4.12	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.21	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	817	-	-	-	159	565
Stage 1	-	-	-	-	403	-
Stage 2	-	-	-	-	591	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	795	-	-	-	143	549
Mov Cap-2 Maneuver	-	-	-	-	143	-
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	534	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.9		0		22.4	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	795	-	-	-	270	
HCM Lane V/C Ratio	0.054	-	-	-	0.234	
HCM Control Delay (s)	9.8	0.4	-	-	22.4	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9	

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	0	20	10	0	15	5	460	1	0	370	15
Conflicting Peds, #/hr	1	0	1	1	0	1	23	0	10	10	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	68	67	67	95	95	95	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	5	5	5	2	2	2
Mvmt Flow	14	0	29	15	0	22	5	484	1	0	402	16
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	918	908	434	922	915	509	419	0	0	486	0	0
Stage 1	411	411	-	496	496	-	-	-	-	-	-	-
Stage 2	507	497	-	426	419	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.15	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.245	-	-	2.218	-	-
Pot Cap-1 Maneuver	254	277	626	253	275	568	1124	-	-	1077	-	-
Stage 1	622	598	-	559	549	-	-	-	-	-	-	-
Stage 2	552	548	-	610	593	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	238	275	613	235	273	557	1102	-	-	1056	-	-
Mov Cap-2 Maneuver	238	275	-	235	273	-	-	-	-	-	-	-
Stage 1	618	598	-	555	545	-	-	-	-	-	-	-
Stage 2	517	544	-	570	593	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15			16.1			0.1			0		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1102	-	-	402	361	1056	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.108	0.103	-	-	-				
HCM Control Delay (s)	8.3	0	-	15	16.1	0	-	-				
HCM Lane LOS	A	A	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.4	0.3	0	-	-				

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	1	1	485	385	5
Conflicting Peds, #/hr	4	2	31	0	0	31
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	25	92	92	93	93
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	4	1	527	414	5
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	950	452	423	0	-	0
Stage 1	421	-	-	-	-	-
Stage 2	529	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	291	612	1126	-	-	-
Stage 1	667	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	289	594	1097	-	-	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	665	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.1	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1097	-	594	-	-	
HCM Lane V/C Ratio	0.001	-	0.007	-	-	
HCM Control Delay (s)	8.3	0	11.1	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	25	460	390	10
Conflicting Peds, #/hr	0	0	21	0	0	21
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	91	91	90	90
Heavy Vehicles, %	2	2	5	5	2	2
Mvmt Flow	0	0	27	505	433	11
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	999	460	444	0	-	0
Stage 1	439	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.15	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.245	-	-	-
Pot Cap-1 Maneuver	270	601	1100	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	261	590	1081	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1081	-	-	-	-	
HCM Lane V/C Ratio	0.025	-	-	-	-	
HCM Control Delay (s)	8.4	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations		↔			↔		↔	↔			↔		
Volume (vph)	25	575	140	55	385	10	125	210	155	10	250	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3385	0	0	3436	0	1787	1728	0	0	1748	0	
Flt Permitted		0.924			0.717		0.316				0.727		
Satd. Flow (perm)	0	3132	0	0	2478	0	593	1728	0	0	1273	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		29			2			30			4		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	23		3	3		23	4		22	22		4	
Confl. Bikes (#/hr)								3					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	7%	7%	7%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	804	0	0	489	0	136	396	0	0	310	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effect Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.44			0.44		0.30	0.24			0.24		
v/c Ratio		0.58			0.45		0.55	0.90			1.00		
Control Delay		25.4			24.4		38.1	62.5			93.5		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		25.4			24.4		38.1	62.5			93.5		
LOS		C			C		D	E			F		
Approach Delay		25.4			24.4			56.2			93.5		
Approach LOS		C			C			E			F		
Queue Length 50th (ft)		239			139		74	272			~256		
Queue Length 95th (ft)		307			191		126	#475			#437		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1377			1078		246	440			310		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.58			0.45		0.55	0.90			1.00		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 104.8

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 42.7

Intersection LOS: D

Intersection Capacity Utilization 87.1%

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: 1: Lowell Avenue & Washington Street

↔ ø1	↔ ø2	↔ ø3	↔ ø4
50 s	23 s	11 s	30 s

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	770	475	5	5	10
Conflicting Peds, #/hr	19	0	0	19	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	21	21
Mvmt Flow	11	837	516	5	5	11
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	522	0	-	0	959	280
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	4.14	-	-	-	7.22	7.32
Critical Hdwy Stg 1	-	-	-	-	6.22	-
Critical Hdwy Stg 2	-	-	-	-	6.22	-
Follow-up Hdwy	2.22	-	-	-	3.71	3.51
Pot Cap-1 Maneuver	1041	-	-	-	223	663
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1025	-	-	-	219	653
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	553	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.2		0		14.6	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1025	-	-	-	393	
HCM Lane V/C Ratio	0.011	-	-	-	0.041	
HCM Control Delay (s)	8.6	0.1	-	-	14.6	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	775	465	0	5	15
Conflicting Peds, #/hr	21	0	0	21	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	0	0
Mvmt Flow	2	842	505	0	5	16
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	931	274
Stage 1	-	-	-	-	505	-
Stage 2	-	-	-	-	426	-
Critical Hdwy	4.14	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.22	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1056	-	-	-	269	730
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	632	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1038	-	-	-	268	717
Mov Cap-2 Maneuver	-	-	-	-	268	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	629	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		12.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1038	-	-	-	505	
HCM Lane V/C Ratio	0.002	-	-	-	0.043	
HCM Control Delay (s)	8.5	0	-	-	12.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	775	465	15	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	4	4	0	0
Mvmt Flow	5	842	505	16	2	0
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	522	0	-	0	946	261
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	432	-
Critical Hdwy	4.16	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.23	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1034	-	-	-	263	744
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1034	-	-	-	261	744
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	622	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		18.9	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1034	-	-	-	261	
HCM Lane V/C Ratio	0.005	-	-	-	0.008	
HCM Control Delay (s)	8.5	0	-	-	18.9	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	770	480	5	0	2
Conflicting Peds, #/hr	17	0	0	17	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	4	4	0	0
Mvmt Flow	5	837	522	5	0	2
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	527	0	-	0	953	281
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	429	-
Critical Hdwy	4.16	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.23	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1029	-	-	-	261	722
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	630	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1014	-	-	-	259	712
Mov Cap-2 Maneuver	-	-	-	-	259	-
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	624	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		10.1	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1014	-	-	-	712	
HCM Lane V/C Ratio	0.005	-	-	-	0.003	
HCM Control Delay (s)	8.6	0	-	-	10.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations		↔↔			↔↔		↔	↑	↔		↔↔		
Volume (vph)	40	635	95	190	365	50	100	400	265	25	330	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3410	0	0	3364	0	1752	1845	1568	0	1738	0	
Flt Permitted		0.871			0.527		0.177				0.859		
Satd. Flow (perm)	0	2976	0	0	1797	0	324	1845	1444	0	1493	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			8				288		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		212			406			348			228		
Travel Time (s)		4.8			9.2			7.9			5.2		
Confl. Peds. (#/hr)	24		17	17		24	22		73	73		22	
Confl. Bikes (#/hr)									3			1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	8%	8%	8%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	836	0	0	658	0	109	435	288	0	408	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		37.4			47.4		43.6	42.6	42.6		30.0		
Actuated g/C Ratio		0.29			0.36		0.33	0.33	0.33		0.23		
v/c Ratio		0.98			1.60dl		0.55	0.73	0.43		1.19		
Control Delay		71.3			57.4		41.9	47.4	5.7		153.9		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		71.3			57.4		41.9	47.4	5.7		153.9		
LOS		E			E		D	D	A		F		
Approach Delay		71.3			57.4			32.3			153.9		
Approach LOS		E			E			C			F		
Queue Length 50th (ft)		370			231		67	332	0		~430		
Queue Length 95th (ft)		#508			#338		114	460	65		#643		
Internal Link Dist (ft)		132			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		856			737		216	620	676		343		
Starvation Cap Reductn		0			0		0	0	0		0		
Spillback Cap Reductn		0			0		0	0	0		0		
Storage Cap Reductn		0			0		0	0	0		0		
Reduced v/c Ratio		0.98			0.89		0.50	0.70	0.43		1.19		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 131

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.19

Intersection Signal Delay: 68.4

Intersection LOS: E

Intersection Capacity Utilization 93.4%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

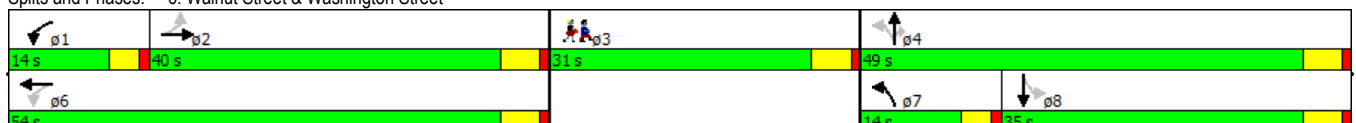
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street











Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	55	870	570	30	30	35
Conflicting Peds, #/hr	21	0	0	21	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	4	4	5	5
Mvmt Flow	60	946	620	33	33	38
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	654	0	-	0	1230	349
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	592	-
Critical Hdwy	4.16	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.23	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	922	-	-	-	166	638
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	906	-	-	-	142	626
Mov Cap-2 Maneuver	-	-	-	-	142	-
Stage 1	-	-	-	-	479	-
Stage 2	-	-	-	-	435	-
Approach	EB		WB		SB	
HCM Control Delay, s	1.1		0		25.8	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	906	-	-	-	243	
HCM Lane V/C Ratio	0.066	-	-	-	0.291	
HCM Control Delay (s)	9.3	0.6	-	-	25.8	
HCM Lane LOS	A	A	-	-	D	
HCM 95th %tile Q(veh)	0.2	-	-	-	1.2	

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	0	2	0	0	0	2	475	15	5	375	5
Conflicting Peds, #/hr	1	0	7	7	0	1	21	0	55	55	0	21
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	14	14	14	2	2	2	3	3	3	10	10	10
Mvmt Flow	5	0	2	0	0	0	2	516	16	5	408	5
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	964	972	472	965	967	586	420	0	0	540	0	0
Stage 1	428	428	-	536	536	-	-	-	-	-	-	-
Stage 2	536	544	-	429	431	-	-	-	-	-	-	-
Critical Hdwy	7.24	6.64	6.34	7.12	6.52	6.22	4.13	-	-	4.2	-	-
Critical Hdwy Stg 1	6.24	5.64	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.24	5.64	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.626	4.126	3.426	3.518	4.018	3.318	2.227	-	-	2.29	-	-
Pot Cap-1 Maneuver	223	241	568	234	254	510	1134	-	-	989	-	-
Stage 1	582	565	-	529	523	-	-	-	-	-	-	-
Stage 2	507	500	-	604	583	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	210	236	539	219	249	484	1082	-	-	944	-	-
Mov Cap-2 Maneuver	210	236	-	219	249	-	-	-	-	-	-	-
Stage 1	577	558	-	524	518	-	-	-	-	-	-	-
Stage 2	482	496	-	570	576	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	19.6			0			0			0.1		
HCM LOS	C			A								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1082	-	-	254	-	944	-	-				
HCM Lane V/C Ratio	0.002	-	-	0.03	-	0.006	-	-				
HCM Control Delay (s)	8.3	0	-	19.6	0	8.8	0	-				
HCM Lane LOS	A	A	-	C	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-				

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	5	475	385	1
Conflicting Peds, #/hr	24	2	18	0	0	18
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	10	10
Mvmt Flow	0	0	5	516	418	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	970	461	444	0	-	0
Stage 1	443	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	281	600	1111	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	268	579	1094	-	-	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1094	-	-	-	-	
HCM Lane V/C Ratio	0.005	-	-	-	-	
HCM Control Delay (s)	8.3	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	5	470	385	15
Conflicting Peds, #/hr	0	0	15	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	8	8
Mvmt Flow	0	0	5	511	418	16
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	949	442	435	0	-	0
Stage 1	427	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	289	615	1119	-	-	-
Stage 1	658	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	287	607	1105	-	-	-
Mov Cap-2 Maneuver	287	-	-	-	-	-
Stage 1	658	-	-	-	-	-
Stage 2	591	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1105	-	-	-	-	
HCM Lane V/C Ratio	0.005	-	-	-	-	
HCM Control Delay (s)	8.3	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	20	545	165	160	525	25	155	180	105	15	305	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3430	0	0	3512	0	1752	1730	0	0	1850	0	
Flt Permitted		0.919			0.574		0.245				0.922		
Satd. Flow (perm)	0	3155	0	0	2038	0	452	1730	0	0	1709	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		39			4			24			4		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	18		3	3		18	2		6	6		2	
Confl. Bikes (#/hr)			1			3			1			1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	793	0	0	772	0	168	310	0	0	386	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effct Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.46			0.46		0.31	0.25			0.25		
v/c Ratio		0.55			0.83		0.76	0.68			0.89		
Control Delay		22.2			35.5		52.1	42.0			61.4		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		22.2			35.5		52.1	42.0			61.4		
LOS		C			D		D	D			E		
Approach Delay		22.2			35.5			45.5			61.4		
Approach LOS		C			D			D			E		
Queue Length 50th (ft)		146			181		63	144			206		
Queue Length 95th (ft)		297			#421		#210	#333			#493		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1455			928		220	454			434		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.55			0.83		0.76	0.68			0.89		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 100.2

