

# TRANSPORTATION IMPACT ASSESSMENT

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PROPOSED RESIDENTIAL DEVELOPMENT  
39 MAIN STREET (ROUTE 109)  
MEDWAY, MASSACHUSETTS

*Prepared for:*

SLV MEDWAY I, LLC  
Needham, Massachusetts

November 2018

*Prepared by:*

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Dear Reviewer:

This letter shall certify that this *Transportation Impact Assessment* has been prepared under my direct supervision and responsible charge. I am a Registered Professional Engineer (P.E.) in the Commonwealth of Massachusetts (Massachusetts P.E. No. 38871, Civil) and hold Certification as a Professional Traffic Operations Engineer (PTOE) from the Transportation Professional Certification Board, Inc. (TPCB), an affiliate of the Institute of Transportation Engineers (ITE) (PTOE Certificate No. 993). I am also a Fellow of the Institute of Transportation Engineers (FITE).

Sincerely,

VANASSE & ASSOCIATES, INC.

Jeffrey S. Dirk, P.E., PTOE, FITE  
Principal

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## EXECUTIVE SUMMARY

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Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of a 190-unit multifamily residential community to be located at 39 Main Street (Route 109) in Medway, Massachusetts (hereafter referred to as the “Project”). At present, the Project site consists of areas of open and wooded space, with portions of the property occupied by a single-family home and associated appurtenances that will be removed to accommodate the Project.

This assessment was prepared in consultation with the Massachusetts Department of Transportation (MassDOT) and the Towns of Medway and Millis; was performed in accordance with MassDOT’s *Transportation Impact Assessment (TIA) Guidelines*; and was conducted pursuant to the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the Institute of Transportation Engineers (ITE)<sup>1</sup>, the Project is expected to generate approximately 1,034 vehicle trips on an average weekday (two-way, 24-hour volume), with 64 vehicle trips expected during the weekday morning peak-hour and 82 vehicle trips expected during the weekday evening peak-hour;
2. The Project will not have a significant impact (increase) on motorist delays or vehicle queuing over Existing or anticipated future conditions without the Project (No-Build conditions), with only minor changes in levels of service (LOS) predicted to occur as a result of the addition of Project-related traffic and the majority of the movements at the study intersections shown to operate at LOS D or better under all analysis conditions where an LOS of “D” or better is defined as “acceptable” operating conditions;
3. All movements exiting the Project site driveway intersection with Main Street are expected to operate at LOS C during the peak hours with vehicle queueing of up to one (1) vehicle;
4. A review of the MassDOT statewide High Crash Location List indicated that the intersection of Main Street with the driveways to Medway Commons and the

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<sup>1</sup>*Trip Generation*, 10<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2017.

Walgreens Pharmacy is included on MassDOT's Highway Safety Improvement Program (HSIP) listing as high crash cluster location for 2013-2015. Recommendations have been provided as a part of this assessment to advance safety-related improvements at this intersection (discussion follows); and

5. Lines of sight to and from the Project site driveway intersection with Main Street were found to exceed the recommended minimum sight distance for the intersection to function in a safe and efficient manner based on the measured travel speed approaching the intersection.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with implementation of the recommendations that follow.

## **RECOMMENDATIONS**

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

### **Project Access**

Access to the Project will be provided by way of a new driveway that will intersect the south side of Main Street approximately 100 feet west of Lee lane. Secondary access to Main Street and the Project site for emergency vehicles will be provided by a gated connection located across from Lee Lane. The following recommendations are offered with respect to Project access and internal circulation:

- The Project site driveway and internal circulating roadways should be a minimum of 24-feet in width or as required to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle as defined by the Medway Fire Department pursuant to the requirements of NFPA® 1.<sup>2</sup>
- To the extent that the driveway will be constructed as a boulevard-type drive, the drive should provide 20-foot wide entering and exiting travel lanes separated by a raised median that should be a minimum of 6-feet in width (46-foot wide minimum cross-section) unless otherwise approved by the Medway Fire Department.
- Emergency vehicle access drives and fire lanes, where provided, should be a minimum of 20-feet in width and constructed of bituminous concrete or other suitable material that can support travel by emergency vehicles under all weather conditions pursuant to the requirements of NFPA® 1 unless otherwise approved by the Medway Fire Department.
- A STOP-sign and marked STOP-line should be provided for vehicles exiting the Project site to Main Street.

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<sup>2</sup>*National Fire Protection Association (NFPA)® 1, Fire Code*, Seventh Edition; NFPA; Quincy, Massachusetts; 2015; as amended per 527 CMR.

- All signs and pavement markings to be installed within the Project site shall conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).<sup>3</sup>
- A sidewalk has been provided around the perimeter of the residential building and extends to Main Street.
- Marked crosswalks with Americans with Disabilities Act (ADA) compliant wheelchair ramps should be provided at all proposed pedestrian crossings.
- A school bus waiting area should be provided at the Project site driveway intersection with Main Street.
- Signs and landscaping to be installed as a part of the Project within intersection sight triangle areas should be designed and maintained so as not to restrict lines of sight.
- Snow windrows within sight triangle areas shall be promptly removed where such accumulations would impede sight lines.
- Consideration should be given to installing electric vehicle charging stations within the Project site and to accommodating the staging of car-sharing vehicles (ZipCar or similar).

### **Off-Site**

#### **Main Street at the Medway Commons and Walgreens Driveways**

The addition of Project-related traffic to the intersection of Main Street at the Medway Commons and Walgreens Pharmacy driveway was not shown to result in a change in LOS over No-Build conditions, with Project-related impacts at the intersection defined as an increase average motorist delay of less than 1.0 seconds and vehicle queuing of up to one (1) vehicle. Independent of and unrelated to the Project, the intersection was found to be included on MassDOT's HSIP listing as high crash cluster location for 2013-2015. In an effort to advance safety improvements at this location that are warranted as a result of existing conditions unrelated to the Project, the Project proponent will facilitate the completion of a Road Safety Audit (RSA) in order to identify improvements strategies for the intersection.

#### **Transportation Demand Management**

Public transportation services are provided to the Town of Medway by the Greater Attleboro Taunton Regional Transit Authority (GATRA) (fixed-route bus service) by way of the Medway T Shuttle which provides service to Norfolk Station on the Franklin Line of the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system. The shuttle operates during the weekday morning and evening peak commuter periods (5:55 to 8:00 AM and 5:00 to 7:00 PM) and includes a stop at the Medway Middle School located at 45 Holliston Street, an approximate a 5-minute driving distance from the Project site. GATRA also operates Paratransit Services for seniors, the disabled and passengers who meet ADA requirements located within a ¾ mile radius of a fixed route bus service corridor.

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<sup>3</sup>*Manual on Uniform Traffic Control Devices* (MUTCD); Federal Highway Administration; Washington, D.C.; 2009.



In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following Transportation Demand Management (TDM) measures should be implemented as a part of the Project:

- The owner or property manager should contact MassRIDES to obtain information on facilitating and encouraging healthy transportation options for residents of the Project;
- Information regarding public transportation services, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents;
- A “welcome packet” should be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options available through MassRIDES’ and their Bay State Commute program (formerly NuRide) which rewards individuals that choose to walk, bicycle, carpool, vanpool or that use public transportation to travel to and from work;
- Residents should be made aware of the Emergency Ride Home (ERH) program available through MassRIDES, which reimburses employees of a participating MassRIDES employer partner worksite that is registered for ERH and that carpool, take transit, bicycle, walk or vanpool to work;
- Pedestrian accommodations have been provided within the Project site and include a sidewalk along the building perimeter that extends to Main Street;
- A mail drop should be provided in a central location; and
- Secure bicycle parking should be provided consisting of: i) exterior bicycle parking conveniently located proximate to the building entrance; and ii) weather protected bicycle parking located in a secure area within the building.

With implementation of the above recommendations, safe and efficient vehicular, pedestrian and bicycle access will be provided to the Project site and the Project can be accommodated within the confines of the existing and improved transportation system.

## **INTRODUCTION**

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Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of a 190-unit multifamily residential community to be located at 39 Main Street (Route 109) in Medway, Massachusetts (hereafter referred to as the “Project”). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing traffic conditions and future traffic conditions, both with and without the Project, along Main Street, and at the following specific intersections: Main Street at Holliston Street; Main Street at the Medway Commons and Walgreens Pharmacy driveway; and Main Street at Coffee Street.

## **PROJECT DESCRIPTION**

The Project will entail the construction of a 190-unit multifamily residential community to be located at 39 Main Street (Route 109) in Medway, Massachusetts. The Project site encompasses approximately 12.3± acres of land that is bounded by Main Street to the north; areas of open and wooded space to the south; and residential properties and areas of open and wooded space to the east and west. Figure 1 depicts the Project site location in relation to the existing roadway network. At present, the Project site consists of areas of open and wooded space, with portions of the property occupied by a single-family home and associated appurtenances that will be removed to accommodate the Project.

Access to the Project will be provided by way of a new driveway that will intersect the south side of Main Street approximately 100 feet west of Lee lane. Secondary access to Main Street for emergency vehicles will be provided by a gated connection located across from Lee Lane.

On-site parking will be provided for 304 vehicles or a parking ratio of approximately 1.6 spaces per dwelling unit, which is above that required pursuant to Section 7, General Regulations, Table 3, *Schedule of Off-Street Parking Requirements*, of the Town of Medway Zoning Bylaw which requires 1.5 parking spaces per residential unit for multifamily developments.





Figure 1

Site Location Map



## **STUDY METHODOLOGY**

This study was prepared in consultation with the Massachusetts Department of Transportation (MassDOT) and the Towns of Medway and Millis; was performed in accordance with: i) MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; observations of traffic flow; and collection of pedestrian, bicycle and vehicle counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon from the current year (2018) was selected for analyses consistent with MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. The analysis conducted in stage two identifies existing or projected future capacity, safety, and access issues, as these areas relate to the transportation infrastructure.

The third stage of the study presents and evaluates measures to address deficiencies in the transportation infrastructure, if any, identified in stage two of the study.

## **EXISTING CONDITIONS**

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A comprehensive field inventory of existing conditions within the study area was conducted in September and October 2018. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; traffic volumes; and operating characteristics; as well as posted speed limits and land use information within the study area. The study area for the Project was selected to contain the major roadway providing access to the Project site, Main Street, as well as the following specific intersections: Main Street at Holliston Street; Main Street at the Medway Commons and Walgreens Pharmacy driveway; and Main Street at Coffee Street.

The following describes the study area roadway and intersections as observed in September 2018.

### **Roadway**

#### **Main Street (Route 109)**

- Two-lane urban principal arterial roadway under Town jurisdiction
- Traverses a general east-west direction and provides access to Interstate-95 (I-95) to the northeast of the Project site and to Interstate-495 (I-495) to the southwest
- Provides two 12.5 to 13-foot wide travel lanes separated by a double-yellow centerline with variable marked shoulders
- Posted speed limit is 35 miles per hour (mph)
- Sidewalks are provided along the north side of the roadway in the vicinity of the Project site
- Illumination is provided by way of street lights mounted on wood poles
- Land use within the study area consists of the Project site, areas of open and wooded space, and residential and commercial properties

## Intersections

Table 1 and Figure 2 summarize lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections as observed in September 2018.