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 37.2

Intersection LOS: D

Intersection Capacity Utilization 92.8%

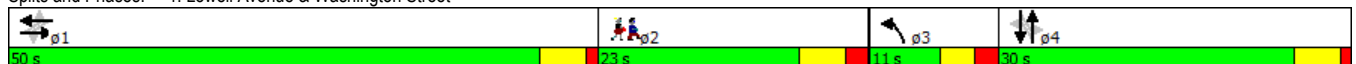
ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Lowell Avenue & Washington Street



Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	645	710	5	0	5
Conflicting Peds, #/hr	27	0	0	27	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	5	701	772	5	0	5
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	777	0	-	0	1135	416
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	361	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	842	-	-	-	199	591
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	823	-	-	-	197	578
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	675	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		11.3	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	823	-	-	-	578	
HCM Lane V/C Ratio	0.007	-	-	-	0.009	
HCM Control Delay (s)	9.4	0	-	-	11.3	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	645	695	0	10	20
Conflicting Peds, #/hr	30	0	0	30	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	1	701	755	0	11	22
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	755	0	-	0	1108	408
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	858	-	-	-	207	598
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	837	-	-	-	207	583
Mov Cap-2 Maneuver	-	-	-	-	207	-
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	687	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		15.9	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	837	-	-	-	363	
HCM Lane V/C Ratio	0.001	-	-	-	0.09	
HCM Control Delay (s)	9.3	0	-	-	15.9	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0.3	

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	630	690	65	1	5
Conflicting Peds, #/hr	39	0	0	39	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	27	685	750	71	1	5
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	821	0	-	0	1182	449
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	397	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	810	-	-	-	186	563
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	654	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	784	-	-	-	176	545
Mov Cap-2 Maneuver	-	-	-	-	176	-
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	617	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.7		0		14.1	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	784	-	-	-	404	
HCM Lane V/C Ratio	0.035	-	-	-	0.016	
HCM Control Delay (s)	9.8	0.3	-	-	14.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0	

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	625	700	5	25	55
Conflicting Peds, #/hr	46	0	0	46	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	5	679	761	5	27	60
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	767	0	-	0	1116	430
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	351	-
Critical Hdwy	4.12	-	-	-	6.82	6.92
Critical Hdwy Stg 1	-	-	-	-	5.82	-
Critical Hdwy Stg 2	-	-	-	-	5.82	-
Follow-up Hdwy	2.21	-	-	-	3.51	3.31
Pot Cap-1 Maneuver	849	-	-	-	203	576
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	687	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	816	-	-	-	201	553
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	680	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		18.3	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	816	-	-	-	357	
HCM Lane V/C Ratio	0.007	-	-	-	0.244	
HCM Control Delay (s)	9.4	0	-	-	18.3	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations		↔↔			↔↔		↔	↑	↔		↔↔		
Volume (vph)	20	565	65	235	560	55	120	410	215	35	355	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3502	0	0	3437	0	1770	1863	1583	0	1850	0	
Flt Permitted		0.866			0.518		0.146				0.735		
Satd. Flow (perm)	0	3037	0	0	1804	0	268	1863	1497	0	1362	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		9			6				231		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		212			406			348			228		
Travel Time (s)		4.8			9.2			7.9			5.2		
Confl. Peds. (#/hr)	44		6	6		44	48		47	47		48	
Confl. Bikes (#/hr)			1			1			1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	707	0	0	924	0	130	446	234	0	451	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		39.0			49.0		44.0	43.0	43.0		30.0		
Actuated g/C Ratio		0.29			0.37		0.33	0.32	0.32		0.23		
v/c Ratio		0.79			1.45dl		0.68	0.74	0.37		1.46		
Control Delay		50.2			165.6		51.1	48.7	5.9		262.4		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		50.2			165.6		51.1	48.7	5.9		262.4		
LOS		D			F		D	D	A		F		
Approach Delay		50.2			165.6			36.7			262.4		
Approach LOS		D			F			D			F		
Queue Length 50th (ft)		295			~495		81	342	2		~540		
Queue Length 95th (ft)		373			#671		#135	471	61		#757		
Internal Link Dist (ft)		132			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		897			729		201	616	649		308		
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		0.79			1.27		0.65	0.72	0.36		1.46		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 133

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.46

Intersection Signal Delay: 116.4

Intersection LOS: F

Intersection Capacity Utilization 103.2%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

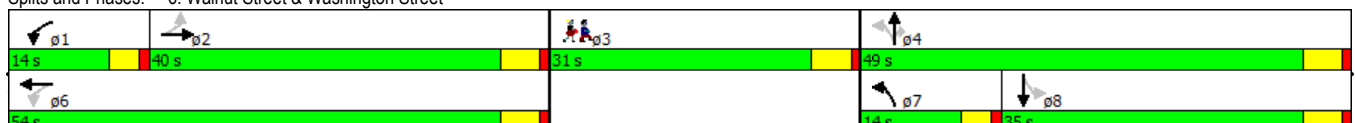
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street



Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	40	775	815	25	20	35
Conflicting Peds, #/hr	32	0	0	32	0	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	43	842	886	27	22	38
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	916	0	-	0	1410	492
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	508	-
Critical Hdwy	4.12	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.21	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	747	-	-	-	129	522
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	727	-	-	-	114	507
Mov Cap-2 Maneuver	-	-	-	-	114	-
Stage 1	-	-	-	-	355	-
Stage 2	-	-	-	-	505	-
Approach	EB		WB		SB	
HCM Control Delay, s	1		0		26.7	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	727	-	-	-	225	
HCM Lane V/C Ratio	0.06	-	-	-	0.266	
HCM Control Delay (s)	10.3	0.5	-	-	26.7	
HCM Lane LOS	B	A	-	-	D	
HCM 95th %tile Q(veh)	0.2	-	-	-	1	

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	0	20	10	0	15	5	480	1	0	385	15
Conflicting Peds, #/hr	1	0	1	1	0	1	23	0	10	10	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	5	5	5	2	2	2
Mvmt Flow	11	0	22	11	0	16	5	522	1	0	418	16
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	970	963	451	973	970	546	436	0	0	524	0	0
Stage 1	428	428	-	534	534	-	-	-	-	-	-	-
Stage 2	542	535	-	439	436	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.15	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.245	-	-	2.218	-	-
Pot Cap-1 Maneuver	235	258	613	233	255	541	1108	-	-	1043	-	-
Stage 1	609	588	-	534	528	-	-	-	-	-	-	-
Stage 2	528	527	-	601	583	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	222	256	601	219	253	530	1087	-	-	1023	-	-
Mov Cap-2 Maneuver	222	256	-	219	253	-	-	-	-	-	-	-
Stage 1	605	588	-	530	524	-	-	-	-	-	-	-
Stage 2	499	523	-	568	583	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.3			16.6			0.1			0		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1087	-	-	383	338	1023	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.085	0.08	-	-	-				
HCM Control Delay (s)	8.3	0	-	15.3	16.6	0	-	-				
HCM Lane LOS	A	A	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.3	0.3	0	-	-				

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	1	1	505	400	5
Conflicting Peds, #/hr	4	2	31	0	0	31
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	0	1	1	549	435	5
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	993	473	444	0	-	0
Stage 1	442	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	274	595	1106	-	-	-
Stage 1	652	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	272	578	1077	-	-	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.2	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1077	-	578	-	-	
HCM Lane V/C Ratio	0.001	-	0.002	-	-	
HCM Control Delay (s)	8.3	0	11.2	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	25	480	405	10
Conflicting Peds, #/hr	0	0	21	0	0	21
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	5	5	2	2
Mvmt Flow	0	0	27	522	440	11
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1022	467	451	0	-	0
Stage 1	446	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.15	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.245	-	-	-
Pot Cap-1 Maneuver	261	596	1094	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	562	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	252	586	1075	-	-	-
Mov Cap-2 Maneuver	252	-	-	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	542	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1075	-	-	-	-	
HCM Lane V/C Ratio	0.025	-	-	-	-	
HCM Control Delay (s)	8.4	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations		↔			↔		↔	↔			↔		
Volume (vph)	25	585	140	60	395	10	125	210	160	10	250	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3385	0	0	3436	0	1787	1725	0	0	1740	0	
Flt Permitted		0.924			0.696		0.302				0.710		
Satd. Flow (perm)	0	3132	0	0	2406	0	567	1725	0	0	1238	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		29			2			31			5		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	23		3	3		23	4		22	22		4	
Confl. Bikes (#/hr)								3					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	7%	7%	7%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	815	0	0	505	0	136	402	0	0	321	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effect Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.44			0.44		0.30	0.24			0.24		
v/c Ratio		0.59			0.48		0.57	0.91			1.06		
Control Delay		25.6			25.0		39.0	64.5			109.4		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		25.6			25.0		39.0	64.5			109.4		
LOS		C			C		D	E			F		
Approach Delay		25.6			25.0			58.0			109.4		
Approach LOS		C			C			E			F		
Queue Length 50th (ft)		244			146		74	277			~278		
Queue Length 95th (ft)		313			201		#127	#484			#460		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1377			1046		240	440			302		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.59			0.48		0.57	0.91			1.06		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 104.8

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 45.8

Intersection LOS: D

Intersection Capacity Utilization 88.7%

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: 1: Lowell Avenue & Washington Street

↔ ø1	↔ ø2	↔ ø3	↔ ø4
50 s	23 s	11 s	30 s

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	40	755	455	25	20	45
Conflicting Peds, #/hr	19	0	0	19	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	21	21
Mvmt Flow	43	821	495	27	22	49
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	522	0	-	0	1005	280
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	497	-
Critical Hdwy	4.14	-	-	-	7.22	7.32
Critical Hdwy Stg 1	-	-	-	-	6.22	-
Critical Hdwy Stg 2	-	-	-	-	6.22	-
Follow-up Hdwy	2.22	-	-	-	3.71	3.51
Pot Cap-1 Maneuver	1041	-	-	-	208	663
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1025	-	-	-	192	653
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	485	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.7		0		16.8	
HCM LOS					C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1025	-	-	-	376	
HCM Lane V/C Ratio	0.042	-	-	-	0.188	
HCM Control Delay (s)	8.7	0.3	-	-	16.8	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations		↔↔			↔↔		↔	↑	↔		↔↔		
Volume (vph)	40	640	95	190	360	60	100	405	265	60	345	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3410	0	0	3351	0	1752	1845	1568	0	1733	0	
Flt Permitted		0.871			0.527		0.184				0.603		
Satd. Flow (perm)	0	2976	0	0	1790	0	337	1845	1444	0	1046	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			10				288		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		511			406			348			228		
Travel Time (s)		11.6			9.2			7.9			5.2		
Confl. Peds. (#/hr)	24		17	17		24	22		73	73		22	
Confl. Bikes (#/hr)									3			1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	8%	8%	8%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	842	0	0	663	0	109	440	288	0	462	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		37.4			47.4		43.6	42.6	42.6		30.0		
Actuated g/C Ratio		0.29			0.36		0.33	0.33	0.33		0.23		
v/c Ratio		0.98			1.60dl		0.53	0.73	0.43		1.92		
Control Delay		72.9			58.6		41.4	47.9	5.7		457.7		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		72.9			58.6		41.4	47.9	5.7		457.7		
LOS		E			E		D	D	A		F		
Approach Delay		72.9			58.6			32.5			457.7		
Approach LOS		E			E			C			F		
Queue Length 50th (ft)		373			232		67	337	0		~622		
Queue Length 95th (ft)		#514			#345		114	466	65		#845		
Internal Link Dist (ft)		431			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		856			736		220	620	676		241		
Starvation Cap Reductn		0			0		0	0	0		0		
Spillback Cap Reductn		0			0		0	0	0		0		
Storage Cap Reductn		0			0		0	0	0		0		
Reduced v/c Ratio		0.98			0.90		0.50	0.71	0.43		1.92		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 131

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.92

Intersection Signal Delay: 120.9

Intersection LOS: F

Intersection Capacity Utilization 100.5%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

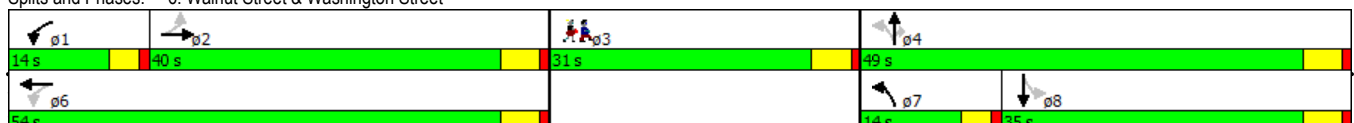
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street











Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	55	910	575	30	30	35
Conflicting Peds, #/hr	21	0	0	21	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	4	4	5	5
Mvmt Flow	60	989	625	33	33	38
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	660	0	-	0	1257	352
Stage 1	-	-	-	-	643	-
Stage 2	-	-	-	-	614	-
Critical Hdwy	4.16	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.23	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	917	-	-	-	159	636
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	901	-	-	-	135	624
Mov Cap-2 Maneuver	-	-	-	-	135	-
Stage 1	-	-	-	-	476	-
Stage 2	-	-	-	-	420	-
Approach	EB		WB		SB	
HCM Control Delay, s	1.1		0		26.9	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	901	-	-	-	234	
HCM Lane V/C Ratio	0.066	-	-	-	0.302	
HCM Control Delay (s)	9.3	0.6	-	-	26.9	
HCM Lane LOS	A	A	-	-	D	
HCM 95th %tile Q(veh)	0.2	-	-	-	1.2	

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	0	490	15	5	425
Conflicting Peds, #/hr	7	1	0	55	55	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	10	10
Mvmt Flow	0	0	533	16	5	462
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1021	603	0	0	556	0
Stage 1	548	-	-	-	-	-
Stage 2	473	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.2	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.29	-
Pot Cap-1 Maneuver	262	499	-	-	976	-
Stage 1	579	-	-	-	-	-
Stage 2	627	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	247	473	-	-	931	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	576	-	-	-	-	-
Stage 2	594	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	0	0		0.1		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	-	931	-	
HCM Lane V/C Ratio	-	-	-	0.006	-	
HCM Control Delay (s)	-	-	0	8.9	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	50	20	470	380	10
Conflicting Peds, #/hr	24	2	18	0	0	18
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	10	10
Mvmt Flow	11	54	22	511	413	11
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	996	460	448	0	-	0
Stage 1	442	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	271	601	1107	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	253	580	1090	-	-	-
Mov Cap-2 Maneuver	253	-	-	-	-	-
Stage 1	635	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.7	0.3		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1090	-	477	-	-	
HCM Lane V/C Ratio	0.02	-	0.137	-	-	
HCM Control Delay (s)	8.4	0	13.7	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	5	475	390	15
Conflicting Peds, #/hr	0	0	15	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	3	3	8	8
Mvmt Flow	0	0	5	516	424	16
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	959	447	440	0	-	0
Stage 1	432	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	285	612	1115	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	283	604	1101	-	-	-
Mov Cap-2 Maneuver	283	-	-	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1101	-	-	-	-	
HCM Lane V/C Ratio	0.005	-	-	-	-	
HCM Control Delay (s)	8.3	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	20	565	165	155	500	25	155	180	110	15	305	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3434	0	0	3511	0	1752	1726	0	0	1850	0	
Flt Permitted		0.921			0.567		0.245				0.907		
Satd. Flow (perm)	0	3165	0	0	2013	0	452	1726	0	0	1681	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		37			4			25			4		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		284			392			262			230		
Travel Time (s)		6.5			8.9			6.0			5.2		
Confl. Peds. (#/hr)	18		3	3		18	2		6	6		2	
Confl. Bikes (#/hr)			1			3			1			1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	815	0	0	738	0	168	316	0	0	386	0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA		
Protected Phases		1			1		3	4			4		2
Permitted Phases	1			1			4			4			
Detector Phase	1	1		1	1		3	4		4	4		
Switch Phase													
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0		7.0
Minimum Split (s)	20.0	20.0		20.0	20.0		11.0	13.0		13.0	13.0		23.0
Total Split (s)	50.0	50.0		50.0	50.0		11.0	30.0		30.0	30.0		23.0
Total Split (%)	43.9%	43.9%		43.9%	43.9%		9.6%	26.3%		26.3%	26.3%		20%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0		2.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0		
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0		
Lead/Lag	Lead	Lead		Lead	Lead		Lead	Lag		Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
Recall Mode	Max	Max		Max	Max		None	None		None	None		None
Act Effct Green (s)		45.6			45.6		31.4	25.3			25.3		
Actuated g/C Ratio		0.46			0.46		0.31	0.25			0.25		
v/c Ratio		0.56			0.80		0.76	0.70			0.90		
Control Delay		22.5			33.9		52.1	42.5			63.9		
Queue Delay		0.0			0.0		0.0	0.0			0.0		
Total Delay		22.5			33.9		52.1	42.5			63.9		
LOS		C			C		D	D			E		
Approach Delay		22.5			33.9			45.8			63.9		
Approach LOS		C			C			D			E		
Queue Length 50th (ft)		152			169		63	147			206		
Queue Length 95th (ft)		308			#395		#210	#342			#498		
Internal Link Dist (ft)		204			312			182			150		
Turn Bay Length (ft)													
Base Capacity (vph)		1458			917		220	454			427		
Starvation Cap Reductn		0			0		0	0			0		
Spillback Cap Reductn		0			0		0	0			0		
Storage Cap Reductn		0			0		0	0			0		
Reduced v/c Ratio		0.56			0.80		0.76	0.70			0.90		

Intersection Summary

Area Type: Other

Cycle Length: 114

Actuated Cycle Length: 100.2

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 37.2

Intersection LOS: D

Intersection Capacity Utilization 92.8%

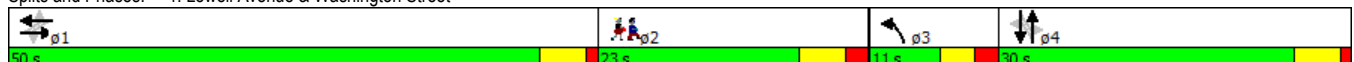
ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Lowell Avenue & Washington Street



Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	80	595	615	55	55	70
Conflicting Peds, #/hr	27	0	0	27	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	87	647	668	60	60	76
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	728	0	-	0	1195	391
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	497	-
Critical Hdwy	4.12	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.21	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	878	-	-	-	182	614
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	582	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	858	-	-	-	153	600
Mov Cap-2 Maneuver	-	-	-	-	153	-
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	490	-
Approach	EB		WB		SB	
HCM Control Delay, s	1.7		0		32.4	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	858	-	-	-	263	
HCM Lane V/C Ratio	0.101	-	-	-	0.517	
HCM Control Delay (s)	9.7	0.6	-	-	32.4	
HCM Lane LOS	A	A	-	-	D	
HCM 95th %tile Q(veh)	0.3	-	-	-	2.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø3
Lane Configurations		↔↔			↔↔		↔	↑	↔		↔↔		
Volume (vph)	20	565	65	235	535	75	110	420	215	40	355	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Satd. Flow (prot)	0	3502	0	0	3420	0	1770	1863	1583	0	1849	0	
Flt Permitted		0.870			0.518		0.149				0.664		
Satd. Flow (perm)	0	3051	0	0	1795	0	273	1863	1497	0	1230	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		9			9				225		2		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		511			406			348			228		
Travel Time (s)		11.6			9.2			7.9			5.2		
Confl. Peds. (#/hr)	44		6	6		44	48		47	47		48	
Confl. Bikes (#/hr)			1			1			1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	707	0	0	919	0	120	457	234	0	456	0	
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA		
Protected Phases		2		1	6		7	4			8		3
Permitted Phases	2			6			4		4	8			
Detector Phase	2	2		1	6		7	4	4	8	8		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	10.0	10.0		7.0
Minimum Split (s)	15.0	15.0		10.0	15.0		10.0	15.0	15.0	15.0	15.0		31.0
Total Split (s)	40.0	40.0		14.0	54.0		14.0	49.0	49.0	35.0	35.0		31.0
Total Split (%)	29.9%	29.9%		10.4%	40.3%		10.4%	36.6%	36.6%	26.1%	26.1%		23%
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	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	1.0		1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0		
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0		
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes		
Recall Mode	Min	Min		Min	Min		None	Min	Min	Min	Min		None
Act Effect Green (s)		39.0			49.0		43.8	42.8	42.8		30.0		
Actuated g/C Ratio		0.29			0.37		0.33	0.32	0.32		0.23		
v/c Ratio		0.78			1.43dl		0.63	0.76	0.37		1.63		
Control Delay		49.8			163.2		47.7	49.9	6.4		335.1		
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0		
Total Delay		49.8			163.2		47.7	49.9	6.4		335.1		
LOS		D			F		D	D	A		F		
Approach Delay		49.8			163.2			37.0			335.1		
Approach LOS		D			F			D			F		
Queue Length 50th (ft)		294			~489		74	353	5		~576		
Queue Length 95th (ft)		373			#665		124	485	65		#793		
Internal Link Dist (ft)		431			326			268			148		
Turn Bay Length (ft)													
Base Capacity (vph)		902			729		202	617	646		279		
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		0.78			1.26		0.59	0.74	0.36		1.63		

Intersection Summary

Area Type: Other

Cycle Length: 134

Actuated Cycle Length: 132.8

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.63

Intersection Signal Delay: 127.2

Intersection LOS: F

Intersection Capacity Utilization 104.1%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

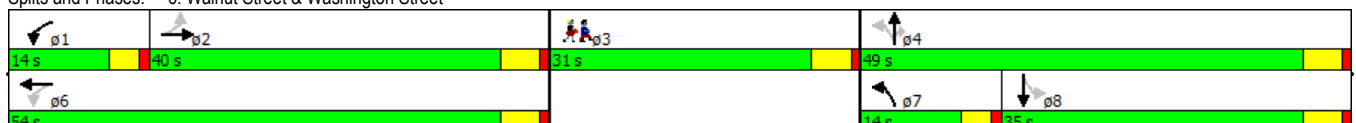
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 6: Walnut Street & Washington Street











Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	40	780	810	25	20	35
Conflicting Peds, #/hr	32	0	0	32	0	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	43	848	880	27	22	38
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	911	0	-	0	1408	489
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	4.12	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.21	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	750	-	-	-	130	525
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	730	-	-	-	115	510
Mov Cap-2 Maneuver	-	-	-	-	115	-
Stage 1	-	-	-	-	357	-
Stage 2	-	-	-	-	503	-
Approach	EB		WB		SB	
HCM Control Delay, s	1		0		26.4	
HCM LOS					D	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	730	-	-	-	227	
HCM Lane V/C Ratio	0.06	-	-	-	0.263	
HCM Control Delay (s)	10.2	0.5	-	-	26.4	
HCM Lane LOS	B	A	-	-	D	
HCM 95th %tile Q(veh)	0.2	-	-	-	1	

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	15	515	1	0	410
Conflicting Peds, #/hr	1	1	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	5	5	2	2
Mvmt Flow	11	16	560	1	0	446
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1007	571	0	0	562	0
Stage 1	561	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	269	524	-	-	1009	-
Stage 1	575	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	267	519	-	-	1001	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	15.3	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	377	1001	-	
HCM Lane V/C Ratio	-	-	0.072	-	-	
HCM Control Delay (s)	-	-	15.3	0	-	
HCM Lane LOS	-	-	C	A	-	
HCM 95th %tile Q(veh)	-	-	0.2	0	-	

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	20	30	40	490	380	25
Conflicting Peds, #/hr	4	2	31	0	0	31
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	4	4	2	2
Mvmt Flow	22	33	43	533	413	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1051	462	444	0	-	0
Stage 1	431	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	253	604	1106	-	-	-
Stage 1	660	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	237	586	1077	-	-	-
Mov Cap-2 Maneuver	237	-	-	-	-	-
Stage 1	658	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16.4	0.6		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1077	-	369	-	-	
HCM Lane V/C Ratio	0.04	-	0.147	-	-	
HCM Control Delay (s)	8.5	0	16.4	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	25	485	405	10
Conflicting Peds, #/hr	0	0	21	0	0	21
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	5	5	2	2
Mvmt Flow	0	0	27	527	440	11
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1028	467	451	0	-	0
Stage 1	446	-	-	-	-	-
Stage 2	582	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.15	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.245	-	-	-
Pot Cap-1 Maneuver	259	596	1094	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	559	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	250	586	1075	-	-	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	0	0.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1075	-	-	-	-	
HCM Lane V/C Ratio	0.025	-	-	-	-	
HCM Control Delay (s)	8.4	0	0	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	-	-	-	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	585	140	60	395	10	125	210	160	10	250	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3385	0	0	3436	0	1787	1727	0	0	1740	0
Flt Permitted		0.927			0.753		0.395				0.950	
Satd. Flow (perm)	0	3142	0	0	2603	0	741	1727	0	0	1656	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			3			47			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		284			392			262			230	
Travel Time (s)		6.5			8.9			6.0			5.2	
Confl. Peds. (#/hr)	23		3	3		23	4		22	22		4
Confl. Bikes (#/hr)								3				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	7%	7%	7%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	815	0	0	505	0	136	402	0	0	321	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		1			1		3	4			4	
Permitted Phases	1			1			4			4		
Detector Phase	1	1		1	1		3	4		4	4	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	36.0	36.0		36.0	36.0		11.0	29.0		29.0	29.0	
Total Split (s)	42.0	42.0		42.0	42.0		11.0	37.0		37.0	37.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		12.2%	41.1%		41.1%	41.1%	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lead	Lag		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effect Green (s)		37.2			37.2		29.0	22.9			22.9	
Actuated g/C Ratio		0.46			0.46		0.36	0.28			0.28	
v/c Ratio		0.56			0.42		0.40	0.77			0.68	
Control Delay		18.2			17.4		18.3	33.9			32.6	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		18.2			17.4		18.3	33.9			32.6	
LOS		B			B		B	C			C	
Approach Delay		18.2			17.4			29.9			32.6	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)		147			87		42	165			140	
Queue Length 95th (ft)		241			153		76	264			223	
Internal Link Dist (ft)		204			312			182			150	
Turn Bay Length (ft)												
Base Capacity (vph)		1459			1193		341	712			660	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.56			0.42		0.40	0.56			0.49	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 81.3

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 23.0

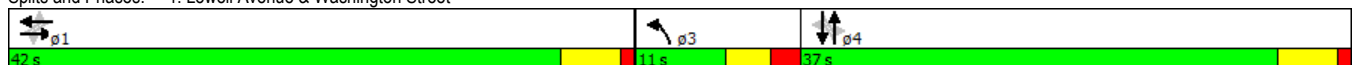
Intersection LOS: C

Intersection Capacity Utilization 106.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 1: Lowell Avenue & Washington Street



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↑	↔		↔	
Volume (vph)	40	640	95	190	360	60	100	405	265	60	345	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3420	0	0	3349	0	1752	1845	1568	0	3291	0
Flt Permitted		0.885			0.532		0.342				0.827	
Satd. Flow (perm)	0	3034	0	0	1807	0	624	1845	1417	0	2729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			16				288		6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		511			406			348			228	
Travel Time (s)		11.6			9.2			7.9			5.2	
Confl. Peds. (#/hr)	24		17	17		24	22		73	73		22
Confl. Bikes (#/hr)									3			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	3%	3%	3%	8%	8%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	842	0	0	663	0	109	440	288	0	462	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		
Detector Phase	2	2		1	6		7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	6.0	10.0	
Minimum Split (s)	38.0	38.0		10.0	38.0		10.0	31.0	31.0	10.0	38.0	
Total Split (s)	41.0	41.0		11.0	52.0		10.0	38.0	38.0	10.0	38.0	
Total Split (%)	41.0%	41.0%		11.0%	52.0%		10.0%	38.0%	38.0%	10.0%	38.0%	
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	Min	Min		Min	Min		None	Min	Min	None	Min	
Act Effect Green (s)		27.1			37.8		30.9	29.9	29.9		22.4	
Actuated g/C Ratio		0.35			0.48		0.39	0.38	0.38		0.29	
v/c Ratio		0.79			0.67		0.32	0.63	0.40		0.59	
Control Delay		30.2			19.9		18.3	24.1	4.1		28.0	
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0	
Total Delay		30.2			19.9		18.3	24.1	4.1		28.0	
LOS		C			B		B	C	A		C	
Approach Delay		30.2			19.9			16.5			28.0	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)		184			100		31	158	0		98	
Queue Length 95th (ft)		312			184		74	301	47		172	
Internal Link Dist (ft)		431			326			268			148	
Turn Bay Length (ft)												
Base Capacity (vph)		1503			1268		338	904	841		1231	
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		0.56			0.52		0.32	0.49	0.34		0.38	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 78.4

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 23.3

Intersection LOS: C


















Intersection Capacity Utilization 105.8%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 6: Walnut Street & Washington Street

 11 s	 41 s	 10 s	 38 s
 52 s	 10 s	 10 s	 38 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	565	165	155	500	25	155	180	110	15	305	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3434	0	0	3511	0	1752	1726	0	0	1850	0
Flt Permitted		0.924			0.585		0.279				0.977	
Satd. Flow (perm)	0	3175	0	0	2076	0	514	1726	0	0	1811	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54			6			34			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		284			392			262			230	
Travel Time (s)		6.5			8.9			6.0			5.2	
Confl. Peds. (#/hr)	18		3	3		18	2		6	6		2
Confl. Bikes (#/hr)			1			3			1			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	815	0	0	738	0	168	316	0	0	386	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		1			1		3	4			4	
Permitted Phases	1			1			4			4		
Detector Phase	1	1		1	1		3	4		4	4	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		6.0	8.0		8.0	8.0	
Minimum Split (s)	36.0	36.0		36.0	36.0		11.0	26.0		26.0	26.0	
Total Split (s)	47.0	47.0		47.0	47.0		13.0	30.0		30.0	30.0	
Total Split (%)	52.2%	52.2%		52.2%	52.2%		14.4%	33.3%		33.3%	33.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag							Lead	Lag		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effect Green (s)		42.1			42.1		29.8	22.1			22.1	
Actuated g/C Ratio		0.48			0.48		0.34	0.25			0.25	
v/c Ratio		0.52			0.73		0.59	0.68			0.83	
Control Delay		16.4			23.9		26.6	34.0			46.6	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		16.4			23.9		26.6	34.0			46.6	
LOS		B			C		C	C			D	
Approach Delay		16.4			23.9			31.5			46.6	
Approach LOS		B			C			C			D	
Queue Length 50th (ft)		155			174		59	140			198	
Queue Length 95th (ft)		211			251		103	229			#329	
Internal Link Dist (ft)		204			312			182			150	
Turn Bay Length (ft)												
Base Capacity (vph)		1565			1009		292	522			526	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.52			0.73		0.58	0.61			0.73	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 86.9

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 26.5

Intersection LOS: C

Intersection Capacity Utilization 104.0%

ICU Level of Service G



















Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Lowell Avenue & Washington Street



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	565	65	235	535	75	110	420	215	40	355	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3507	0	0	3418	0	1770	1863	1583	0	3512	0
Flt Permitted		0.908			0.560		0.339				0.871	
Satd. Flow (perm)	0	3189	0	0	1940	0	615	1863	1464	0	3068	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			14				234		7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		511			406			348			228	
Travel Time (s)		11.6			9.2			7.9			5.2	
Confl. Peds. (#/hr)	44		6	6		44	48		47	47		48
Confl. Bikes (#/hr)			1			1			1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	707	0	0	919	0	120	457	234	0	456	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		7	4		3	8	
Permitted Phases	2			6			4		4	8		
Detector Phase	2	2		1	6		7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	10.0	10.0	6.0	10.0	
Minimum Split (s)	38.0	38.0		10.0	38.0		10.0	27.0	27.0	10.0	34.0	
Total Split (s)	42.0	42.0		10.0	52.0		10.0	38.0	38.0	10.0	38.0	
Total Split (%)	42.0%	42.0%		10.0%	52.0%		10.0%	38.0%	38.0%	10.0%	38.0%	
Yellow Time (s)	4.0	4.0		3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0		4.0	5.0	5.0		5.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	Min	Min		Min	Min		None	Min	Min	None	Min	
Act Effect Green (s)		31.7			42.2		31.7	30.6	30.6		23.2	
Actuated g/C Ratio		0.38			0.51		0.38	0.37	0.37		0.28	
v/c Ratio		0.58			0.85		0.37	0.67	0.34		0.53	
Control Delay		23.2			27.3		21.1	27.7	4.1		28.7	
Queue Delay		0.0			0.0		0.0	0.0	0.0		0.0	
Total Delay		23.2			27.3		21.1	27.7	4.1		28.7	
LOS		C			C		C	C	A		C	
Approach Delay		23.2			27.3			19.9			28.7	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)		172			194		45	215	0		117	
Queue Length 95th (ft)		230			#287		81	318	44		165	
Internal Link Dist (ft)		431			326			268			148	
Turn Bay Length (ft)												
Base Capacity (vph)		1497			1250		321	846	792		1283	
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		0.47			0.74		0.37	0.54	0.30		0.36	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 83.4

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 24.5

Intersection LOS: C

Intersection Capacity Utilization 107.2%

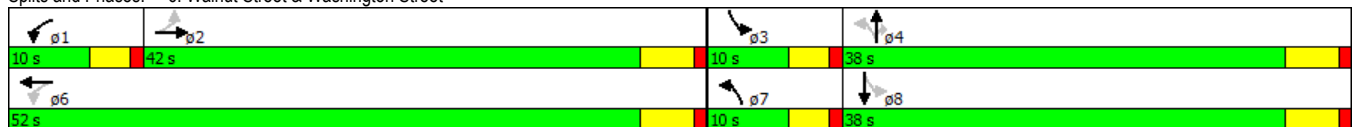
ICU Level of Service G

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: Walnut Street & Washington Street





Washington Street Priority Study



Stephanie Pollack, MassDOT Secretary and CEO and MPO Chairman
Karl H. Quackenbush, Executive Director, MPO Staff

TECHNICAL MEMORANDUM

DATE: January 22, 2015
TO: Boston Region MPO
FROM: Chen-Yuan Wang, MPO Staff
RE: Washington Street Subregional Priority Roadway Study in Newton

The roadway segment of Washington Street between Chestnut Street and Church Street in Newton was selected for analysis in a project funded by the Boston Region MPO for federal fiscal year (FFY) 2014, "Addressing Safety, Mobility, and Access on Subregional Priority Roadways." The work program for this corridor study was approved on September 12, 2013, and the selection was approved on December 19, 2013.

1 INTRODUCTION

This memorandum summarizes the existing conditions and issues, roadway operations and safety analyses, and proposed short- and long-term improvements for the entire study corridor and for specific locations. It contains the following sections:

1. Introduction
2. Existing Conditions and Issues
3. Crash Data Analysis
4. Roadway Operations Analysis
5. Proposed Improvements
6. Summary and Recommendations

This memorandum also includes technical appendices that contain the data and methods that were applied in the study.

1.1 Study Background

During the MPO's outreach for the development of the Unified Planning Work Program (UPWP) and the Long-Range Transportation Plan (LRTP), Metropolitan Area Planning Council (MAPC) subregional groups and other entities submit comments and identify transportation problems and issues that concern them. These issues are related to some or all of the following: bicycle, pedestrian, and

freight accommodation; bottlenecks; safety; and lack of safe or convenient access for abutters along roadway corridors. They can affect not only mobility and safety along a roadway and its side streets, but also quality of life, including economic development and air quality.

This study was undertaken to identify roadway corridors in the MPO region that are of concern to Boston Region MPO subregional groups but that have not been identified in the LRTP regional Needs Assessment. It focused on the issues that were identified by relevant subregional groups, and developing improvement recommendations to address those issues. In addition to mobility, safety, and access, the study considered transit feasibility, truck issues, bicycle and pedestrian transportation, and other topics.

1.2 Selection Procedure

The Washington Street corridor was selected through a comprehensive process. First, MPO staff identified potential study locations using various sources: soliciting suggestions during the outreach process for the FFY 2014 UPWP; reviewing meeting records from the UPWP outreach process for the past five years; and appraising potential locations from the list of monitored roadways in the MPO's Congestion Management Process (CMP) program.

MPO staff identified 29 roadway corridors in the MPO region as potential study locations. The staff then assembled detailed data on the identified roadways and evaluated them according to five selection criteria:

- *Safety*: The location has a high crash rate for its functional class,¹ or contains areas with a high number of crashes or with a significant number of pedestrian-bicycle collisions.
- *Multimodal Significance*: The location supports transit, bicycle, or pedestrian activity, or has an implementation project to support one or more of these activities.
- *Subregional Significance*: The location carries a significant proportion of subregional vehicle, bicycle, or pedestrian traffic.
- *Subregional Priority*: The location is endorsed by a subregion and is a priority for the subregion.
- *Implementation Potential*: The location was proposed by the roadway agency or related agencies that have identified prospective funding sources for design and implementation.

¹ The location has a segment crash rate (crashes per million vehicle-miles traveled) higher than the statewide average for its functional class.

The selected corridor is a four-lane roadway that serves residents, commuters, and local businesses, and supports transit—Massachusetts Bay Transit Authority (MBTA) bus service and access to commuter rail stations on the Framingham/Worcester Line. The City of Newton expressed interest in this corridor study, which focused on 1) urban design and multiuse roadways that have pedestrian and bicycle facilities; 2) improved transportation access and mobility; and 3) safety enhancements.

1.3 Study Objectives

The objectives of this study were to:

- Identify the safety, mobility, access, and other transportation-related problems in the corridor.
- Develop and evaluate potential multimodal transportation solutions to the problems, including pedestrian, bicycle, truck, and transit modes.

1.4 Study Area and Data Collection

This study focused on a two-mile corridor of Washington Street between Chestnut Street in West Newton and Church Street near Newton Corner. The selected roadway segment is under the jurisdiction of the City of Newton, but the Massachusetts Department of Transportation (MassDOT) Highway Division District 6 Office oversees the area's roadway improvement projects.

With the assistance of MassDOT and the City, MPO staff collected extensive roadway traffic and speed data; intersection turning-movement counts, including pedestrian and bicycle movements and the percentages of heavy vehicles (trucks and buses); information about on-street parking regulations and adjacent developments; and multiple-year crash reports.

1.5 Input from City Staff and Public Involvement

During the course of the study, MPO staff worked closely with the City's transportation team. Three major meetings were conducted to support the study.

The purpose of the first meeting, hosted by the City on February 26, 2014, was to introduce the study and to get input on the issues and concerns about the study corridor from members of the public, including the area's residents, business owners, and citizen groups. The second meeting, conducted by MPO staff on July 31, 2014, focused on reviewing the findings and preliminary improvement proposals with the City's transportation team and MassDOT District 6 staff. At the last meeting, which was held on November 19, 2014, and was open to the public, MPO staff presented the study findings and improvement proposals to the

City's Public Facilities Committee and Public Safety and Transportation Committee.