**Table 1**  
**STUDY AREA INTERSECTION DESCRIPTION**

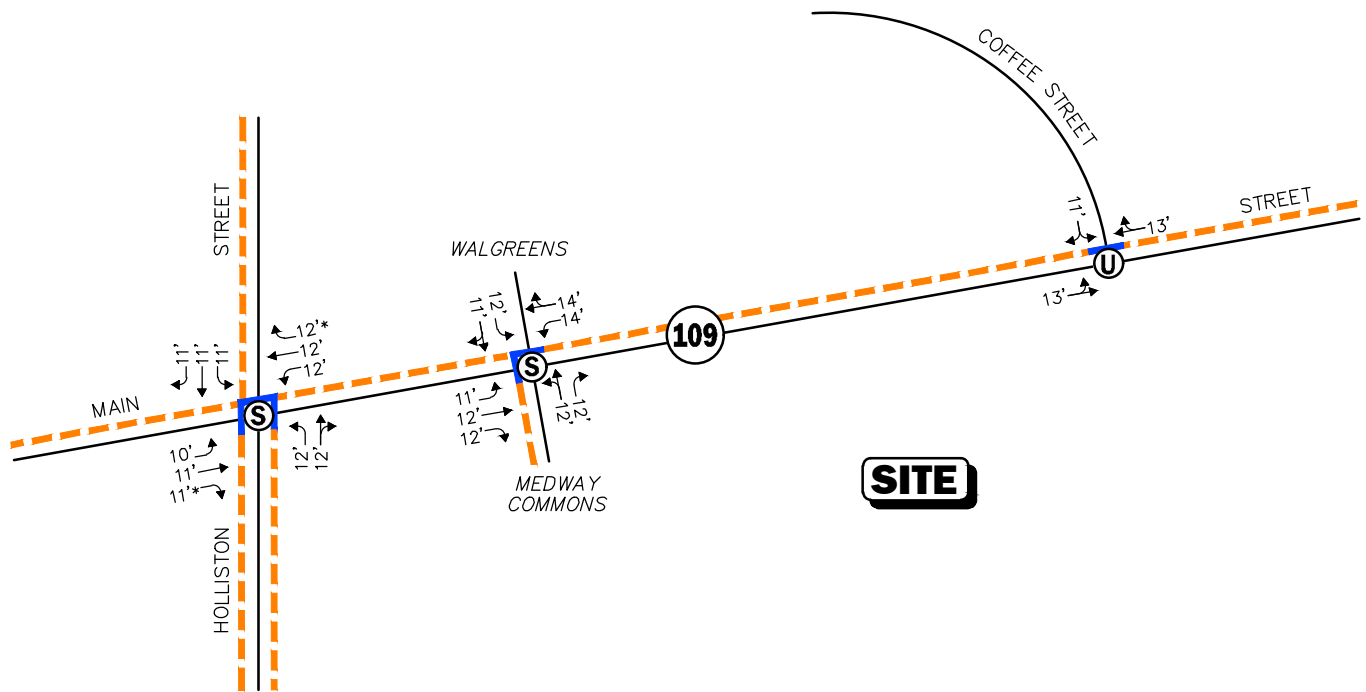
<b>Intersection</b>	<b>Traffic Control Type<sup>a</sup></b>	<b>No. of Travel Lanes Provided</b>	<b>Shoulder Provided? (Yes/No/Width)</b>	<b>Pedestrian Accommodations? (Yes/No/Description)</b>	<b>Bicycle Accommodations? (Yes/No/Description)</b>
Main St./ Holliston St. (currently under construction)	TS	1 left-turn lane, 1 through lane and 1 channelized right-turn lane on Main St. approaches; 1 left-turn and 1 general-purpose travel lane on Holliston St. northbound; 1 left-turn lane, 1 through lane and 1 right-turn lane on Holliston St. southbound	Yes – 1 to 2.5-feet on all approaches	Yes – Sidewalks along both sides of Holliston St. and the north side of Main St.; crosswalks for crossing north, east and west legs of intersection; pedestrian traffic signal equipment and phasing provided	Yes <sup>b</sup> – Shared traveled-way
Main St./Medway Commons/ Walgreens Dwy.	TS	1 left-turn lane, 1 through lane and 1 right-turn lane on Main St. eastbound; 1 left-turn lane and 1 general-purpose lane on Main St. westbound; 1 left/through lane and 1 right-turn lane on Medway Commons dwy.; 1 left-turn lane and 1 general-purpose lane on Walgreens dwy.	Yes – 2 to 3-feet on Main St.	Yes – Sidewalks along north side of Main St. and the east side of Medway Commons dwy.; crosswalks for crossing the north and west legs of intersection; pedestrian traffic signal equipment and phasing provided	Yes – Shared traveled-way on Main St.
Main St./ Coffee St.	S	1 per direction on all approaches	Yes – 6-7-feet on Main St. and 1-foot on Coffee St.	Yes – Sidewalk along the north side of Main St.; crosswalk for crossing Coffee St.	Yes – Shared traveled way on Main St.

<sup>a</sup>TS = traffic signal control; F = flashing signal/beacon; S = STOP-sign control; NC = no control present.

<sup>b</sup>Combined shoulder and travel lane width equal to or exceed 14 feet.

**Legend:**

- Ⓢ Signalized Intersection
- Ⓤ Unsignalized Intersection
- Sidewalk
- Crosswalk
- xx' Lane Use and Travel Lane Width
- \*xx' Channelized Right-Turn



Not To Scale



**Vanasse & Associates, Inc.**  
Transportation Engineers & Planners

**Figure 2**

**Existing Intersection Lane Use,  
Travel Lane Width and  
Pedestrian Facilities**

## **EXISTING TRAFFIC VOLUMES**

In order to determine existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts, manual turning movement counts (TMCs) and vehicle classification counts were completed in October 2018 while public schools were in regular session. The ATR counts were conducted on Main Street in the vicinity of the Project site over a continuous 48-hour period from October 2, 2018 (Tuesday) through October 3, 2018 (Wednesday) in order to record weekday traffic conditions along this roadway over an extended period, with weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period manual TMCs performed at the Main Street/Medway Commons/Walgreens Pharmacy driveway and Main Street/Coffee Street intersections on October 2, 2018 (Tuesday). Traffic counts were not conducted at the Main Street/Holliston Street intersection due to on-going construction at this location. The traffic count time periods were selected for analysis purposes as they are representative of the peak-traffic-volume hours for both the Project and the adjacent roadway network.

### **Traffic-Volume Adjustments**

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, traffic volume data from MassDOT Continuous Count Station No. 6213 located on Main Street at the Medway/Millis town line were reviewed.<sup>4</sup> Based on a review of this data, it was determined that traffic volumes for the month of October are approximately 4.1 percent below average-month conditions and, therefore, the October traffic count data was adjusted upward to average-month conditions.

In order to assess the impact on traffic volumes within the study area resulting from construction activities associated with the Main Street improvement project, the seasonally adjusted 2018 traffic volumes were compared to the 2011 traffic volume data that was presented in the September 2011 Functional Design Report (FDR) prepared for the reconstruction of Route 109 (Main Street).<sup>5</sup> Table 2 summarizes and compares the weekday morning and evening peak-hour traffic volumes at the Main Street/Medway Commons/Walgreens Pharmacy driveway intersection as collected in 2018 to the data that was presented in the 2011 FDR and adjusted to average-month conditions.

**Table 2**  
**TRAFFIC VOLUME SUMMARY AND COMPARISON - 2018 VS. 2011 DATA**

Traffic Count Location	(A)	(B)	(A-B) Difference
	Seasonally Adjusted 2018 Traffic Volumes <sup>a</sup>	2011 Traffic Volumes <sup>b</sup>	
Main Street/Medway Commons/ Walgreens Pharmacy Driveway	1,029/1,294	1,272/1523	-243/-229

<sup>a</sup>Average weekday morning/evening peak-hour traffic volume.

<sup>b</sup>Seasonally adjusted weekday morning/evening peak-hour traffic volume.

<sup>4</sup>MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2018.

<sup>5</sup>*Functional Design Report*; Reconstruction of Route 109; Greenman-Pedersen, Inc.; September 2011.



As can be seen in Table 2, traffic volumes at the Main Street/Medway Commons/Walgreens Pharmacy driveway intersection were shown to have experienced a general decline between 2011 and 2018, most likely due to the current roadway construction along Route 109. As such and in order to provide a conservative (high) analysis condition, a 0.5 percent per year compounded annual background traffic growth rate (discussion follows) was applied to the 2011 Existing weekday morning and evening traffic volume data that was presented in the September 2011 FDR to develop 2018 Existing peak-hour traffic volume conditions at the Main Street/Medway Commons/Walgreens Pharmacy driveway and Main Street/Holliston Street intersections. The seasonally adjusted October 2018 traffic volumes were used for the Main Street/Coffee Street intersection.

The 2018 Existing traffic volumes are summarized in Table 3, with the weekday morning and evening peak-hour traffic volumes graphically depicted on Figure 3. Note that the peak-hour traffic volumes presented in Table 3 were obtained from the aforementioned Figure.

**Table 3**  
**2018 EXISTING TRAFFIC VOLUMES**

Location	AWT <sup>a</sup>	Weekday Morning Peak-Hour (7:30 – 8:30 AM)			Weekday Evening Peak-Hour (4:30 – 5:30 PM)		
		VPH <sup>b</sup>	K Factor <sup>c</sup>	Directional Distribution	VPH	K Factor	Directional Distribution
Main Street, east of Coffee Street	14,950	971	6.5	62.6% EB	1,152	7.7	57.8% WB

<sup>a</sup>Average weekday traffic in vehicles per day.

<sup>b</sup>Vehicles per hour.

<sup>c</sup>Percent of daily traffic occurring during the peak-hour.

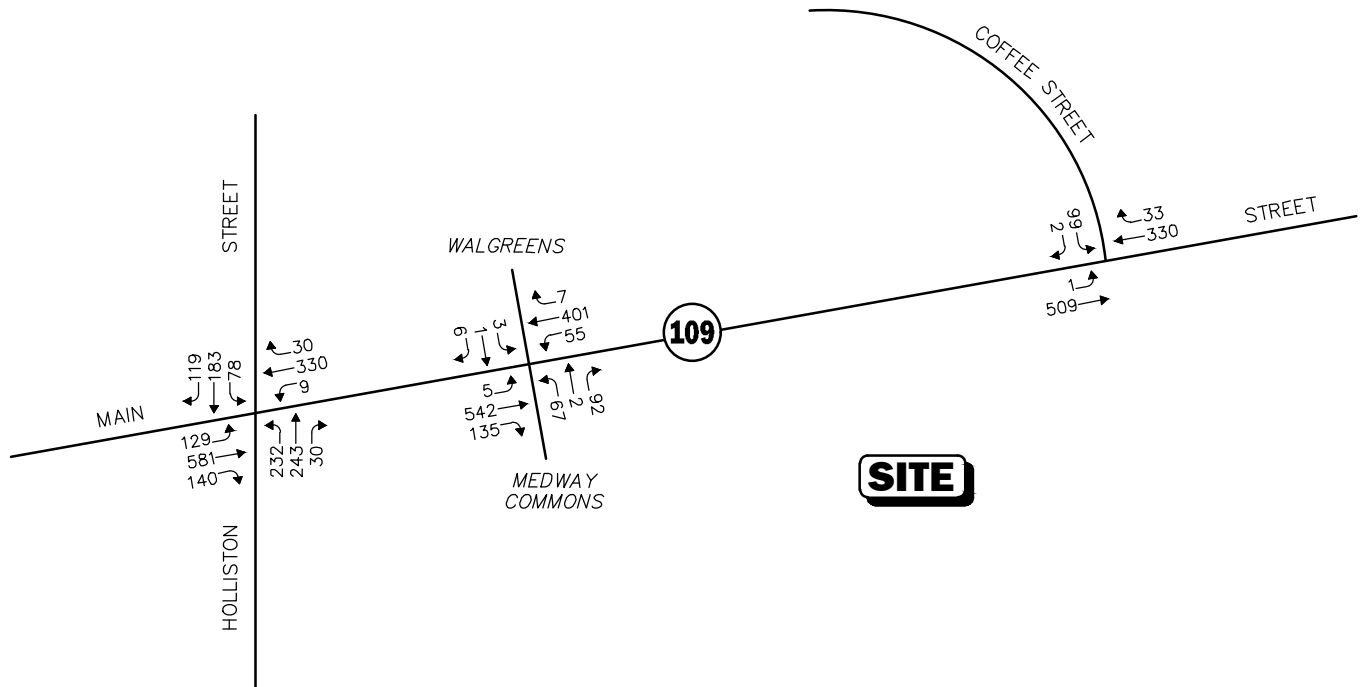
EB = eastbound; WB = westbound.

As can be seen in Table 3, Main Street in the vicinity of the Project site was found to accommodate approximately 14,950 vehicles on an average weekday (two-way, 24-hour volume), with approximately 971 vehicles per hour (vph) during the weekday morning peak-hour and 1,152 vph during the weekday evening peak-hour.

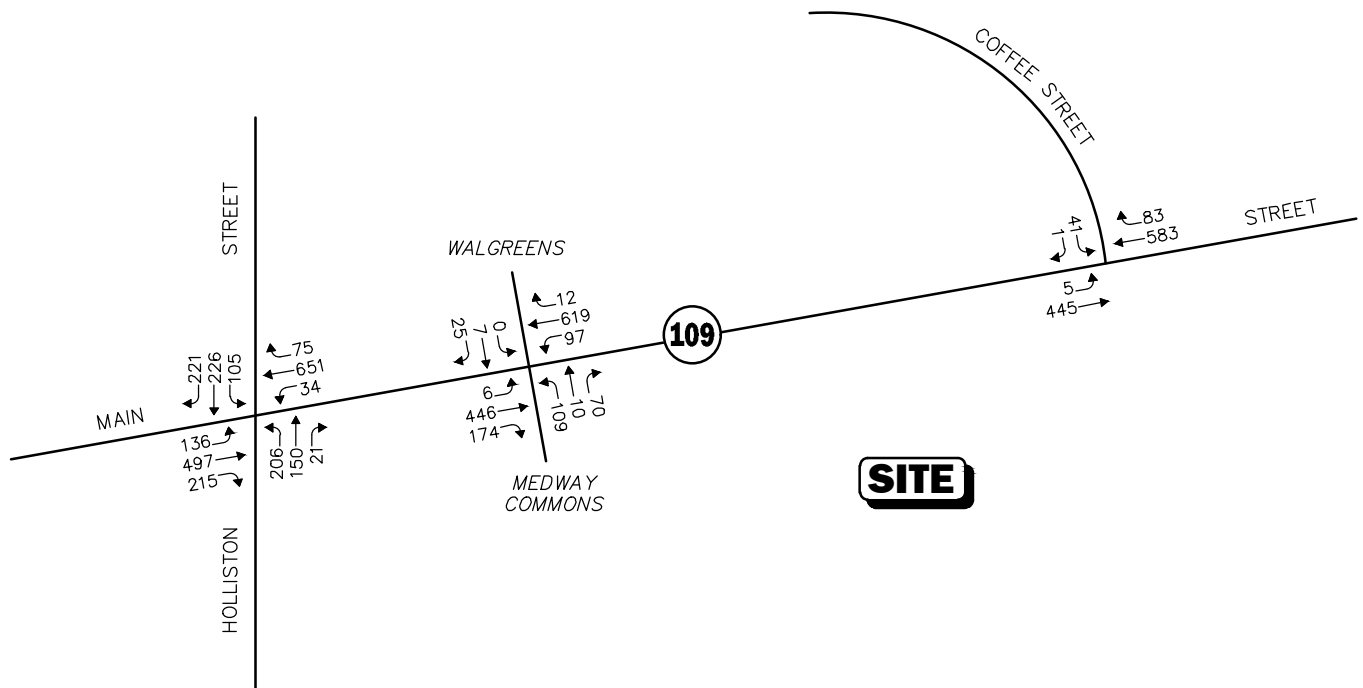
### **SPOT SPEED MEASUREMENTS**

Vehicle travel speed measurements were performed on Main Street in the vicinity of the Project site in conjunction with the ATR counts. Table 4 summarizes the vehicle travel speed measurements.

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 3



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2018 Existing  
Weekday  
Peak Hour Traffic Volumes

**Table 4**  
**VEHICLE TRAVEL SPEED MEASUREMENTS**

	Main Street, east of Coffee Street	
	Eastbound	Westbound
Mean Travel Speed (mph)	35	35
85 <sup>th</sup> Percentile Speed (mph)	41	41
Posted Speed Limit (mph)	35	35

mph = miles per hour.

As can be seen in Table 4, the mean vehicle travel speed along Main Street in the vicinity of the Project site was found to be approximately 35 mph in both directions. The measured 85<sup>th</sup> percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be approximately 41 mph in both directions, which is 6 mph above the posted speed limit of 35 mph. The 85<sup>th</sup> percentile speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

### **PEDESTRIAN AND BICYCLE FACILITIES**

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in September 2018. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities. As detailed on Figure 2, sidewalks are currently provided along the north side of Main Street; the west side of the Medway Commons driveway; and along the both sides of Holliston Street south of Main Street and along the west side for a short distance (approximately 400 feet) north of Main Street. Marked crosswalks are provided at the Main Street/Holliston Street (north, east and west legs), Main Street/Medway Commons/Walgreens Pharmacy driveway (north and west legs) and Main Street/Coffee Street (north leg) intersections. The traffic signal systems at the Main Street/Holliston Street and Main Street/Medway Commons/Walgreens Pharmacy driveway intersections include pedestrian traffic signal equipment (pushbuttons and signal indications) and phasing.

### **PUBLIC TRANSPORTATION**

Public transportation services are provided to the Town of Medway by the Greater Attleboro Taunton Regional Transit Authority (GATRA) (fixed-route bus service) by way of the Medway T Shuttle which provides service to Norfolk Station on the Franklin Line of the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system. The shuttle operates during the weekday morning and evening peak commuter periods (5:55 to 8:00 AM and 5:00 to 7:00 PM) and includes a stop at the Medway Middle School located at 45 Holliston Street, an approximate a 5-minute driving distance from the Project site. GATRA

also operates Paratransit Services for seniors, the disabled and passengers who meet Americans with Disabilities Act (ADA) requirements located within a  $\frac{3}{4}$  mile radius of a fixed route bus service corridor.

The public transportation schedules and fare information are provided in the Appendix.

### **MOTOR VEHICLE CRASH DATA**

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2012 through 2016, inclusive) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, severity, roadway and weather conditions and day of occurrence, and presented in Table 5.

As can be seen in Table 5, the study area intersections experienced an average of approximately four (4) or fewer reported motor vehicle crashes per year over the five-year review period and were found to have motor vehicle crash rates that were below both the MassDOT statewide and District averages for a signalized or unsignalized intersection, as appropriate, for the MassDOT Highway Division District in which the intersections are located (District 3).

A review of the MassDOT statewide High Crash Location List indicated that the Main Street/Medway Commons/Walgreens Pharmacy driveway intersection is included on MassDOT's Highway Safety Improvement Program (HSIP) listing as high crash cluster location for 2013-2015. MassDOT defines a HSIP eligible cluster as: *"...a cluster in which the total number of 'equivalent property damage only' crashes is within the top 5 percent of all clusters in that region. 'Equivalent property damage only' is a method of combining the number of crashes with the severity of crashes based on a weighted scale where a fatal crash is worth 10, an injury crash is worth 5 and a property damage only crash is worth 1."* Designation as a HSIP location allows for MassDOT to prioritize funding for safety-related improvements in a specific region of the state. Specific recommendations to advance safety-related improvements at this intersection have been identified and are detailed in the *Recommendations* section of this assessment.

No fatal motor vehicle crashes were reported to have occurred at the study area intersections over the five-year review period. The detailed MassDOT Crash Rate Worksheets and High Crash Location mapping are provided in the Appendix.

**Table 5**  
**MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

	Main Street/ Holliston Street	Main Street/ Medway Commons/ Walgreens Driveways	Main Street/ Coffee Street
Traffic Control Type: <sup>b</sup>	TS	TS	U
<i>Year:</i>			
2012	5	0	0
2013	4	1	0
2014	6	3	0
2015	2	4	1
<u>2016</u>	<u>4</u>	<u>4</u>	<u>0</u>
Total	21	12	1
Average	4.20	2.40	0.20
Rate <sup>c</sup>	0.42	0.39	0.04
MassDOT Crash Rate: <sup>d</sup>	0.78/0.89	0.78/0.89	0.57/0.61
Significant? <sup>e</sup>	No	No	No
<i>Type:</i>			
Angle	3	1	0
Rear-End	11	10	1
Head-On	0	0	0
Sideswipe	3	1	0
Fixed Object	0	0	0
Pedestrian/Bicycle	1	0	0
<u>Unknown/Other</u>	<u>3</u>	<u>0</u>	<u>0</u>
Total	21	12	1
<i>Conditions:</i>			
Clear	14	11	1
Cloudy	0	1	0
Rain	7	0	0
<u>Snow/Ice</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	12	1
<i>Lighting:</i>			
Daylight	14	12	1
Dawn/Dusk	0	0	0
Dark (Road Lit)	7	0	0
<u>Dark (Road Unlit)</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	12	1
<i>Day of Week:</i>			
Monday through Friday	19	8	1
Saturday	0	3	0
<u>Sunday</u>	<u>2</u>	<u>1</u>	<u>0</u>
Total	21	12	1
<i>Severity:</i>			
Property Damage Only	16	11	0
Personal Injury	5	1	1
<u>Fatality</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	21	12	1

<sup>a</sup>Source: MassDOT Safety Management/Traffic Operations Unit records, 2012 through 2016.

<sup>b</sup>Traffic Control Type: U = unsignalized; TS = traffic signal.

<sup>c</sup>Crash rate per million vehicles entering the intersection.

<sup>d</sup>Statewide/District crash rate.

<sup>e</sup>The intersection crash rate is significant if it is found to exceed the MassDOT statewide or District (District 3) crash rates.

## **FUTURE CONDITIONS**

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Traffic volumes in the study area were projected to the year 2025, which reflects a seven-year planning horizon consistent with MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. Independent of the Project, traffic volumes on the roadway network in the year 2025 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon the 2025 No-Build traffic volumes reflect 2025 Build traffic volume conditions with the Project.

### **FUTURE TRAFFIC GROWTH**

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic; however, potential population growth and development external to the study area would not be accounted for in the resulting traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

### **Specific Development by Others**

The Town of Medway Community & Economic Development Department and the Town of Millis Planning Board were contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following project was identified for inclusion in this assessment:

- ***Medical Marijuana Dispensary, 1525 Main Street, Millis Massachusetts.*** This project will entail the construction of a 6,800 square foot (sf) medical marijuana dispensary to be located at 1525 Main Street in Millis, Massachusetts.

Traffic volumes associated with the aforementioned specific development project by others were obtained by using trip-generation information available from the Institute of Transportation Engineers (ITE)<sup>6</sup> for the appropriate land use and were assigned onto the study area roadway network based on existing traffic patterns where no other information was available. No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

### **General Background Traffic Growth**

Traffic-volume data compiled by MassDOT from Continuous Count Station No. 6213 located on Route 109 at the Medway/Millis town line were reviewed. Based on a review of this data, it was determined that traffic volumes within the study area have generally increased by an average of approximately 0.2 percent per year over the past several years. A review of the September 2011 FDR that was prepared for the Route 109 reconstruction project<sup>7</sup> indicated that a 0.5 percent per year compounded annual background traffic growth rate was used to establish future traffic volume conditions within the study area. Consistent with the methodology that was used September 2011 FDR, a 0.5 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

### **Roadway Improvement Projects**

MassDOT and the Town of Medway were contacted in order to determine if there were any planned future roadway improvement projects expected to be complete by 2025 within the study area. Based on these discussions, the following roadway improvement project was identified:

- ***Reconstruction of Route 109 (Main Street) from Holliston Street to 100 feet west of Highland Street (MassDOT Project No. 605657)*** – This roadway improvement project is being undertaken by MassDOT and entails the reconstruction of Route 109 to include consolidating driveways; improving sidewalks, signs and street lighting; and streetscape improvements. In addition, the traffic signal systems at the Main Street/Holliston Street and Main Street/Franklin Street/Milford Street/Highland Street intersections will be upgraded, and an optimal traffic signal timing and coordination plan will be implemented at the Main Street/Medway Commons/Walgreens Pharmacy driveway. This project is currently under construction and is expected to be substantially complete in the spring of 2019, and, as such, is reflected in both the 2025 No-Build and 2025 Build condition analyses.