2 EXISTING CONDITIONS AND ISSUES

This section examines the corridor's location; roadway configurations; adjacent developments; public transportation facilities; parking regulations; and observed traffic, pedestrian, and bicycle conditions. It also summarizes the issues and concerns raised in the first public meeting and issues identified from observations of the existing conditions.

2.1 Study Corridor and Major Transportation Facilities in the Area

Washington Street is a major regional roadway for Newton and the adjacent communities. It begins at the Wellesley-Natick border as part of state Route 16, continuing northeast through Wellesley into Newton Lower Falls, where it intersects Interstate 95/Route 128 at Exit 21. It connects with Interstate 90 at Exit 16 in Auburndale before turning east, running parallel with I-90 into Newton Corner. After crossing I-90 again at Exit 17, it turns southeast into Brighton and Brookline, ending at state Route 9 in Brookline Village.

The study corridor, between Chestnut Street and Church Street, contains most of Washington Street that is parallel to I-90 and carries a high proportion of commuting traffic. In addition, it functions like a service road for I-90 between Exit 16 (West Newton) and Exit 17 (Newton Corner), providing access to the neighborhoods in Newton, Waltham, and Watertown on both sides of I-90. Locally, the corridor links three major Newton villages (neighborhoods): West Newton, Newtonville, and Newton Corner.

Figure 1 shows the location of the study corridor and major transportation facilities in the area. Located on the north side of I-90, the entire corridor is classified as a minor urban arterial. It is a four-lane roadway with on-street parking allowed on both sides for most of its length. There are sidewalks on both sides of the roadway. The roadway, which currently contains no separate bicycle lanes, is designated as a bicycle route for advanced (experienced) cyclists (see Appendix A: Newton Bicycle Map).

The adjacent land uses are mainly multifamily residential and business, with some institutional and parkland use. The land uses in the area between Chestnut Street and Lowell Avenue are mainly residential, except the area near West Newton (business and office). Land use in the area adjacent to Newtonville (between Lowell Avenue and Harvard Street) is mainly business. Land use in the area between Harvard Street and Church Street) is mixed, with businesses,

offices, apartments and condos, schools, institutions, and parkland (see Appendix B, Newton Zoning Map).

The study area contains a dense roadway network. The selected Washington Street corridor intersects three other minor arterials—Chestnut Street, Walnut Street, and Crafts Street—and a few collector roadways: Lowell Avenue, Lewis Terrace, Adams Street, and Jackson Road. In total, there were seven signalized intersections and a few major unsignalized intersections that had stop controls on side streets. The corridor also contains a high number of driveways from adjacent business developments.

2.2 MBTA Transit Services in the Area

In the study area, there are various transit services provided by the MBTA, including several express and local buses and the Framingham/Worcester commuter rail line. The bus routes run mainly along arterials and major collector roadways. The commuter rail line runs along the north side of I-90 just south of the study corridor. Figure 2 shows these services in the study area.

Transit services in the study corridor consist of four express bus routes (Routes 553, 554, 556, and 558) that run to and from Downtown Boston, and two commuter rail stations, Newtonville and West Newton, on the Framingham/Worcester Line. The four bus routes mainly serve commuters and local travelers in Newton and Waltham. Routes 553 (Brandeis/Roberts–Downtown Boston) and 554 (Waverley Square–Downtown Boston) traverse the entire corridor, with about 10 stops in each direction. Routes 556 (Waltham Highlands–Downtown Boston) and 558 (Auburndale–Downtown Boston), traversing only part of the corridor, divert from the corridor at Walnut Street and Adams Street, respectively.

The MBTA 2014 bus ridership and service statistics indicate that the four bus routes together serve about 1,400 riders (about 2,600 inbound and outbound boardings) per weekday. According to the 2008–09 MBTA Systemwide Passenger Survey, 56.9 percent of the total trips on the four bus routes are regional (Newton/Waltham–Boston), 19.1 percent are local (Newton–Newton, Waltham–Waltham, or Newton–Waltham), and 24 percent are trips to and from other communities.

For commuter rail service, the survey focused on inbound riders, whose purpose is predominantly commuting (which is referred to as a “home-based work” trip purpose in the MPO’s regional travel demand model) from Newton to Downtown Boston. The survey data indicate that there were 240 riders boarding the line at Newtonville Station, and 230 riders at West Newton Station. Walking and driving-

parking are two major means of access. At Newtonville, about 20 percent of the riders parked their cars near the station.

Further analyses of the ridership and trip characteristics of the four bus routes and the two commuter rail stations are presented in Appendix C.

In the study area, there are also a number of bus connections at various locations along Washington Street. At Newton Corner, the bus routes that connect are Route 52 (Watertown–Dedham), Route 57 (Watertown–Kenmore Square), and two other express buses: Route 502 (Watertown–Copley Square) and Route 504 (Watertown–Downtown Boston). At Newtonville Station, the connecting bus route is Route 59, which runs between Needham and Watertown. At West Newton Station, the connecting bus is Route 170, which travels to Downtown Boston from Waltham. Among these bus connections, Newton Corner is especially attractive because of high number of express bus routes to Downtown Boston.

2.3 Traffic, Pedestrian, and Bicycle Volumes

The study corridor carries both local and regional traffic from residents and businesses in the study area and vicinity. It is also an alternative to I-90 for people commuting to Boston, Brookline, Newton, and adjacent communities. Based on the traffic counts conducted in April 2014 by MassDOT for this study, the corridor carried about 14,000 to 26,000 vehicles per weekday.

Figure 3 shows traffic volumes on Washington Street and at major intersections in the study corridor. The volumes represent recently observed traffic flows in the morning and evening peak hours of a typical weekday. As a reference, average daily traffic (ADT) volumes at eight locations in the corridor are also cited in Figure 3. Generally the daily volumes in the westbound direction are about 3 to 4 percent higher than in the eastbound direction at almost all of the count locations.

The traffic volumes increase gradually from the western to the eastern segments of the corridor. In the morning, traffic gradually feeds into the corridor from local streets—Lowell Avenue, Walnut Street, Harvard Street, Crafts Street, Adams Street, and Jackson Road—mainly in the eastbound direction. Some traffic leaves the corridor, but most of the traffic continues to Newton Corner. In the evening, the corridor has a reverse traffic pattern, with traffic peaking in the westbound direction and gradually leaving the corridor.

Turning movements at major intersections in the corridor were also collected for the study, in 15-minute intervals between 7:00 to 9:00 AM and 4:00 to 6:00 PM. Traffic movements in the morning and evening peak hours were then identified

and summarized for operational analyses. In general, each of the signalized intersections carries a total volume of entering vehicles ranging from 1,450 (at Chestnut Street) to 2,650 vehicles (at Jackson Road) per peak hour, and each of the unsignalized intersections carries a total volume ranging from 1,150 (at Armory Street) to 1,650 vehicles (at Harvard Street) per peak hour.

It is essential to examine the proportion of heavy-vehicle traffic in a corridor, since an unusually high share of heavy vehicles may seriously affect roadway and intersection operations. The recent counts indicate that the study corridor carries a heavy-vehicle percentage that is lower than the average for urban minor arterials, with about 2 percent to 3 percent of the daily traffic and 1 percent to 2 percent of the peak-hour traffic.

The intersection turning-movement counts also included pedestrian crossings and bicycle counts. The pedestrian crossing counts indicate that pedestrians are active in the study corridor, especially in the business districts in Newtonville. The intersection of Washington Street at Walnut Street experiences about 100 to 150 pedestrian crossings per peak hour.

The bicycle counts at major intersections indicate that on average 5 to 10 bicycles traveled on or crossed the corridor per peak hour on a spring weekday. Intersections on major bicycle routes, such as Jackson Road, Adams Street, and Walnut Street, carried higher bicycle volumes (about 11 to 14 bicycles per peak hour). It should be noted that these observations were performed on April 9, 2014, which was a relatively cold early spring day. The volumes are assumed to be higher in the late spring, summer, and early fall, when the weather is warmer.

2.4 On-Street Parking Conditions

There is on-street parking on both sides of the roadway in most segments of the corridor. In total, there are 558 parking spaces, under varying regulations depending on their locations. They comprise 357 spaces on the south side and 201 spaces on the north side.²

Table 1 summarizes the parking regulations for these spaces. For some of the spaces, the number of spaces was estimated by using 22 feet per space length, since those spaces are not metered and have no space delineation.

² Off-street parking is limited in the corridor. They are mainly associated with three major commercial developments: Whole Foods Market, Marty's, and Trader Joe's.

TABLE 1
Summary of Parking Spaces by Regulation

Parking Regulation	South Side	North Side	Both Sides
Meter: 1-hour limit	0	60	60
Meter: 2-hour limit	19	21	40
Meter: 12-hour limit	107	0	107
Free: 1-hour limit	4	12	16
Free: 2-hour limit	50	25	75
No regulation	177	83	260
Total	357	201	558

Tables 2 and 3 further summarize the parking spaces, by the street segment, by the associated land use, and by regulation, for the south and north side, respectively. In general, the spaces are metered, with a 1-, 2-, or 12-hour limit in the business areas, or free, with a 1-hour limit, 2-hour limit, or no limit, in the residential and other areas. The 12-hour metered parking spaces, 107 in total, are distributed around Newtonville Station and are mainly intended for commuter rail riders.

TABLE 2
Summary of South Side Parking Spaces by Location and Regulation

Street Segment	Land Use	Regulation	Number of Spaces
Chestnut Street - Armory Street	Commercial	No regulation	30
	N/A	No regulation	24
Armory Street - Lowell Avenue	N/A	No regulation	100
Lowell Avenue - Walnut Street	N/A	Meter: 2-hour limit	7
	N/A	Meter: 12-hour limit	17
Walnut Street - Harvard Street	N/A	Meter: 2-hour limit	12
	N/A	Meter: 12-hour limit	69
Harvard Street - Crafts Street	N/A	Meter: 12-hour limit	21
	Commercial	Free: 1-hour limit	4
Crafts Street - Jackson Road	Commercial/office/residential	No regulation	23
Jackson Road - Church Street	N/A	Free: 2-hour limit	50
Total			357

N/A = not applicable (vacant or adjacent to commuter rail tracks)

TABLE 3
Summary of North Side Parking Spaces by Location and Regulation

Street Segment	Land Use	Regulation	Number of Spaces
Church Street - Jackson Road	Residential/office	Free: 1-hour limit	12
	School/office/residential	Free: 2-hour limit	25
Jackson Road - Crafts Street	Institutional	Prohibited	0
Jackson Road - Crafts Street	Residential	No regulation	7
Crafts Street - Harvard Street	Commercial	Prohibited	0
	Commercial	Meter: 2-hour limit	9
Harvard Street - Walnut Street	Commercial	Meter: 1-hour limit	30
	Commercial	Meter: 2-hour limit	12
Walnut Street - Lowell Avenue	Commercial	Meter: 1-hour limit	20
Lowell Avenue - Armory Street	Residential/commercial/office	No regulation	52
Armory Street - Chestnut Street	Commercial/office/residential	No regulation	24
	Commercial	Meter: 1-hour limit	10
Total			201

The corridor has a wide range of land use activities, including commercial, office, residential, institutional (school and others), and recreational (parkland). Most of the land use activities are on the north side, since land use on the south side is limited because the area is adjacent to commuter rail tracks and I-90. The corridor has about 150 more parking spaces on the south side than on the north side. To reach the developments on the north side of Washington Street, people parking on the south side of the street have to cross four lanes of fast-moving traffic and that are busy during the peak hours.

Field observations indicate that parking utilization varies widely along the corridor. The metered and free parking spaces in the commercial areas between Chestnut Street and Armory Street are generally utilized during daylight business hours (about 70 percent to 80 percent of the spaces are occupied then). The free parking spaces in the residential areas between Cross Street and Lowell Avenue are sparsely occupied, except the section adjacent to Lowell Avenue, where the

south side's free spaces are usually fully occupied during daylight business hours.³

The short-term (1-hour and 2-hour) metered spaces in Newtonville are frequently utilized (about 80 percent or more of the spaces are occupied), especially in the area adjacent to Walnut Street. The 12-hour parking spaces distributed between Lowell Avenue and Crafts Street are generally underutilized (about only half of the spaces are occupied).

Between Crafts Street and Jackson Road, the free and metered parking spaces for adjacent businesses, offices, and residences are generally utilized during business hours. Between Jackson Road and Church Street, the free short-term parking spaces are generally fully occupied during the day. They are intended for visitors of the adjacent schools, institutions, offices, Newton Veterans Memorial Park, and the residences and offices near Church Street. However, some of the spaces might be used by Boston-bound commuters and visitors who are transferring to buses at Newton Corner.

2.5 Issues and Concerns

In the February 2014 study-scoping meeting, which was also a listening session, residents and business owners raised a number of issues and concerns related to the safety and operations of the corridor. Their comments, summarized by location and issue category, are in Appendix D.