No other roadway improvement projects outside of routine maintenance activities were identified to be planned within the study area at this time.

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<sup>6</sup>Ibid 1.

<sup>7</sup>Ibid 5.

## **No-Build Traffic Volumes**

The 2025 No-Build condition peak-hour traffic-volumes were developed by applying the 0.5 percent per year compounded annual background traffic growth rate to the 2018 Existing peak-hour traffic volumes and then adding the peak-hour traffic volumes associated with the identified specific development project by others. The resulting 2025 No-Build weekday morning and evening peak-hour traffic volumes are shown on Figure 4.

## **PROJECT-GENERATED TRAFFIC**

Design year (2025 Build) traffic volumes for the study area roadways were determined by estimating Project-generated traffic volumes and assigning those volumes on the study roadways. The following sections describe the methodology used to develop the anticipated traffic characteristics of the Project.

As proposed, the Project will entail the construction of a 190-unit multifamily residential community. In order to develop the traffic characteristics of the Project, trip-generation statistics published by the ITE<sup>8</sup> for a similar land use as that proposed were used. ITE Land Use Code (LUC) 221, *Multifamily Housing (Mid-Rise)*, was used to develop the traffic characteristics of the Project, the results of which are summarized in Table 6.

**Table 6**  
**TRIP GENERATION SUMMARY**

Time Period/Direction	Vehicle Trips
	Proposed Residential Community (190 Units) <sup>a</sup>
<i>Average Weekday Daily:</i>	
Entering	517
<u>Exiting</u>	<u>517</u>
Total	1,034
<i>Weekday Morning Peak Hour:</i>	
Entering	17
<u>Exiting</u>	<u>47</u>
Total	64
<i>Weekday Evening Peak Hour:</i>	
Entering	50
<u>Exiting</u>	<u>32</u>
Total	82

<sup>a</sup>Based on ITE LUC 221, *Multifamily Housing (Mid-Rise)*.

<sup>8</sup>Ibid 1.





### 2025 No-Build Weekday Peak Hour Traffic Volumes

## **Project-Generated Traffic Volume Summary**

As can be seen in Table 6, the Project is expected to generate approximately 1,034 vehicle trips on an average weekday (two-way, 24-hour volume, or 517 vehicles entering and 517 exiting), with 64 vehicle trips (17 vehicles entering and 47 exiting) expected during the weekday morning peak-hour and 82 vehicle trips (50 vehicles entering and 32 exiting) expected during the weekday evening peak-hour.

## **TRIP DISTRIBUTION AND ASSIGNMENT**

The directional distribution of generated trips to and from the Project site was determined based on a review of Journey-to-Work data obtained from the U.S. Census for persons residing in the Town of Medway, and then refined based on existing traffic patterns within the study area during the commuter peak periods. This methodology is consistent with the residential nature of the Project and commuter traffic patterns during the peak hours. The general trip distribution for the Project is graphically depicted on Figure 5. The additional traffic expected to be generated by the Project was assigned on the study area roadway network as shown on Figure 6.

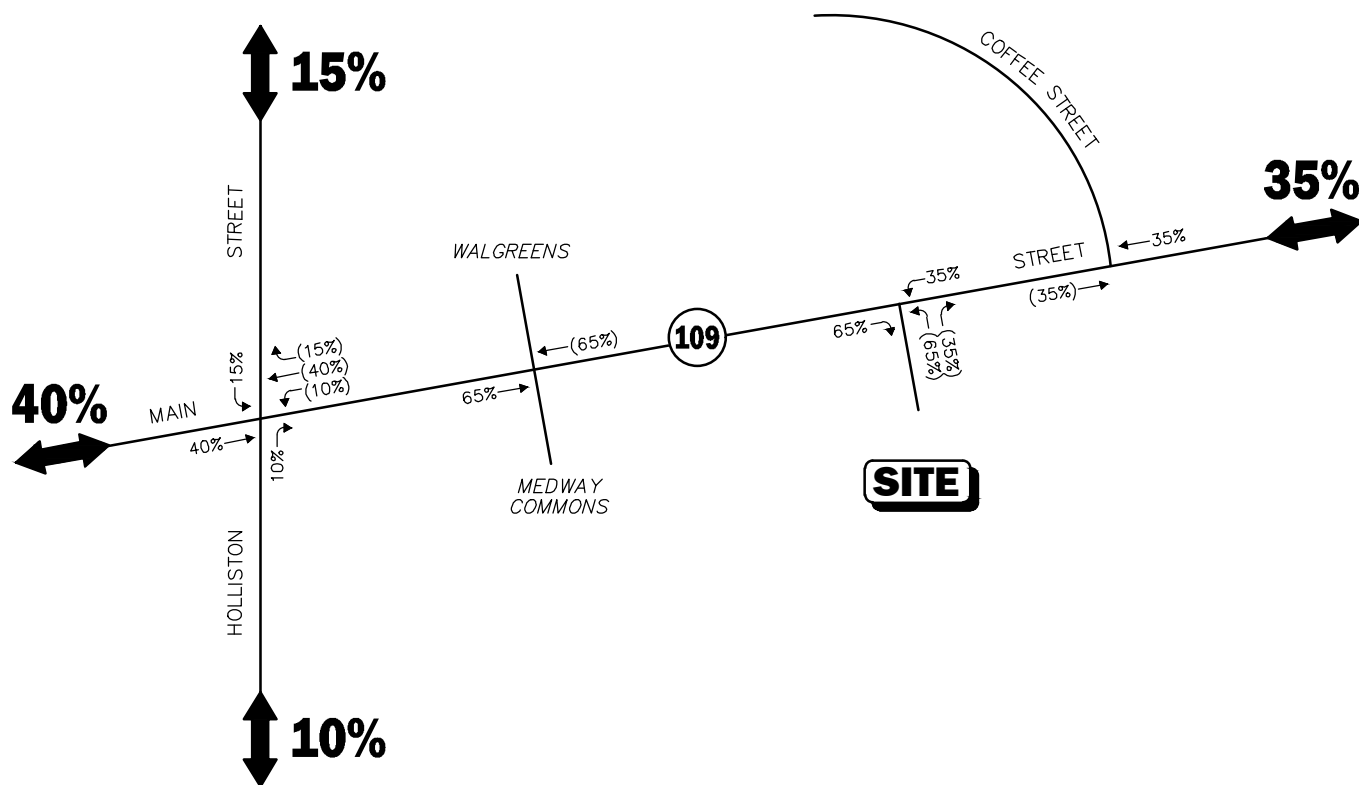
## **FUTURE TRAFFIC VOLUMES - BUILD CONDITION**

The 2025 Build condition traffic volumes were developed by adding the traffic expected to be generated by the Project to the 2025 No-Build traffic volumes. The resulting 2025 Build peak-hour traffic-volumes are graphically depicted on Figure 7.

A summary of peak-hour projected traffic-volume increases outside of the study area that is the subject of this assessment is shown in Table 7. These volumes are based on the expected increases from the Project.

**Legend:**

XX Entering Trips  
(XX) Exiting Trips



Not To Scale



**Vanasse & Associates, Inc.**  
Transportation Engineers & Planners

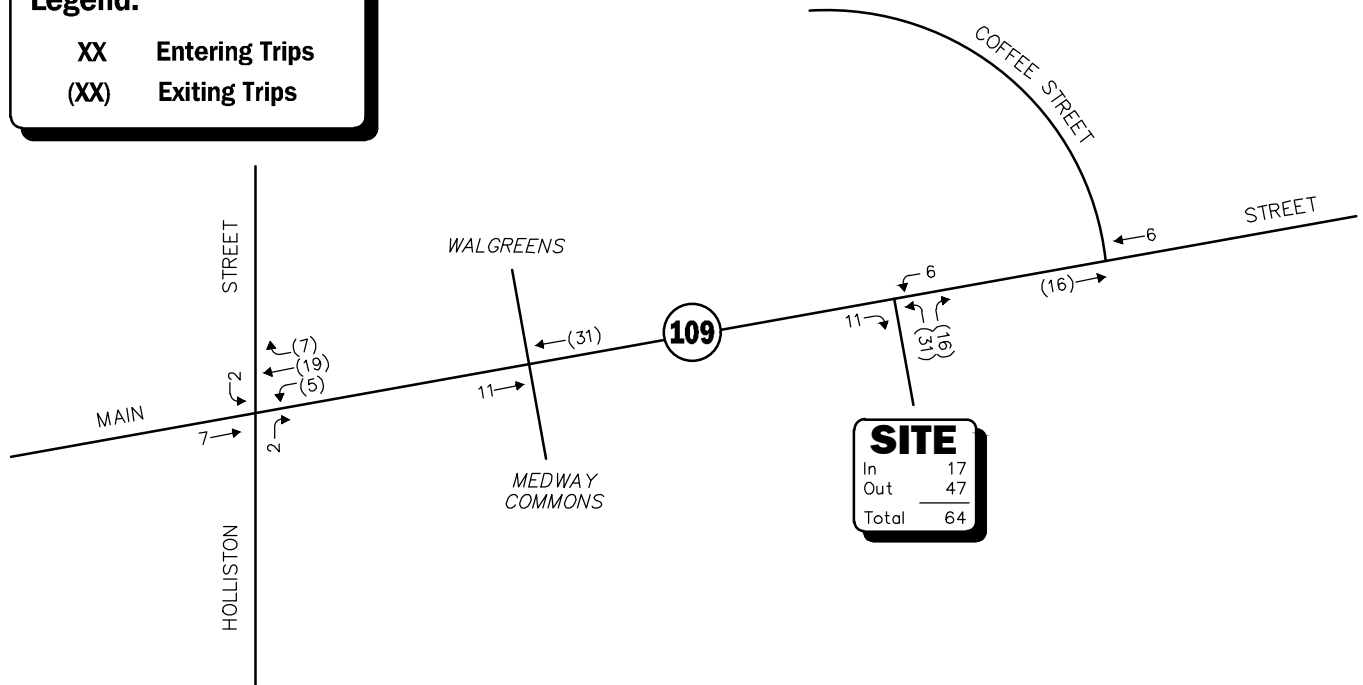
**Figure 5**

**Trip Distribution Map**

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)

Legend:

XX Entering Trips  
(XX) Exiting Trips



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)

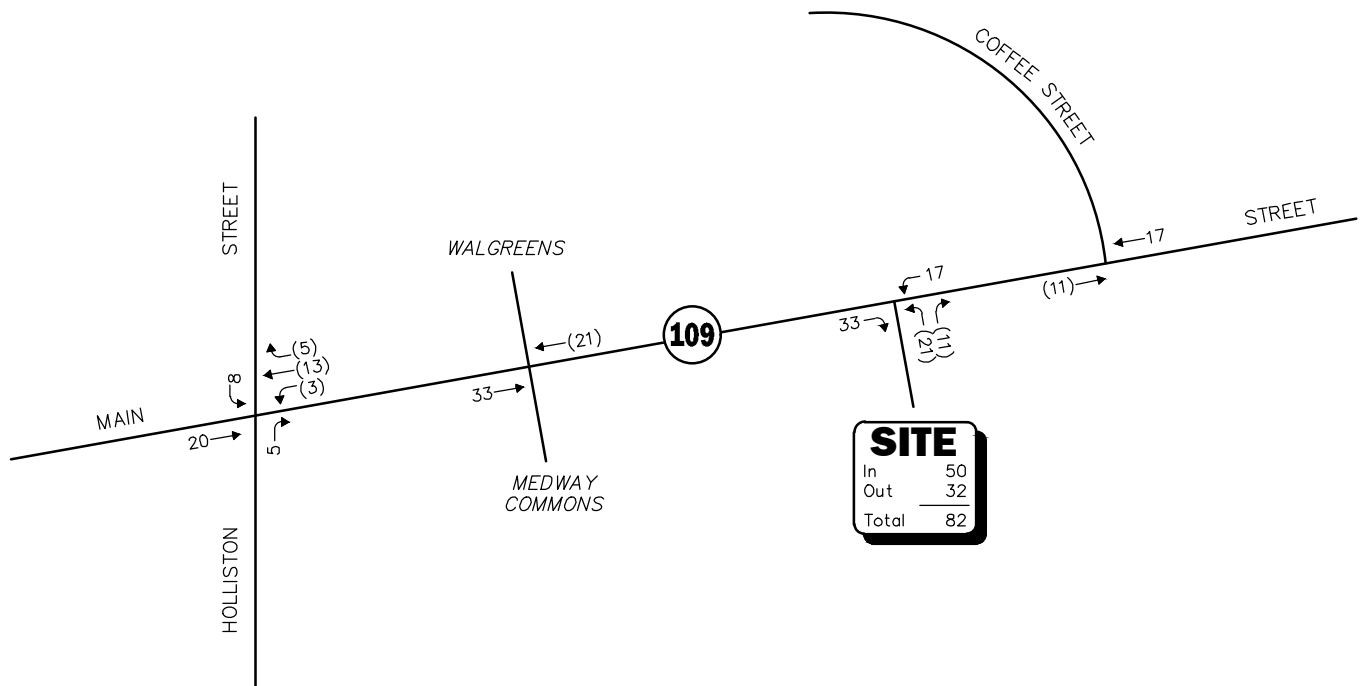
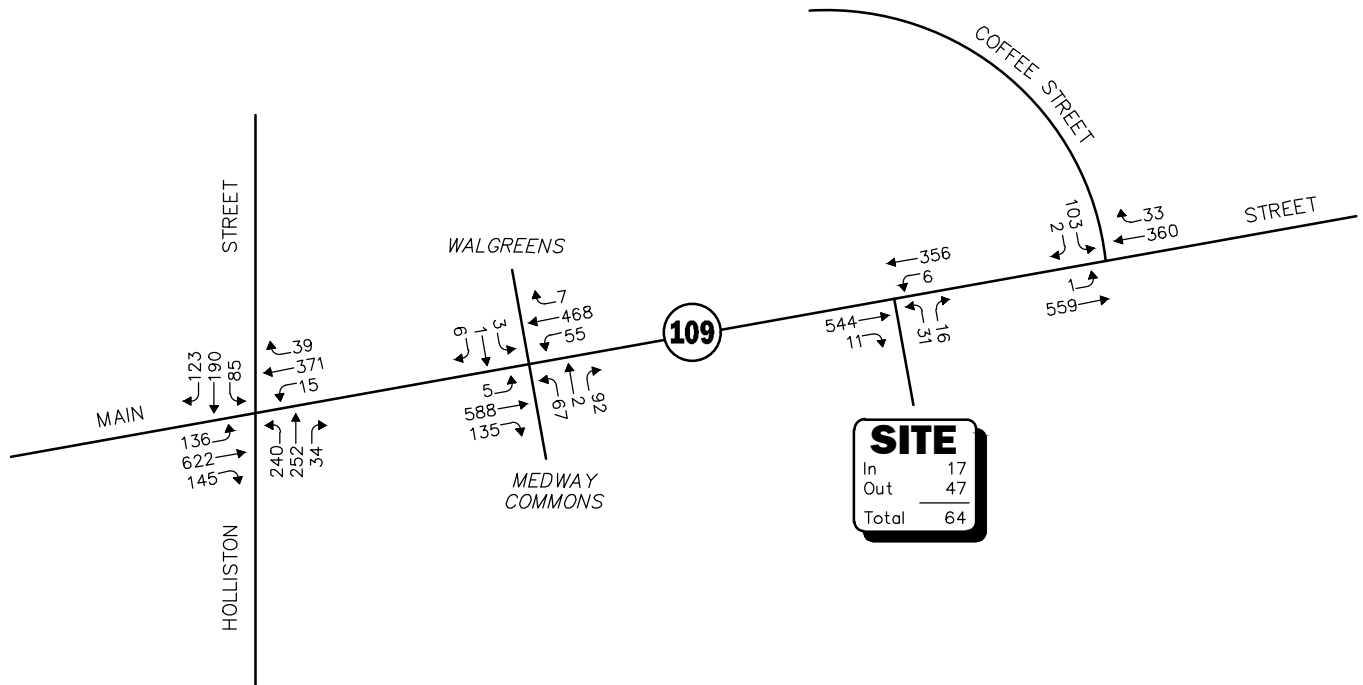


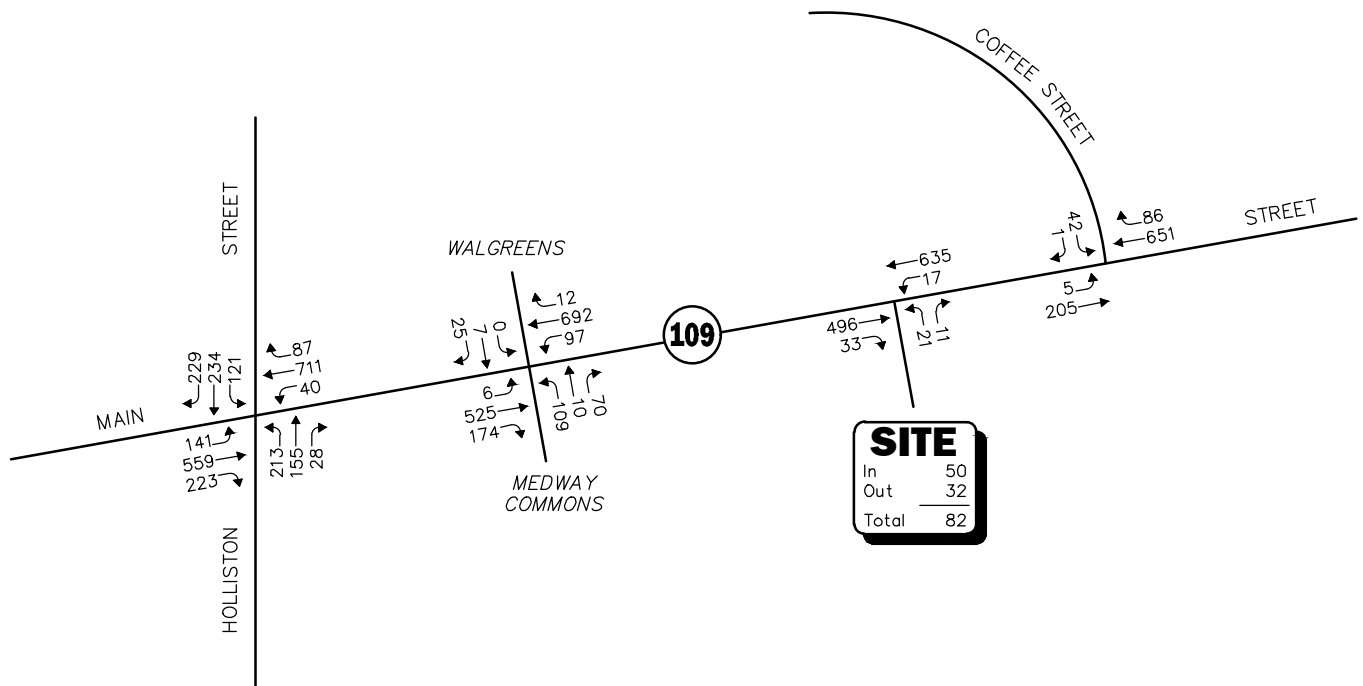
Figure 6

Project-Generated  
Weekday  
Peak Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 7



Vanasse & Associates, Inc.  
Transportation Engineers & Planners

2025 Build  
Weekday  
Peak Hour Traffic Volumes

**Table 7**  
**PEAK-HOUR TRAFFIC-VOLUME INCREASES**

Location/Peak Hour	2018 Existing	2025 No-Build	2025 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Main Street, east of Coffee Street:</i>					
Weekday Morning	971	1,034	1,056	22	2.1
Weekday Evening	1,152	1,253	1,281	28	2.2
<i>Main Street, west of Holliston Street:</i>					
Weekday Morning	1,531	1,611	1,637	26	1.6
Weekday Evening	1,926	2,043	2,076	33	1.6
<i>Holliston Street, north of Main Street:</i>					
Weekday Morning	782	816	825	9	1.1
Weekday Evening	913	954	967	13	1.4
<i>Holliston Street, south of Main Street:</i>					
Weekday Morning	837	869	876	7	0.8
Weekday Evening	852	885	893	8	0.9

As shown in Table 7, Project-related traffic-volume increases outside of the study area relative to 2025 No-Build conditions are anticipated to range from 0.8 to 2.2 percent during the peak periods, with vehicle increases shown to range from 7 to 33 vehicles. ***When dispersed over the peak-hour, such increases would not result in a significant impact (increase) on motorist delays or vehicle queuing outside of the immediate study area that is the subject of this assessment.***

## **TRAFFIC OPERATIONS ANALYSIS**

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Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build and Build traffic volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

### **METHODOLOGY**

#### **Levels of Service**

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.<sup>9</sup> The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

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<sup>9</sup>The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

## **Signalized Intersections**

The six levels of service for signalized intersections may be described as follows:

- *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than *LOS A*.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2000 Highway Capacity Manual and implemented as a part of the Synchro® 10 software. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 8 summarizes the relationship between level of service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.



**Table 8**  
**LEVEL-OF-SERVICE CRITERIA**  
**FOR SIGNALIZED INTERSECTIONS**

Level of Service	Control (Signal) Delay per Vehicle (Seconds)
A	$\leq 10.0$
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	$> 80.0$

<sup>a</sup>Source: *Highway Capacity Manual*, Transportation Research Board; Washington, DC; 2000; page 16-2.

### **Unsignalized Intersections**

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2010 *Highway Capacity Manual*.<sup>10</sup> Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the 2010 *Highway Capacity Manual*. Table 9 summarizes the relationship between level of service and average control delay for two-way stop controlled and all-way stop controlled intersections.

<sup>10</sup>*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

**Table 9**  
**LEVEL-OF-SERVICE CRITERIA FOR**  
**UNSIGNALIZED INTERSECTIONS<sup>a</sup>**

Level-of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	$\leq 10.0$
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	$> 50.0$

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010; page 19-2.

### **Vehicle Queue Analysis**

Vehicle queue analyses are a direct measurement of an intersection's ability to process vehicles under various traffic control and volume scenarios and lane use arrangements. The vehicle queue analysis was performed using the Synchro® intersection capacity analysis software which is based upon the methodology and procedures presented in the 2010 *Highway Capacity Manual*. The Synchro® vehicle queue analysis methodology is a simulation based model which reports the number of vehicles that experience a delay of six seconds or more at an intersection. For signalized intersections, Synchro® reports both the average (50<sup>th</sup> percentile) the 95<sup>th</sup> percentile vehicle queue. For unsignalized intersections, Synchro® reports the 95<sup>th</sup> percentile vehicle queue. Vehicle queue lengths are a function of the capacity of the movement under study and the volume of traffic being processed by the intersection during the analysis period. The 95<sup>th</sup> percentile vehicle queue is the vehicle queue length that will be exceeded only 5 percent of the time, or approximately three minutes out of 60 minutes during the peak one hour of the day (during the remaining 57 minutes, the vehicle queue length will be less than the 95<sup>th</sup> percentile queue length).

### **ANALYSIS RESULTS**

Level-of-service and vehicle queue analyses were conducted for 2018 Existing, 2025 No-Build and 2025 Build conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized in Tables 10 and 11. The detailed analysis results are presented in the Appendix.

The following is a summary of the level-of-service and vehicle queue analyses for the intersections within the study area. For context, a LOS of "D" or better is generally defined as "acceptable" operating conditions.