The issues and concerns related to the corridor in general, based on comments from the meeting and the above existing-conditions analyses, are summarized below:

- High travel speeds and unsafe conditions for all users due to multiple-lane traffic operations
- Difficult and unsafe pedestrian crossings, including access to bus stops
- Lack of bicycle accommodations
- High number of pedestrian and bicycle crashes
- Inconvenient and unsafe access from Washington Street to adjacent businesses and residences
- Limited sight distances to Washington Street from side streets due to roadway geometry and parking at street corners

³ These approximate parking occupancy data were derived from quick observations during a number of site visits between April and July, not from actual counting in a continuous period or at different periods of a day.

- Parking management and enforcement issues
- Noise from I-90
- Insufficient lighting

3 CRASH DATA ANALYSIS

Crash data are an essential source for identifying safety and operational problems in a study area. Analyses of crash locations, collision types, time-of-day, roadway conditions, and other factors also assist in developing improvement strategies. MPO staff collected two sets of data for the analyses. The two datasets are:

- 2007–11 MassDOT Registry of Motor Vehicles Division Crash Data
- Recent three-plus-years (January 2011 through February 2014) crash reports from the Newton Police Department

The five-year MassDOT data were used to examine the crash locations and crash rates. The Newton police reports were used to construct collision diagrams for further analysis of safety and operational problems at major intersections and in different segments.

3.1 Crash Locations and Crash Rates

Figure 4 shows the crash locations and crash rates at major intersections and in different segments of the corridor during the five-year period 2007–11. Among the 434 crashes that occurred in the corridor during that time period, 267 were identified as having occurred at the nine major intersections, and 167 in the segments between those intersections.

The crash rates at the intersections and in the roadway segments were calculated. Among the seven signalized intersections, the crash rates at Chestnut Street (0.96), Adams Street/Lewis Terrace (1.05), and Church Street (0.90) are higher than the MassDOT District 6 average of 0.76 crashes per million entering vehicles. The crash rate at the Walnut Street intersection is calculated as 0.69 crashes per million entering vehicles, which is slightly lower than the District 6 average.

For unsignalized intersections, the crash rate at Armory Street (1.04) is higher than the MassDOT District 6 average of 0.58 crashes per million entering vehicles, and the crash rate at Harvard Street is 0.49 crashes per million entering vehicles, which is slightly lower than the District 6 average.

The segment crash analysis indicated that the crash rates in the segments that have primarily business uses—Chestnut Street–Armory Street (5.13), Lowell Avenue–Walnut Street (5.87), Walnut Street–Harvard Street (4.80), and Harvard Street–Crafts Street (6.70)—are all higher than the state average for urban minor arterials of 3.63 crashes per million miles traveled. The crash rates in the segments with mostly institutional and office land uses— Crafts Street–Adams Street (2.21) and Jackson Road–Church Street (2.02)—are lower than the state average. The crash rate in the segment that is mostly residential—Armory Street–Lowell Avenue (1.60)—is much lower than the state average.

3.2 Pedestrian and Bicycle Crashes

Figure 4 also shows the pedestrian and bicycle crash locations in the corridor that were identified from both of the datasets in the recent period of slightly more than seven years. In total, 21 pedestrian crashes and 16 bicycle crashes were identified at various locations in the corridor.⁴

On average, about five crashes involved at least one pedestrian or cyclist per year in this corridor. The locations with a high rate of pedestrian and bicycle crashes are:

- Adams Street/Lewis Terrace Intersection: five bicycle crashes (2010–12) and three pedestrian crashes (2007–09)
- Segment adjacent to Newtonville Station: three pedestrian crashes (2010–2013) and one bicycle crash (2010)
- Segment between Walnut Street and Lowell Avenue: three pedestrian crashes (one in 2010 and two in 2012)
- Harvard Street Intersection: three pedestrian crashes (2007–2012)
- Walnut Street Intersection: two pedestrian crashes (2007 and 2008) and one bicycle crash (2012)
- Lowell Avenue Intersection: two bicycle crashes (2008 and 2013) and one pedestrian crash (2010)
- Chestnut Street Intersection: three pedestrian crashes (2011–13)

⁴ In this study, the term “pedestrian crashes” refers to the crashes that involve at least one vehicle and one pedestrian, and the term “bicycle crashes” refers to crashes involving at least one vehicle and one bicycle. No crashes involving at least one bicycle or one pedestrian were identified from the available data.

- Crafts Street Intersection: two pedestrian crashes (2007 and 2009) and one bicycle crash (2012)⁵

3.4 Intersection Crash Analyses

To further investigate safety and operational problems, MPO staff summarized the crash data for the study intersections according to crash severity (property damage only, non-fatal injury, fatality, unknown), collision type (single-vehicle, rear-end, angle, sideswipe, head-on, rear-to-rear, unknown), pedestrian or bicycle involvement, time of day, pavement conditions, and light conditions.

Crash statistics for the intersections in each dataset are summarized in Table E-1 and Table E-2 in Appendix E, respectively. The data show that the number of crashes in the three recent years at Chestnut Street, Armory Street, Lowell Avenue, Harvard Street, and Church Street has been decreasing slightly, while the number of crashes at Walnut Street Intersection has increased slightly. The other intersections remain about the same.

The collision diagrams for the intersections, which cover more than three years, were constructed by using recent crash reports provided by the Newton Police Department. The crash reports contain detailed information about how and where those crashes occurred. The collision diagrams for the intersections, in order from west to east, are in Appendix F. The date and time, severity, collision type, road conditions, and contributing factors for each of the crashes used in the analysis are also summarized in tables, which follow their respective collision diagrams, in Appendix F.

Major factors affecting intersection operations and findings from the collision diagrams for each of the intersections are summarized below:

Washington Street at Chestnut Street (Figure F-1 and Table F-1)

- High westbound left-turn traffic volume during peak hours
- Most crashes involved a westbound left-turning vehicle
- Two pedestrian crashes in the last two years

Washington Street at Armory Street (Figure F-2 and Table F-2)

- The low-volume Armory Street traffic, under a stop control, increasing primarily in the PM peak hour and weekend midday hours.
- Most Trader Joe's traffic exits from its driveway east of the intersection, not from Armory Street.

⁵ The intersection was reconstructed in 2012; countdown pedestrian signals were installed at that time.

- Three crashes at the Trader Joe's driveway.

Washington Street at Lowell Avenue (Figure F-3 and Table F-3)

- Located in the path to Newton North High School
- No noticeable patterns of crashes
- One bicycle crash in 2013
- One pedestrian crash in 2012

Washington Street at Walnut Street (Figure F-4 and Table F-4)

- High number of crashes in recent years
- High number of left-turn crashes
- Four crashes possibly related to the parking maneuvers near the intersection
- One pedestrian crash and one bicycle crash in 2012

Washington Street at Harvard Street (Figure F-5 and Table F-5)

- Unsignalized intersection adjacent to the stairs from Harvard Street to the Newtonville Station commuter rail platform
- Recently installed pedestrian crossing warning beacon (rectangular rapid flashing beacon)
- One pedestrian crash at the intersection in 2012
- One bicycle crash involving a parked car near the intersection

Washington Street at Crafts Street (Figure F-6 and Table F-6)

- Recently reconstructed intersection (2012) with pedestrian countdown signals
- High number of crashes related to parking at, and exiting from, the adjacent Tedeschi Food Shops, which appears to be in decline after the intersection was reconstructed
- One bicycle crash in 2011

Washington Street at Adams Street/Lewis Terrace (Figure F-7 and Table F-7)

- High traffic volumes on all approaches during peak hours
- High number of crashes in recent years
- High number of left-turn crashes
- Four bicycle crashes in 2011 and 2012

Washington Street at Jackson Road (Figure F-8 and Table F-8)

- Traffic signals under the same controller as at Adams Street/Lewis Terrace
- High traffic volumes on Washington Street during peak hours
- Mostly rear-end collisions on Washington Street
- No pedestrian or bicycle crashes

Washington Street at Church Street (Figure F-9 and Table F-9)

- High traffic volumes on Washington Street during peak hours
- Limited space between on-street parking and travel lanes
- High number of rear-end and sideswipe collisions on Washington Street
- No pedestrian or bicycle crashes

3.5 Segment Crash Analyses

Based on the Newton Police crash reports, MPO staff constructed collision diagrams for the segments between major intersections. The collision diagrams for these segments, in order from west to east, are included in Appendix G. The date and time, severity, collision type, road conditions, and contributing factors for each of the crashes used in the analysis are summarized in tables that follow their respective segments, in Appendix G.

In general, the segments that have commercial developments experience many more crashes than those with residences, offices, and institutions. The major findings from the analyses of all of the segment collision diagrams are summarized below:

- Nearly 25 percent of the total crashes involved a parked or parking vehicle, mainly in the commercial segments
- About 20 percent of the total crashes were related to vehicles' going to and from these commercial developments⁶
- Two midblock-crossing pedestrian crashes, one near the post office and one near Newtonville Station
- Three bicycle crashes, two involving a turning vehicle and one a rear-end crash

⁶ This percentage does not include some rear-end collisions that might have been caused by a vehicle on Washington Street waiting to turn into adjacent developments.

4 ROADWAY OPERATIONS ANALYSIS

To address issues and concerns related to roadway operations, this section examines the roadway's prevailing travel speeds, existing roadway cross-sections, and operations at major intersections, and explores an alternative roadway design for accommodating pedestrians and bicycles and improving access to and from adjacent developments. It also examines the roadway's operations under various projected future-year traffic conditions.

4.1 Roadway Travel Speeds

High travel speeds in the corridor are a major concern of the area's residents. In order to understand how fast drivers travel in the corridor, MPO staff requested MassDOT's assistance in collecting spot speeds during the period when automatic traffic counts were being conducted, in April 2014. The speed counts were collected at five selected locations in the corridor from April 7 to April 9. Appendix H summarizes the average and 85th percentile speeds for each location.

The "85th percentile" is the principal value used for establishing speed controls. It is the speed at or below which 85 percent of vehicles passing a given point are traveling. Currently most segments in the corridor are posted with a 35 mph (miles per hour) speed limit, except for the segments west of Davis Court and east of Jewett Street, where the speed limits are 25 mph.

Table 4 shows the observed 85th percentile speeds and the posted speed limits at the five selected locations in the corridor.⁷ In general, the eastbound speeds gradually decrease from west to east and the westbound speeds gradually increase from east to west. The 85th percentile speeds indicate that most vehicles in the corridor travel within a range of plus or minus 5 mph of the 35-mph speed limit. Note that there was roadside construction work on water supplies in the corridor at the time of the observations, and most of the speed counts were performed only on the curb lane in both directions (except the last location). Because of these factors, the actual travel speeds should be assumed to be somewhat higher than those shown in Table 4.

⁷ Data shown in Table 4 are the average of three weekdays' observations from April 7 to 9 in 2014. The 85th percentile speeds were derived from spot speed data collected from automatic traffic recorders. To establish or modify speed controls, MassDOT requires that data be collected using radar or laser guns at critical locations for an area not to exceed 0.25 miles, in addition to vehicle trial runs in the study area.

TABLE 4
Observed 85th Percentile Speeds in the Corridor

Speed Study Location	Eastbound Speed	Westbound Speed	Posted Speed Limit
1. Washington Street west of Armory Street	37.2 mph	35.3 mph	35 mph
2. Washington Street west of Cross Street	38.9 mph	33.9 mph	35 mph
3. Washington Street west of Walker Street	37.6 mph	35.1 mph	35 mph
4. Washington Street west of Harvard Street	34.0 mph	33.7 mph	35 mph
5. Washington Street west of Adams Street	29.4 mph	33.9 mph	35 mph

The nearly 40 mph travel speeds observed at various locations in the corridor are not considered unusual for roadways with a speed limit of 35 mph. The current speed regulations in the corridor generally comply with the MassDOT speed zoning requirements.⁸

Operating speeds on roadways generally conform to design conditions. Lowering the posted speed limit without related design reconfigurations is unlikely to meaningfully reduce travel speeds.

4.2 Existing Roadway Cross-Sections

The top graphic in Figure 5 shows a roadway cross-section that is typical of most segments of the study corridor, presenting the street view of an eastbound driver. The four-lane roadway generally has two travel lanes, each of them about 11.5 feet wide and on-street parking (about seven feet wide) in each direction. There are no separate bicycle lanes. Cyclists have to ride with the outside-lane traffic and close to the parked (or parking) vehicles.

There are sidewalks on both sides of the roadway. On the north side, they are eight feet wide in most of the corridor segments. Some sidewalks in the commercial districts have a width of 10 to 12 feet, mainly in the area west of Armory Street. On the south side, the sidewalks are generally located next to the commuter rail fence, and have a width of five feet or less. Some are unpaved in the areas that are far from the commercial districts.

⁸ MassDOT procedures for speed zoning require that at speed observation locations, the established safe speed shall not be more than 7 mph below the 85th percentile speed, and not higher than the 95th percentile speed. See *Procedures for Speed Zoning on State and Municipal Roadways*, MassDOT Highway Division, May 2012.

Most of the segments in the corridor have a roadway surface width (curb to curb) of about 60 feet. Some segments in the residential districts, from Armory Street to Lowell Avenue, have a surface width of 58 feet or less. The segment adjacent to Newtonville Station has a roadway surface that is wider than the other segments in the corridor, of about 80 to 85 feet.