### **Signalized Intersections**

***Main Street/Holliston Street*** – With the reconstruction of the traffic signal system and implementation of an optimal traffic signal timing and coordination plan as a part of the Main Street improvement project, no change in overall LOS is predicted to occur over No-Build conditions, with Project-related impacts defined as an increase in average motorist delay of up to 1.8 seconds and in vehicle queuing of approximately one (1) vehicle. The addition of Project-related traffic to the Holliston Street northbound through/right movement is predicted to result in an increase in average motorist delay of 0.2 seconds that was shown to cause a slight degradation in LOS from LOS C to LOS D during the weekday morning peak-hour with no associated increase in vehicle queuing.

***Main Street/Medway Commons and Walgreens Driveways*** – With the implementation of an optimal traffic signal timing and coordination plan as a part of the Main Street improvement project, no change in overall LOS is predicted to occur over No-Build conditions, with Project-related impacts defined as an increase in average motorist delay of less than 1.0 seconds and in vehicle queuing of up to one (1) vehicle.

### **Unsignalized Intersections**

***Main Street/Coffee Street*** – The addition of Project-related traffic was shown to result in a change in LOS for the Coffee Street approach from LOS C to LOS D during the weekday morning peak-hour as a result of an increase in average motorist delay of less than 1.0 seconds with no associated increase in vehicle queuing.

***Main Street/Project Site Driveway*** – All movements exiting the Project site driveway were shown to operate at LOS C during both the weekday morning and evening peak hours, with a predicted vehicle queue of up to one (1) vehicle. All movements along Main Street approaching the Project site driveway were shown to operate at LOS A during the peak hours with negligible vehicle queuing.

**Table 10**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-hour/Movement	2018 Existing				2025 No-Build				2025 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Main Street at Holliston Street</b>												
<i>Weekday Morning:</i>												
Main Street EB LT	0.68	46.3	D	3/7	0.71	48.4	D	4/7	0.71	48.4	D	4/7
Main Street EB TH	0.75	26.8	C	10/21	0.80	29.7	C	11/23	0.81	30.3	C	11/24
Main Street EB RT	0.09	0.1	A	0/0	0.09	0.1	A	0/0	0.09	0.1	A	0/0
Main Street WB LT	0.14	51.0	D	0/1	0.15	51.1	D	1/1	0.22	52.4	D	1/1
Main Street WB TH	0.51	21.3	C	6/7	0.56	23.0	C	6/8	0.59	23.7	C	6/8
Main Street WB RT	0.02	0.0	A	0/0	0.02	0.0	A	0/0	0.02	0.0	A	0/0
Holliston Street NB LT	0.99	>80.0	F	6/12	0.88	62.1	E	6/12	0.88	62.1	E	6/12
Holliston Street NB TH/RT	0.71	37.9	D	7/12	0.68	34.9	C	7/12	0.68	35.1	D	7/12
Holliston Street SB LT	0.50	40.6	D	2/4	0.59	45.0	D	2/4	0.60	45.9	D	2/4
Holliston Street SB TH	0.61	37.5	D	4/7	0.69	41.5	D	5/8	0.69	41.5	D	5/8
Holliston Street SB RT	0.08	23.7	C	0/2	0.09	24.4	C	0/2	0.09	24.4	C	0/2
<b>Overall</b>	--	<b>34.7</b>	<b>C</b>	--	--	<b>33.0</b>	<b>C</b>	--	--	<b>33.2</b>	<b>C</b>	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.71	48.4	D	4/7	0.73	50.5	D	4/7	0.73	50.5	D	4/7
Main Street EB TH	0.69	26.0	C	10/16	0.73	27.0	C	12/19	0.76	28.2	C	12/20
Main Street EB RT	0.14	0.2	A	0/0	0.14	0.2	A	0/0	0.14	0.2	A	0/0
Main Street WB LT	0.27	45.9	D	1/2	0.29	46.2	D	1/2	0.31	46.5	D	1/2
Main Street WB TH	1.00	56.5	E	16/25	1.04	67.7	E	19/28	1.06	73.8	E	20/28
Main Street WB RT	0.05	0.0	A	0/0	0.05	0.1	A	0/0	0.06	0.1	A	0/0
Holliston Street NB LT	0.88	64.8	E	5/11	0.91	70.9	E	6/11	0.91	70.9	E	6/11
Holliston Street NB TH/RT	0.48	32.3	C	4/7	0.57	35.9	D	4/7	0.59	36.6	D	4/7
Holliston Street SB LT	0.60	43.1	D	3/5	0.56	40.2	D	3/5	0.59	41.1	D	3/5
Holliston Street SB TH	0.78	47.6	D	6/11	0.86	57.6	E	6/11	0.86	57.6	E	6/11
Holliston Street SB RT	0.38	26.6	C	2/5	0.42	27.7	C	3/6	0.42	27.7	C	3/6
<b>Overall</b>	--	<b>38.6</b>	<b>D</b>	--	--	<b>43.4</b>	<b>D</b>	--	--	<b>45.2</b>	<b>D</b>	--

See notes at end of table.

Table 10 (Continues)

## SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak-hour/Movement	2018 Existing				2025 No-Build				2025 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Main Street at the Medway Commons and Walgreens</b>												
<b>Driveways</b>												
<i>Weekday Morning:</i>												
Main Street EB LT	0.08	46.0	D	0/0	0.08	46.1	D	0/0	0.08	46.1	D	0/0
Main Street EB TH	0.48	4.0	A	3/3	0.51	4.1	A	3/3	0.52	4.1	A	3/4
Main Street EB RT	0.10	1.5	A	0/0	0.10	1.5	A	0/0	0.10	1.5	A	0/0
Main Street WB LT	0.33	39.1	D	2/3	0.33	39.1	D	2/3	0.33	39.1	D	2/3
Main Street WB TH/RT	0.31	5.3	A	3/7	0.34	5.5	A	3/8	0.36	5.7	A	3/8
Medway Commons Driveway NB LT/TH	0.48	39.5	D	2/4	0.48	39.5	D	2/4	0.48	39.5	D	2/5
Medway Commons Driveway NB RT	0.06	35.5	D	0/2	0.06	35.5	D	0/2	0.06	35.5	D	0/2
Walgreens Driveway SB LT	0.02	35.2	D	0/1	0.02	35.2	D	0/1	0.02	35.2	D	0/1
Walgreens Driveway SB TH/RT	0.01	35.2	D	0/1	0.01	35.2	D	0/1	0.01	35.2	D	0/1
<b>Overall</b>	--	<b>10.1</b>	<b>B</b>	--	--	<b>9.9</b>	<b>A</b>	--	--	<b>9.9</b>	<b>A</b>	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.12	34.6	C	0/1	0.12	34.6	C	0/1	0.12	34.6	C	0/1
Main Street EB TH	0.45	11.5	B	4/9	0.50	12.5	B	5/9	0.53	13.1	B	6/10
Main Street EB RT	0.13	13.9	B	0/2	0.14	14.4	B	1/2	0.15	14.4	B	1/2
Main Street WB LT	0.47	38.7	D	2/4	0.47	38.7	D	2/4	0.47	38.7	D	2/4
Main Street WB TH/RT	0.52	9.4	A	5/14	0.57	10.0	B	6/16	0.58	10.3	B	6/17
Medway Commons Driveway NB LT/TH	0.57	37.6	D	3/5	0.57	37.6	D	3/5	0.57	37.6	D	3/5
Medway Commons Driveway NB RT	0.05	31.3	C	0/1	0.05	31.3	C	0/1	0.05	31.3	C	0/1
Walgreens Driveway SB LT	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0
Walgreens Driveway SB TH/RT	0.05	31.3	C	0/1	0.05	31.3	C	0/1	0.05	31.3	C	0/1
<b>Overall</b>	--	<b>15.9</b>	<b>B</b>	--	--	<b>16.2</b>	<b>B</b>	--	--	<b>16.4</b>	<b>B</b>	--

<sup>a</sup>Volume-to-capacity ratio.<sup>b</sup>Control (signal) delay per vehicle in seconds.<sup>c</sup>Level-of-Service.<sup>d</sup>Queue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

**Table 11**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/ Peak Hour/Movement	2018 Existing				2025 No-Build				2025 Build			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>
<b>Main Street at Coffee Street</b>												
<i>Weekday Morning:</i>												
Main Street EB LT/TH	510	0.0	A	0	544	0.0	A	0	560	0.0	A	0
Main Street WB TH/RT	363	0.0	A	0	388	0.0	A	0	393	0.0	A	0
Coffee Street SB LT/RT	101	22.0	C	2	105	24.6	C	2	105	25.5	D	2
<i>Weekday Evening:</i>												
Main Street EB LT/TH	450	0.1	A	0	496	0.1	A	0	507	0.1	A	0
Main Street WB TH/RT	666	0.0	A	0	720	0.0	A	0	737	0.0	A	0
Coffee Street SB LT/RT	42	26.2	D	1	43	30.7	D	1	43	32.5	D	1
<b>Main Street at the Project Site Driveway</b>												
<i>Weekday Morning:</i>												
Project Site Driveway NB LT/RT	--	--	--	--	--	--	--	--	47	18.4	C	1
Main Street EB TH/RT	--	--	--	--	--	--	--	--	555	0.0	A	0
Main Street WB LT/TH	--	--	--	--	--	--	--	--	362	0.1	A	0
<i>Weekday Evening:</i>												
Project Site Driveway NB LT/RT	--	--	--	--	--	--	--	--	32	23.4	C	1
Main Street EB TH/RT	--	--	--	--	--	--	--	--	529	0.0	A	0
Main Street WB LT/TH	--	--	--	--	--	--	--	--	652	0.2	A	0

<sup>a</sup>Demand in vehicles per hour.

<sup>b</sup>Average control delay per vehicle (in seconds).

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

## SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the Project site driveway intersection with Main Street in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)<sup>11</sup> requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 12 presents the measured SSD and ISD at the subject intersection.

**Table 12**  
**SIGHT DISTANCE MEASUREMENTS<sup>a</sup>**

Intersection/Sight Distance Measurement	Feet		
	Recommended Minimum (SSD)	Desirable (ISD) <sup>b</sup>	Measured
<b>Main Street at the Project Site Driveway</b>			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	360	--	600+
Main Street approaching from the west	360	--	600+
<i>Intersection Sight Distance:</i>			
Looking to the east from the Project Site Driveway	360	430/500	600+
Looking to the west from the Project Site Driveway	360	430/500	600+

<sup>a</sup>Recommended minimum values obtained from: *A Policy on Geometric Design of Highways and Streets*, 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on an approach speed of 45 mph along Main Street.

<sup>b</sup>Value shown is the intersection sight distance for a vehicle turning right/left exiting a roadway or driveway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.

<sup>11</sup>*A Policy on Geometric Design of Highway and Streets*, 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.

As can be seen in Table 12, the available lines of sight at the Project site driveway intersection with Main Street were found to exceed the recommended minimum sight distance for safe (SSD) and efficient (ISD) operation based on a 45 mph approach speed along Main Street, which is slightly above the measured 85<sup>th</sup> percentile vehicle travel speed along this section of Main Street (41 mph) and 10 mph above the posted speed limit (35 mph).



## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

VAI has completed a detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed construction of a 190-unit multifamily residential community to be located at 39 Main Street (Route 109) in Medway, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the ITE<sup>12</sup>, the Project is expected to generate approximately 1,034 vehicle trips on an average weekday (two-way, 24-hour volume), with 64 vehicle trips expected during the weekday morning peak-hour and 82 vehicle trips expected during the weekday evening peak-hour;
2. The Project will not have a significant impact (increase) on motorist delays or vehicle queuing over Existing or anticipated future conditions without the Project (No-Build conditions), with only minor changes in LOS predicted to occur as a result of the addition of Project-related traffic and the majority of the movements at the study intersections shown to operate at LOS D or better under all analysis conditions where an LOS of “D” or better is defined as “acceptable” operating conditions;
3. All movements exiting the Project site driveway intersection with Main Street are expected to operate at LOS C during the peak hours with vehicle queueing of up to one (1) vehicle;
4. A review of the MassDOT statewide High Crash Location List indicated that the intersection of Main Street with the driveways to Medway Commons and the Walgreens Pharmacy is included on MassDOT’s Highway Safety Improvement Program (HSIP) listing as high crash cluster location for 2013-2015. Recommendations have been provided as a part of this assessment to advance safety-related improvements at this intersection (discussion follows); and

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<sup>12</sup>Ibid 1.