The bottom graphic in Figure 5 shows that the segment adjacent to Newtonville Station has a roadway width of about 80 to 85 feet. It contains four 12-foot travel lanes, 7-foot parallel parking on the north side, and 60-degree angle parking on the south side that takes about 25 to 30 feet of roadway width. There are sidewalks on both sides of the roadway. There are no bicycle lanes. Although on the south side bicycles have a wider space between the angle parking and the outside-lane traffic, it is difficult for drivers who are backing out from the angle parking to see them, making this an unsafe area for cyclists.

Some of the major issues and concerns related to the existing roadway include:

- Lack of separate or safe bicycle accommodations
- Residents disfavor high travel speeds that are encouraged by roadway design
- Unsafe pedestrian crossings due to large roadway surface widths and high travel speeds
- Lack of a dedicated turning lane for accessing adjacent developments
- On-street parking and outside-lane traffic encroaching on each other
- Narrow and unpaved sidewalks along the south side of the street
- Closely spaced curb cuts in some commercial districts

4.3 Potential Roadway Cross-Sections (Designs)

The recent counts indicate that most segments of the corridor (about 70 percent) carry an average daily traffic of fewer than 20,000 vehicles. These segments have the potential for a “road diet” application, which would involve reducing the number of travel lanes from four to three in order to accommodate bicycles and to improve safety for pedestrians crossing the roadway and for vehicles accessing adjacent developments.

The top graphic in Figure 6-1 shows the potential three-lane roadway cross-section that could be applied to most of the existing four-lane roadway. The cross-section contains a 12-foot center median or left-turn-only lane, two 11-foot travel lanes (one in each direction), two 6-foot bicycle lanes (one in each direction), and a 7-foot parking lane on both sides.⁹

⁹ The use of a three-lane cross-section such as this is not limited to roadways with a daily traffic volume of fewer than 20,000 vehicles. Its application depends on a number of factors, including traffic flow patterns, the spacing of major intersections, adjacent land uses, and consideration of modes other than motor vehicles. A recent MassDOT project for improving

The 6-foot bicycle lane would provide a slightly wider buffer zone separating bicycles from the parking lane and from adjacent traffic than a standard 5-foot bicycle lane. In this cross-section, pedestrians could stop at the center median and cross only one lane of traffic at a time. Meanwhile, vehicles could stay in the center left-turn lane to access the adjacent developments. It would be much safer for both the turning and through vehicles than under the existing conditions.

For the roadway segments that are not suitable for the “road diet” application, the bicycle accommodations could be accomplished by slightly reducing the width of travel lanes and removing on-street parking from one side of the roadway (mainly the south side). As shown in the bottom graphic in Figure 6-1, the proposed cross-section contains four 10.5-foot travel lanes (two in each direction), two 6-foot bicycle lanes (one in each direction), and a 7-foot parking lane on one side of the roadway.

The analysis in Section 2.4 indicates that many on-street parking spaces are currently not fully utilized, especially on the south side, but removing parking in these segments would likely impact adjacent developments. However, it would provide a safe separate accommodation for bicycles and would reduce unsafe pedestrian crossings. The goal of this study was to preserve as many of the parking spaces in the business districts of the corridor as possible.

Taking into consideration the variations in roadway configurations, adjacent land uses, and pedestrian and bicycle activities, MPO staff proposed two alternative three-lane cross-sections. Figure 6-2 shows the two alternative cross-sections—one for business districts with closely spaced driveways and one for residential districts with limited roadway surface width.

The top graphic in Figure 6-2 shows the potential three-lane roadway cross-section for business districts with closely spaced driveways. The cross-section contains a 12-foot two-way left-turn (TWLT) lane or center median (striped or concrete-stamped), two 15-foot shared lanes for motor vehicles and bicycles (one in each direction), and a 7-foot parking lane with a 2-foot buffer from the shared lane, on both sides of the roadway.

This cross-section could potentially be applied to the business district near West Newton between Chestnut Street and Kempton Place. The TWLT lane would provide access to the dense business developments on both sides of the roadway. The wide shared lane would be more practical than separate bicycle

Needham Street in Newton, which carries about 25,000 vehicles per weekday, had proposed a similar three-lane cross-section.

lanes, which would be discontinuous and would have frequent intrusion by turning vehicles.

The bottom graphic in Figure 6-2 shows the potential three-lane roadway cross-section for residential districts that have limited roadway width. The cross-section contains a 12-foot center median (raised) or left-turn-only lane: two 11-foot travel lanes (one in each direction), two 6-foot bicycle lanes (one in each direction), and a 7-foot parking lane on the north side of the roadway.

This cross-section could potentially be applied to the residential districts between Cross Street and Walker Street, where the roadway surface width (about 58 feet or less) is narrower than in other segments of the corridor and most of the on-street parking areas on the south side are rarely utilized. The proposed roadway surface would be about 53 feet wide. The remaining space, which is 5 feet or less, could be used to increase the sidewalk space on the south side so that pedestrians would have more buffer space from the adjacent commuter rail tracks.

4.4 Existing Conditions at Major Intersections

The corridor contains seven signalized intersections and two major unsignalized intersections. These are the major locations that could affect traffic flow and pedestrian and bicycle movements in the corridor.

Based on the recently collected turning-movement data, MPO staff constructed AM and PM peak-hour traffic models for the entire corridor by using the Synchro traffic capacity and simulation program.¹⁰ Table 5 summarizes the capacity analyses for six of the seven signalized intersections. The intersection of Washington Street at Chestnut Street is not included in the table, as its traffic signal is part of a coordinated system of a series of signals in the West Newton Square area. The signal system is currently being reviewed by the City.

¹⁰ Synchro Version 8.0 was used for the analyses. This software is developed and distributed by Trafficware Ltd. It can perform capacity analysis and traffic simulation (when combined with SimTraffic) for an individual intersection or a series of intersections in a roadway network.

TABLE 5
Intersection Capacity Analyses
Existing (2014) Conditions

Name of Cross Street	AM Peak Hour					PM Peak Hour				
	LOS ¹	Avg. Delay ²	50th PQ ³	95th PQ ⁴	Cong. App. ⁵	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.
Lowell Avenue	C	21.8	100	260	None	C	25.7	145	300	None
Walnut Street	D	38.3	300	435	None	D	36.7	160	570	None
Crafts Street	E	73.9	370	495	SB	D	50.9	295	380	SB
Adams Street/ Lewis Terrace	D	37.1	250	325	SB	D	35.7	30	120	SB
Jackson Road	D	48.9	100	150	None	C	25.4	375	470	None
Church Street	C	21.3	190	570	None	C	20.5	160	535	None

¹ Level of service: A to F, based on 2010 Highway Capacity Manual criteria. LOS F is considered undesirable in urban areas.

² Average delay at the intersection: estimated in seconds per entering vehicle.

³ 50th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁴ 95th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁵ Congested approach: any approach of the intersection evaluated as operating at LOS F.

In general, the existing lane assignments and timing settings for the six intersections all appear to be appropriate. They were evaluated as operating at an acceptable level of service (LOS) E or better. However, Synchro signal timing optimization tests indicated that the signal timings of three of the intersections could be adjusted slightly in order to improve pedestrian safety or traffic operations.

The three intersections are:

- Washington Street at Lowell Avenue: Currently it has an exclusive pedestrian signal phase of 21 seconds, which is not sufficient for pedestrians to cross at some of the approaches (nearly 60 feet wide). It should be increased to at least 27 seconds, the same duration as the timing at the Walnut Street intersection.
- Washington Street at Crafts Street: Synchro analyses indicated that the Crafts Street approach is operating at an undesirable LOS of F, and it could be somewhat improved by appropriating five seconds of green time from the Washington Street approach, which would operate at the same level of service after the timing change.
- Washington Street at Adams Street/Lewis Terrace: Currently the Adams Street approach has a high left-turn volume, with the existing layout of a left-turn/through shared lane and a right-turn-only lane. It could be rearranged as one left-turn-only lane and one right-turn/through shared

lane using the same signal timing settings. Although the Lewis Terrace approach's LOS would deteriorate slightly, the Adams Street LOS would significantly improve.

Table 6 summarizes the capacity analyses for the three intersections with the proposed signal timing adjustments under existing traffic conditions.

TABLE 6
Intersection Capacity Analyses
Existing Conditions with Signal Timing Adjustments

Name of Cross Street	AM Peak Hour					PM Peak Hour				
	LOS ¹	Avg. Delay ²	50th PQ ³	95th PQ ⁴	Cong. App. ⁵	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.
Adams Street./ Lewis Terrace	C	27.4	250	325	NB	C	23.3	30	120	NB
Crafts Street	E	66.0	215	280	SB	D	45.3	325	410	None
Lowell Avenue	C	25.5	115	260	None	C	25.9	145	300	None

¹ Level of service: A to F based on 2010 Highway Capacity Manual criteria. LOS F is considered undesirable in urban areas.

² Average delay at the intersection: estimated in seconds per entering vehicle.

³ 50th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁴ 95th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁵ Congested approach: any approach of an intersection evaluated as operating at LOS F.

4.5 Future-Year Conditions

MPO staff also conducted future-year analyses based on projected traffic conditions for an approximately 10-year period for the horizon year 2025. One major concern about future-year conditions is the MassDOT's plan to reinstate tolls at I-90 Exits 16 and 17.¹¹

Taking this recent development into consideration, the staff developed two sets of future-year projections for this study. The first set is a trend-extending projection that assumes that the toll reinstatement would have a minimal impact on future-year conditions. It predicts that the study corridor would have 0.3 percent annual traffic growth in the AM peak hour and 0.4 percent annual growth in the PM peak hour.¹²

¹¹ In June 2014, MassDOT announced a comprehensive tolling plan for additional Interstate and controlled-access state highways. The plan includes applying AET (All-Electronic Tolling) at the two I-90 exits, potentially within the next two years. AET is a form of toll collection that allows drivers to pay their toll without stopping or slowing down.

¹² The projection was derived from the Boston Region MPO's most recent 2035 regional travel demand model. MPO staff reviewed the growth at all of the major intersections in the corridor and calculated the average annual growth rate for the study corridor.

The second set assumes that toll reinstatement would have a significant impact on the study corridor. Based on a previous MPO study of an adjacent area, the staff estimated that toll reinstatement would cause an increase in total traffic during the peak hours of approximately 5 percent in 2025.¹³

Table 7 summarizes the total percentage of traffic growth from 2014 to 2025 for each of the peak-hour models.

TABLE 7
Future-Year (2025) Traffic Growth Projections

2014–25 Total Growth	AM Peak Hour	PM Peak Hour
Moderate traffic growth	3%	5%
Significant traffic growth	8%	10%

Based on the projections, the staff analyzed three different future-year scenarios:

- 1) Existing corridor layouts with moderate traffic growth
- 2) Existing corridor layouts with significant traffic growth
- 3) Proposed “road diet” layouts with significant traffic growth

Table 8 summarizes capacity analyses of six major intersections in these scenarios. For the scenarios that use existing layouts, signal timings were adjusted within reasonable ranges to accommodate future traffic conditions. In general, traffic would deteriorate from the existing conditions but would still operate at an acceptable LOS (of E or better) at all locations.

¹³ The estimation was derived from the modeling data in the Boston Region MPO’s study, *Newton Corner Rotary Study, Phase II*, January 8, 2009.

TABLE 8
Future-Year (2025) Capacity Analyses

Scenario 1: Existing Corridor Layout with Moderate Traffic Growth

Name of Cross Street	AM Peak Hour					PM Peak Hour				
	LOS ¹	Avg. Delay ²	50th PQ ³	95th PQ ⁴	Cong. App. ⁵	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.
Lowell Avenue	C	26.5	130	270	None	C	27	155	350	None
Walnut Street	D	39.8	325	460	None	D	41.1	170	620	None
Crafts Street	E	70.1	410	540	SB	D	50.7	350	440	SB
Adams Street/ Lewis Terrace	C	33.6	265	345	NB	C	28	100	130	NB
Jackson Road	D	50.2	100	150	None	C	28.5	405	505	None
Church Street	C	22.5	210	600	None	C	23.6	190	585	None

Scenario 2: Existing Corridor Layout with Significant Traffic Growth

Name of Cross Street	AM Peak Hour					PM Peak Hour				
	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.
Lowell Avenue	C	27.9	145	285	None	C	28.8	170	385	None
Walnut Street	D	42.9	390	500	None	D	48.3	195	660	None
Crafts Street	E	71.4	460	595	SB	E	56.8	375	470	SB
Adams Street/ Lewis Terrace	D	46.8	290	380	NB	D	39.4	120	150	NB
Jackson Road	D	53.2	100	150	None	D	35.6	435	580	None
Church Street	C	24.9	240	650	None	C	30.8	225	635	None

Scenario 3: Proposed "Road Diet" Layouts with Significant Traffic Growth

Name of Cross Street	AM Peak Hour					PM Peak Hour				
	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.	LOS	Avg. Delay	50th PQ	95th PQ	Cong. App.
Lowell Avenue	D	48.6	425	900	None	D	45.5	295	635	None
Walnut Street	E	61.1	420	880	SB	D	45.2	230	600	None
Crafts Street	E	71.4	460	595	SB	E	56.5	375	470	SB
Adams Street/ Lewis Terrace	D	46.8	290	380	NB	D	39.4	120	150	NB
Jackson Road	D	53.2	100	150	None	D	35.6	435	580	None
Church Street	C	24.9	240	650	None	C	30.8	225	635	None

¹ Level of service: A to F based on 2010 Highway Capacity Manual criteria.