5. Lines of sight to and from the Project site driveway intersection with Main Street were found to exceed the recommended minimum sight distance for the intersection to function in a safe and efficient manner based on the measured travel speed approaching the intersection.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with implementation of the recommendations that follow.

## **RECOMMENDATIONS**

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

### **Project Access**

Access to the Project will be provided by way of a new driveway that will intersect the south side of Main Street approximately 100 feet west of Lee lane. Secondary access to Main Street and the Project site for emergency vehicles will be provided by a gated connection located across from Lee Lane. The following recommendations are offered with respect to Project access and internal circulation:

- The Project site driveway and internal circulating roadways should be a minimum of 24-feet in width or as required to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle as defined by the Medway Fire Department pursuant to the requirements of NFPA® 1.<sup>13</sup>
- To the extent that the driveway will be constructed as a boulevard-type drive, the drive should provide 20-foot wide entering and exiting travel lanes separated by a raised median that should be a minimum of 6-feet in width (46-foot wide minimum cross-section) unless otherwise approved by the Medway Fire Department.
- Emergency vehicle access drives and fire lanes, where provided, should be a minimum of 20-feet in width and constructed of bituminous concrete or other suitable material that can support travel by emergency vehicles under all weather conditions pursuant to the requirements of NFPA® 1 unless otherwise approved by the Medway Fire Department.
- A STOP-sign and marked STOP-line should be provided for vehicles exiting the Project site to Main Street.
- All signs and pavement markings to be installed within the Project site shall conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).<sup>14</sup>
- A sidewalk has been provided around the perimeter of the residential building and extends to Main Street.

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<sup>13</sup>Ibid 2.

<sup>14</sup>Ibid 3.

- Marked crosswalks with Americans with Disabilities Act (ADA) compliant wheelchair ramps should be provided at all proposed pedestrian crossings.
- A school bus waiting area should be provided at the Project site driveway intersection with Main Street.
- Signs and landscaping to be installed as a part of the Project within intersection sight triangle areas should be designed and maintained so as not to restrict lines of sight.
- Snow windrows within sight triangle areas shall be promptly removed where such accumulations would impede sight lines.
- Consideration should be given to installing electric vehicle charging stations within the Project site and to accommodating the staging of car-sharing vehicles (ZipCar or similar).

### **Off-Site**

#### **Main Street at the Medway Commons and Walgreens Driveways**

The addition of Project-related traffic to the intersection of Main Street at the Medway Commons and Walgreens Pharmacy driveway was not shown to result in a change in LOS over No-Build conditions, with Project-related impacts at the intersection defined as an increase average motorist delay of less than 1.0 seconds and vehicle queuing of up to one (1) vehicle. Independent of and unrelated to the Project, the intersection was found to be included on MassDOT's HSIP listing as high crash cluster location for 2013-2015. In an effort to advance safety improvements at this location that are warranted as a result of existing conditions unrelated to the Project, the Project proponent will facilitate the completion of a Road Safety Audit (RSA) in order to identify improvements strategies for the intersection.

### **Transportation Demand Management**

Public transportation services are provided to the Town of Medway by GATRA (fixed-route bus service) by way of the Medway T Shuttle which provides service to Norfolk Station on the Franklin Line of the MBTA Commuter Rail system. The shuttle operates during the weekday morning and evening peak commuter periods (5:55 to 8:00 AM and 5:00 to 7:00 PM) and includes a stop at the Medway Middle School located at 45 Holliston Street, an approximate a 5-minute driving distance from the Project site. GATRA also operates Paratransit Services for seniors, the disabled and passengers who meet ADA requirements located within a ¾ mile radius of a fixed route bus service corridor.

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following Transportation Demand Management (TDM) measures should be implemented as a part of the Project:

- The owner or property manager should contact MassRIDES to obtain information on facilitating and encouraging healthy transportation options for residents of the Project;
- Information regarding public transportation services, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents;

- A “welcome packet” should be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options available through MassRIDES’ and their Bay State Commute program (formerly NuRide) which rewards individuals that choose to walk, bicycle, carpool, vanpool or that use public transportation to travel to and from work;
- Residents should be made aware of the Emergency Ride Home (ERH) program available through MassRIDES, which reimburses employees of a participating MassRIDES employer partner worksite that is registered for ERH and that carpool, take transit, bicycle, walk or vanpool to work;
- Pedestrian accommodations have been provided within the Project site and include a sidewalk along the building perimeter that extends to Main Street;
- A mail drop should be provided in a central location; and
- Secure bicycle parking should be provided consisting of: i) exterior bicycle parking conveniently located proximate to the building entrance; and ii) weather protected bicycle parking located in a secure area within the building.

With implementation of the above recommendations, safe and efficient vehicular, pedestrian and bicycle access will be provided to the Project site and the Project can be accommodated within the confines of the existing and improved transportation system.

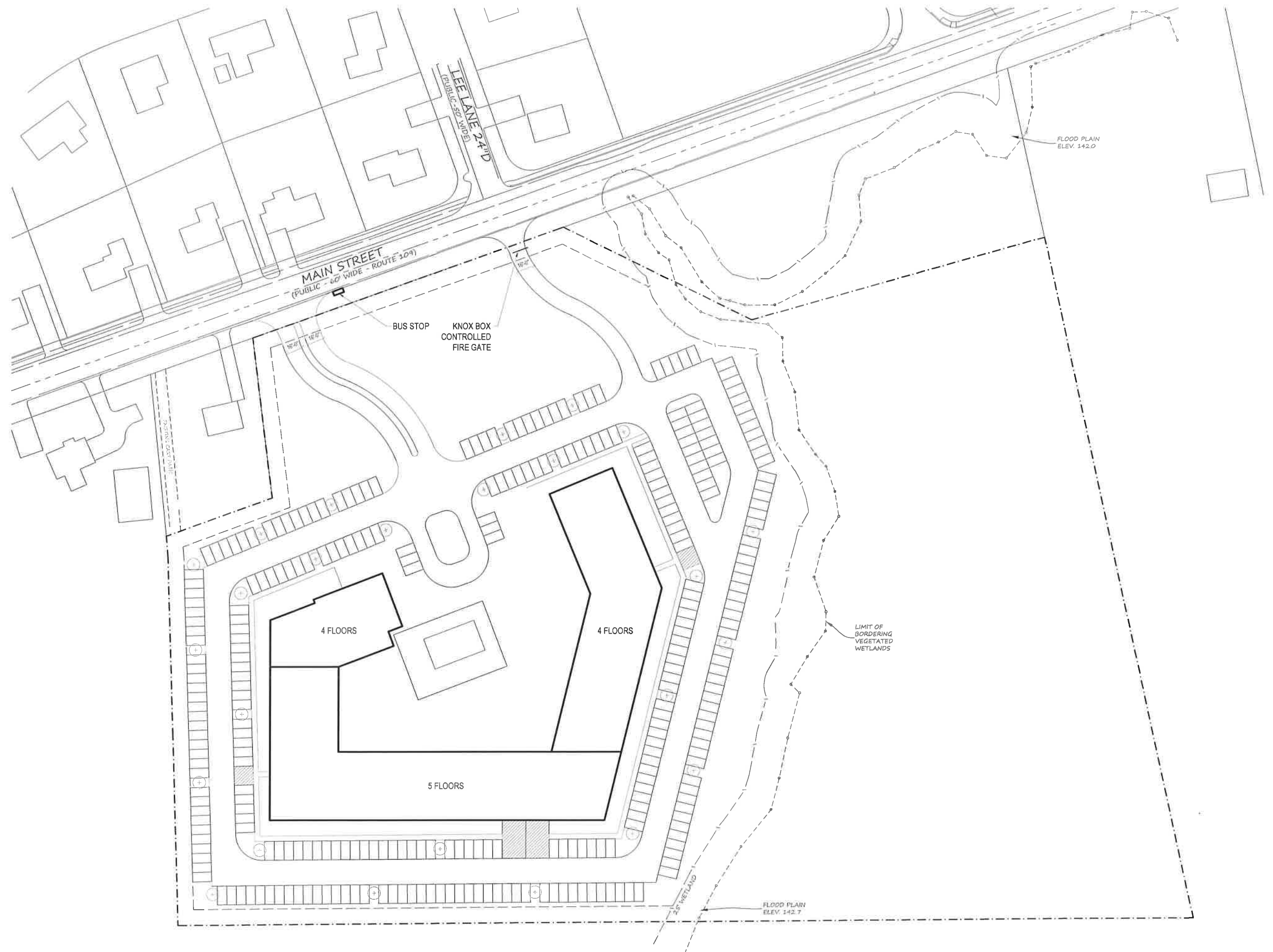
## APPENDIX

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PROJECT SITE PLAN  
AUTOMATIC TRAFFIC RECORDER COUNTS  
MANUAL TURNING MOVEMENT COUNT DATA  
2011 TRAFFIC-VOLUME NETWORKS  
SEASONAL ADJUSTMENT DATA  
PUBLIC TRANSPORTATION SCHEDULES  
VEHICLE TRAVEL SPEED DATA  
MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING  
GENERAL BACKGROUND TRAFFIC GROWTH  
BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS  
TRIP-GENERATION CALCULATIONS  
JOURNEY-TO-WORK TRIP DISTRIBUTION  
CAPACITY ANALYSIS WORKSHEETS

## PROJECT SITE PLAN

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## AUTOMATIC TRAFFIC RECORDER COUNTS



# Accurate Counts

978-664-2565

Location : Main Street  
 Location : East of Oakland Street  
 City/State: Medway, MA

8032VOL1

Start Time	10/1/2018	Tue	Wed	Thu	Fri	Sat	Sun	Week Average
	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*		14	*	*	*	*	12
01:00	*	9	7	*	*	*	*	7
02:00	*	7	2	*	*	*	*	4
03:00	*	17	22	*	*	*	*	20
04:00	*	71	60	*	*	*	*	66
05:00	*	19	81	*	*	*	*	82
06:00	*	84	326	*	*	*	*	327
07:00	*	182	856	*	*	*	*	856
08:00	*	359	630	*	*	*	*	650
09:00	*	648	652	*	*	*	*	650
10:00	*	492	459	*	*	*	*	476
11:00	*	377	411	*	*	*	*	394
12:00 PM	*	360	394	*	*	*	*	377
01:00	*	398	431	*	*	*	*	414
02:00	*	397	373	*	*	*	*	385
03:00	*	364	402	*	*	*	*	383
04:00	*	428	442	*	*	*	*	435
05:00	*	450	713	*	*	*	*	452
06:00	*	454	737	*	*	*	*	450
07:00	*	355	653	*	*	*	*	385
08:00	*	246	296	*	*	*	*	271
09:00	*	166	215	*	*	*	*	190
10:00	*	141	119	*	*	*	*	130
11:00	*	63	56	*	*	*	*	60
Lane	0	7331	7519	0	0	0	0	7426
Day	0	14487	14903	0	0	0	0	14696
AM Peak	-	06:00	06:00	-	-	-	-	06:00
Vol.	-	855	856	-	-	-	-	856
PM Peak	-	17:00	16:00	-	-	-	-	16:00
Vol.	-	454	454	-	-	-	-	452