² Average delay at the intersection: estimated in seconds per entering vehicle.

³ 50th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁴ 95th percentile queue: length estimated in feet on Washington Street in the peak direction (AM: eastbound, PM: westbound).

⁵ Congested approach: any approach of an intersection evaluated as operating a LOS F.

The proposed “road diet” layouts include two major modifications:

- Roadway configuration between Chestnut Street and Court Street: converting from four lanes (two lanes in each direction) to three lanes (one lane in each direction with a center lane for left turns or medians)
- Intersection layout at Lowell Avenue and at Walnut Street: converting the inside lane of both of the Washington Street approaches from a left-turn/through shared lane to a left-turn-only lane.

As shown in Table 8, the “road-diet” scenario would maintain the same levels of service at all of the locations except the Walnut Street intersection. However, the Walnut Street intersection would operate at an acceptable LOS of E during peak hours.¹⁴ Most significantly, the safety and operations of pedestrians, cyclists, and vehicles in the entire corridor would be greatly improved under the “road diet” scenario.

5 PROPOSED IMPROVEMENTS

Based on the above analyses, MPO staff developed a series of short- and long-term improvements to address the identified safety and operational problems. The short-term improvements could be implemented within a year, at relatively low cost. The long-term improvements are generally more complicated and cover large areas, which would require extensive planning and design efforts, as well as sufficient funding.

5.1 Short-Term Improvements

In the short term, a number of improvements could be considered for the corridor in order to enhance safety for pedestrians and cyclists and to moderately improve traffic operations. These improvements are:

- Install traffic signal backplates with reflective borders (yellow stripes).
- Repair street lights as needed.¹⁵
- Repaint faded crosswalk markings at intersections. Currently most of the intersections’ crosswalks are marked by a series of white longitudinal lines

¹⁴ The intersection appears to have room for some layout modifications if that is necessitated by further unexpected traffic growth from the toll reinstatement or an adjacent Austin Street project. Further engineering studies could also examine the feasibility of adding concurrent pedestrian signal phasing at the functional design stage.

¹⁵ On July 26, 2014, MPO staff drove along the corridor to survey nighttime roadway conditions and observed about four to five street lights were not working.

parallel to traffic.¹⁶ At the intersections of Washington Street at Adams Street/Lewis Terrace and at Jackson Road, the crosswalk markings have almost totally disappeared.

- Adjust signal timing or lane assignments at the following intersections:
 - Washington Street at Lowell Avenue: Increase the exclusive pedestrian signal phase from 21 to 27 seconds.
 - Washington Street at Crafts Street: Consider relocating 5 seconds of green time from Washington Street to Crafts Streets.
 - Washington Street at Adams Street/Lewis Terrace: Consider rearranging the southbound approach so it has one left-turn-only lane and one through/right-turn shared lane.
- Enforce the no-parking regulations at the corners of Washington Street westbound near the following streets:
 - Jackson Road
 - Walnut Street (MBTA bus stop location)
 - Walker Street
 - Armory Street
 - Trader Joe's driveway

5.2 Long-Term Improvements

Figures 7-1 to 7-7 show the locations and layouts of the proposed long-term improvements in a series of conceptual plans from west to east within the study corridor. The conceptual plans were not created to scale, but in approximate proportion, in order to show how the proposed improvements would relate to their surroundings. For the roadway cross-sections related to these conceptual plans, please refer to Figures 6-1 and 6-2.

Major proposed improvements include:

- Convert the corridor's travel lanes from four to three from Chestnut Street to Court Street (see the top graphic in Figure 6-1), which constitutes about 70 percent of the study corridor.

¹⁶ *Manual on Uniform Traffic Control Devices*, Section 3B.18: Crosswalk Markings, 2009 Edition with Revisions 1 and 2, Federal Highway Administration, US Department of Transportation, May 2012.

- Maintain four travel lanes between Court Street and Church Street but slightly reduce the lane width and remove on-street parking from one side (mainly the south side) of the roadway (see the bottom graphic in Figure 6-1).¹⁷
- Provide bicycle accommodations on both sides of the corridor. They would be in slightly different forms, but their paths would be continuous (Figures 6-1 and 6-2).
 - 6-foot separate bicycle lanes on both sides (in the majority of the proposed three-lane sections)
 - 6-foot separate bicycle lane on the north side and 5-foot separate bicycle lane on the south side (in the proposed four-lane sections that currently have a limited right-of-way)
 - 15-foot shared lane in the business districts that have closely spaced driveways between Chestnut Street and Kempton Place
- Provide the center lane (in the proposed three-lane sections) as a median, a left-turn-only lane, or a two-way left-turn lane for accessing adjacent businesses and other developments.¹⁸ It would significantly improve the safety and mobility of travel to and from these developments, not only for vehicles but also for pedestrians and cyclists.
- Reduce the curb turning radii in order to slow down turning vehicles and reduce pedestrian crossing distances. Potential locations for such improvements include:
 - Washington Street at Eddy Street
 - Washington Street at Walker Street
 - Washington Street at Lowell Avenue
 - Washington Street at Court Street
 - Washington Street at Jewett Street
- Add sidewalk extensions (pedestrian bulb-outs) to provide staging areas for pedestrians, enhance their view of traffic, and shorten their crossing distances. Potential locations for such improvement include:
 - Washington Street at Armory Street
 - Washington Street at Eddy Street

¹⁷ The parking removal would provide space for continuous dedicated bicycle lanes in the corridor. Meanwhile, most of the on-street parking in the business districts would be preserved.

¹⁸ The traffic median would be concrete-stamped or striped in the business districts and would be raised in the residential districts of the corridor.

- Washington Street at Walker Street
 - Washington Street at Lowell Avenue (north side)
- Install crosswalks at locations that have a significant number of pedestrian crossings or are adjacent to MBTA bus stops. Suitable locations for such improvements are:
 - Washington Street at Armory Street
 - Washington Street at Cross Street
 - Washington Street at Eddy Street
 - Washington Street at Walker Street
- Install midblock crosswalks at locations in business districts that have a significant number of pedestrian crossings. Proposed locations for such improvements are:
 - Washington Street at the post office in Newtonville
 - Washington Street at Newtonville Station
- Consider combining some adjacent MBTA bus stops in the corridor in order to increase the efficiency of bus travel. A potential case would be combining the existing stops at Armory Street and Cross Street.
- Increase the sidewalk width on the south side wherever adequate right-of-way is available.
- Change the corridor's posted speed limit from 35 mph to 30 mph, after the above proposed roadway modifications are in place. The travel-speed analysis (Section 4.1) supports these potential modifications. At the design stage, this would have to be further examined by applying the MassDOT speed zoning procedures.

In addition, the following items should be considered at the design stage:

- Further evaluate parking conditions, locations, and pricing strategies, and develop a comprehensive parking and business access management plan for the entire corridor.
- Further examine design alternatives to the existing angle parking at Newtonville Station.¹⁹

¹⁹ The existing angle parking is substandard, with insufficient vehicle backing space. A number of crashes, including one involving a pedestrian, occurred in that parking area in the past three years. Staff performed a preliminary examination of two options in this study. The first is to convert the angle parking to parallel parking. It would eliminate about half of the existing spaces but would provide more room for wider sidewalks on both sides of Washington Street. The second option is to convert it to "reverse angle parking, which is a type of angle parking

- Review the existing lighting facilities and conditions. If resources are available, consider installing a new lighting system powered by renewable energy for the entire corridor and adding pedestrian-scale lighting in the Newtonville business districts.
- Further examine the potential of replacing the existing fences adjacent to MBTA commuter rail and I-90 with well-designed concrete walls or other features that are more effective in blocking noise.

6 SUMMARY AND RECOMMENDATIONS

For this study, MPO staff performed a series of safety and operations analyses, identified safety and operational problems, and proposed a number of short- and long-term improvements to address the identified problems in the study corridor.

The recommended short-term improvements include:

- Install traffic signal-backplates with reflective borders.
- Repair street lights as needed.
- Repaint faded crosswalk markings at intersections.
- Adjust signal timing or lane assignments at applicable intersections.
- Enforce the no-parking regulations at corners of major intersections.

These improvements are generally low-cost and could enhance safety for pedestrians and cyclists and improve traffic operations. They should be implemented as soon as funding resources can be allocated.

The conceptual plan for long-term improvements provides a vision that would accommodate all users and would significantly enhance their safety, mobility, and access in the corridor. The expected benefits from some of the major proposed long-term improvements include:

- The “road diet” (from four-lane to three-lane) modification of majority (70 percent) of the corridor would slow down traffic and reduce pedestrian crossing distances and risks.
- A center lane in the modified sections, functioning as a median, left-turn-only, or two-way left-turn lane, would significantly improve safety and

that requires vehicles to back into parking spots instead of pulling into them. It allows drivers to make eye contact with pedestrians and cyclists when they exit their spots and is thus considered safer than the usual angle parking. The conversion would not eliminate any of the existing parking spaces. However, it would require educating the public about its operations, as it is not widely used in this country and many drivers may not be familiar with and skilled in its operations.

mobility for users traveling to and from adjacent developments, not only for vehicles but also for the pedestrians and cyclists.

- Bicycle accommodation on both sides of Washington Street would improve cyclists' safety and mobility.
- Redesign of intersections with tighter curb radii and sidewalk extensions would slow down turning vehicles and enhance safety for pedestrians and cyclists.
- Crosswalk installations would enhance pedestrian-crossing safety in business districts and at MBTA bus stops.
- Speed-limit reduction from 35 to 30 mph would make traffic speeds more compatible with the adjacent land-use activities, thus improving safety for all users in the corridor.

In addition, the corridor would benefit from a comprehensive parking and access management program. Lighting and noise conditions should also be further examined during the design stage.

The entire corridor is under the City of Newton's jurisdiction. The MPO staff recommends the following implementation stages for consideration based on input from the community:

- 1) West Section: Chestnut Street to the west of Lowell Avenue
- 2) Middle Section: Lowell Avenue to Harvard Street
- 3) East Section: the east of Harvard Street to Church Street

Implementing the proposed long-term improvements would require sufficient resources. Reconstruction of the entire corridor would cost approximately \$12,000,000 to \$15,000,000.²⁰ Table 9 shows the approximate costs of the three implementation stages.

This study shows that the corridor has great potential to operate safely and efficiently for all users in various transportation modes and provides a vision for the corridor's long-term development. The City was advised to conduct community meetings, build consensus among stakeholders, and advance this planning study to the design stage. It will require significant effort and collaboration on the part of all stakeholders, including residents and owners of adjacent developments, the MBTA, and MassDOT, to achieve the vision.

²⁰ At this preliminary planning stage, the cost was approximated from the general expenses of similar projects. The estimation is only for design and construction; it does not include right-of-way, utility relocation, or other contingency costs.

TABLE 9
Corridor Construction Cost Estimation

Implementation Stages	Approximate Length	Major Improvement Items	Approximate Cost
West Section	0.7 miles	Roadway reconstruction and restriping, median and turning-lane installation, sidewalk widening, curb extension and crosswalk installation, street lighting upgrade, parking meter upgrade, roadside landscaping	\$4,000,000 — \$5,000,000
Middle Section	0.5 miles	Roadway reconstruction and restriping, median and turning lane installation, intersection geometry modification and traffic signal upgrade (3 locations), sidewalk widening, curb extension and crosswalk installation, street lighting upgrade, parking meter upgrade, roadside landscaping	\$5,000,000 — \$6,000,000
East Section	0.6 miles	Roadway reconstruction and restriping, intersection traffic signal upgrade (3 locations), sidewalk paving, street lighting upgrade, parking meter upgrade, roadside landscaping	\$3,000,000 — \$4,000,000
All Sections	1.8 miles	All the above items	\$12,000,000 — 15,000,000

The implementation process must ensure that all parties have consensus about how the recommendations can be realized in a resourceful manner. The City has to work with MassDOT Highway Division District 6 to initiate the project, obtain favorable review from MassDOT's Project Review Committee, and identify potential funding resources through MassDOT and the Boston Region MPO.

Appendix I details the actions that are required in various steps of MassDOT's project development process, including a schematic timetable of the steps. Information regarding the project development process can also be found on MassDOT's website, at www.massdot.state.ma.us/planning/Main/PlanningProcess/ProjectDevelopmentProcess.aspx and at www.massdot.state.ma.us/Portals/8/docs/designGuide/CH_2_a.pdf.

CW/cw



FIGURE 7-3
Conceptual Plan of Proposed Long-Term Improvements (Section 3)
Washington Street, Newton

*Addressing Safety,
Mobility, and Access on
Subregional Priority Roadways*



FIGURE 7-4
Conceptual Plan of Proposed Long-Term Improvements (Section 4)
Washington Street, Newton