Comb. Total 0 14487 14903 0 0 0 0 14696

ADT ADT 14,695 AADT 14,695

# Accurate Counts

978-664-2565

Page 1

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032VOL1

Start Time	10/2/2018 Tue	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		3	90			8	94				
12:15		5	95			9	114				
12:30		1	106			4	121				
12:45		0	107	9	398	1	117	22	446	31	844
01:00		3	85			3	92				
01:15		0	90			3	101				
01:30		3	99			2	117				
01:45		1	123	7	397	1	114	9	424	16	821
02:00		1	87			2	111				
02:15		1	102			1	109				
02:30		2	85			1	152				
02:45		3	90	7	364	1	141	5	513	12	877
03:00		0	95			1	142				
03:15		3	111			1	140				
03:30		7	110			0	175				
03:45		7	112	17	428	0	163	2	620	19	1048
04:00		14	117			0	188				
04:15		16	120			4	157				
04:30		18	110			4	198				
04:45		23	103	71	450	11	187	19	730	90	1180
05:00		40	103			8	196				
05:15		72	132			18	171				
05:30		87	118			30	161				
05:45		129	101	328	454	28	182	84	710	412	1164
06:00		166	87			32	167				
06:15		224	86			46	162				
06:30		238	93			43	141				
06:45		227	89	855	355	61	129	182	599	1037	954
07:00		170	75			87	107				
07:15		165	54			89	102				
07:30		172	58			98	94				
07:45		164	59	671	246	85	64	359	367	1030	613
08:00		174	57			79	68				
08:15		169	41			90	59				
08:30		147	47			107	52				
08:45		158	21	648	166	91	55	367	234	1015	400
09:00		160	34			92	52				
09:15		123	33			89	61				
09:30		107	37			88	35				
09:45		102	37	492	141	91	40	360	188	852	329
10:00		100	25			85	27				
10:15		81	12			108	28				
10:30		89	13			97	13				
10:45		107	13	377	63	94	17	384	85	761	148
11:00		92	11			77	21				
11:15		86	9			88	25				
11:30		90	3			103	19				
11:45		92	4	360	27	101	13	369	78	729	105
Total		3842	3489			2162	4994			6004	8483
Percent		52.4%	47.6%			30.2%	69.8%			41.4%	58.6%

# Accurate Counts

978-664-2565

Page 2

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032VOL1

Start Time	10/3/2018 Wed	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		6	116			13	104				
12:15		3	114			5	113				
12:30		3	97			8	139				
12:45		2	104	14	431	4	86	30	442	44	873
01:00		1	85			1	109				
01:15		2	99			4	101				
01:30		1	100			4	125				
01:45		3	89	7	373	2	114	11	449	18	822
02:00		1	105			1	110				
02:15		0	95			4	121				
02:30		1	111			0	128				
02:45		0	91	2	402	0	134	5	493	7	895
03:00		1	112			0	137				
03:15		7	126			2	144				
03:30		12	101			1	176				
03:45		2	103	22	442	0	174	3	631	25	1073
04:00		10	107			2	179				
04:15		10	111			2	156				
04:30		12	115			4	192				
04:45		28	121	60	454	12	186	20	713	80	1167
05:00		45	111			6	183				
05:15		67	108			16	186				
05:30		88	119			28	199				
05:45		126	108	326	446	31	169	81	737	407	1183
06:00		176	107			39	181				
06:15		215	111			58	159				
06:30		242	107			54	170				
06:45		223	90	856	415	80	143	231	653	1087	1068
07:00		159	84			75	131				
07:15		132	77			100	110				
07:30		170	74			79	82				
07:45		169	61	630	296	97	106	351	429	981	725
08:00		221	62			87	64				
08:15		149	55			80	49				
08:30		138	55			113	71				
08:45		144	43	652	215	106	75	386	259	1038	474
09:00		132	42			104	47				
09:15		100	25			73	48				
09:30		118	36			78	40				
09:45		109	16	459	119	90	40	345	175	804	294
10:00		98	12			89	45				
10:15		112	14			84	46				
10:30		103	9			86	23				
10:45		98	21	411	56	81	20	340	134	751	190
11:00		109	16			93	22				
11:15		92	11			115	18				
11:30		100	5			93	13				
11:45		93	5	394	37	97	15	398	68	792	105
Total		3833	3686			2201	5183			6034	8869
Percent		51.0%	49.0%			29.8%	70.2%			40.5%	59.5%
Grand Total		7675	7175			4363	10177			12038	17352
Percent		51.7%	48.3%			30.0%	70.0%			41.0%	59.0%

ADT

ADT 14,695

AADT 14,695

## MANUAL TURNING MOVEMENT COUNT DATA

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# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 1

Groups Printed- Cars - Trucks													
Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	0	0	6	70	0	18	0	31	0	96	26	247
07:15 AM	0	0	0	14	64	0	18	0	30	0	95	17	238
07:30 AM	0	0	0	10	77	0	16	0	17	0	102	17	239
07:45 AM	0	0	0	6	68	0	8	0	18	0	108	21	229
Total	0	0	0	36	279	0	60	0	96	0	401	81	953
08:00 AM	0	0	0	9	79	0	8	0	17	0	113	28	254
08:15 AM	0	0	0	14	61	0	16	0	13	1	100	39	244
08:30 AM	0	1	2	14	80	2	27	2	17	0	80	22	247
08:45 AM	1	1	0	16	66	1	16	2	19	3	93	25	243
Total	1	2	2	53	286	3	67	4	66	4	386	114	988
Grand Total	1	2	2	89	565	3	127	4	162	4	787	195	1941
Apprch %	20	40	40	13.5	86	0.5	43.3	1.4	55.3	0.4	79.8	19.8	
Total %	0.1	0.1	0.1	4.6	29.1	0.2	6.5	0.2	8.3	0.2	40.5	10	
Cars	1	2	2	89	537	3	122	4	160	4	772	193	1889
% Cars	100	100	100	100	95	100	96.1	100	98.8	100	98.1	99	97.3
Trucks	0	0	0	0	28	0	5	0	2	0	15	2	52
% Trucks	0	0	0	0	5	0	3.9	0	1.2	0	1.9	1	2.7

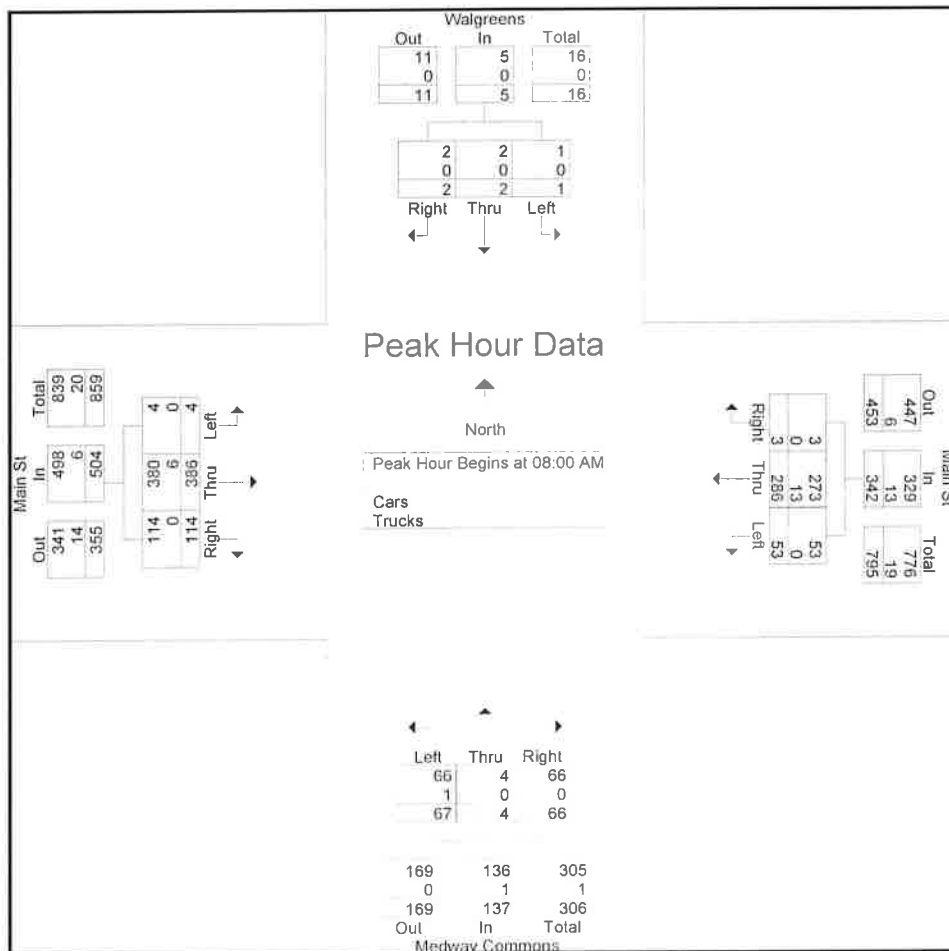
# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 2

	Walgreens From North				Main St From East				Medway Commons From South				Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	9	79	0	88	8	0	17	25	0	113	28	141	254
08:15 AM	0	0	0	0	14	61	0	75	16	0	13	29	1	100	39	140	244
08:30 AM	0	1	2	3	14	80	2	96	27	2	17	46	0	80	22	102	247
08:45 AM	1	1	0	2	16	66	1	83	16	2	19	37	3	93	25	121	243
Total Volume	1	2	2	5	53	286	3	342	67	4	66	137	4	386	114	504	988
% App. Total	20	40	40		15.5	83.6	0.9		48.9	2.9	48.2		0.8	76.6	22.6		
PHF	.250	.500	.250	.417	.828	.894	.375	.891	.620	.500	.868	.745	.333	.854	.731	.894	.972
Cars	1	2	2	5	53	273	3	329	66	4	66	136	4	380	114	498	968
% Cars	100	100	100	100	100	95.5	100	96.2	98.5	100	100	99.3	100	98.4	100	98.8	98.0
Trucks	0	0	0	0	0	13	0	13	1	0	0	1	0	6	0	6	20
% Trucks	0	0	0	0	0	4.5	0	3.8	1.5	0	0	0.7	0	1.6	0	1.2	2.0



# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 4

## Groups Printed- Cars

Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	0	0	6	67	0	18	0	31	0	95	26	243
07:15 AM	0	0	0	14	60	0	17	0	29	0	95	16	231
07:30 AM	0	0	0	10	72	0	13	0	16	0	97	17	225
07:45 AM	0	0	0	6	65	0	8	0	18	0	105	20	222
Total	0	0	0	36	264	0	56	0	94	0	392	79	921
08:00 AM	0	0	0	9	77	0	7	0	17	0	112	28	250
08:15 AM	0	0	0	14	56	0	16	0	13	1	98	39	237
08:30 AM	0	1	2	14	78	2	27	2	17	0	79	22	244
08:45 AM	1	1	0	16	62	1	16	2	19	3	91	25	237
Total	1	2	2	53	273	3	66	4	66	4	380	114	968
Grand Total	1	2	2	89	537	3	122	4	160	4	772	193	1889
Apprch %	20	40	40	14.1	85.4	0.5	42.7	1.4	55.9	0.4	79.7	19.9	
Total %	0.1	0.1	0.1	4.7	28.4	0.2	6.5	0.2	8.5	0.2	40.9	10.2	

# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 7

## Groups Printed- Trucks

Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	0	0	0	3	0	0	0	0	0	1	0	4
07:15 AM	0	0	0	0	4	0	1	0	1	0	0	1	7
07:30 AM	0	0	0	0	5	0	3	0	1	0	5	0	14
07:45 AM	0	0	0	0	3	0	0	0	0	0	3	1	7
Total	0	0	0	0	15	0	4	0	2	0	9	2	32
08:00 AM	0	0	0	0	2	0	1	0	0	0	1	0	4
08:15 AM	0	0	0	0	5	0	0	0	0	0	2	0	7
08:30 AM	0	0	0	0	2	0	0	0	0	0	1	0	3
08:45 AM	0	0	0	0	4	0	0	0	0	0	2	0	6
Total	0	0	0	0	13	0	1	0	0	0	6	0	20
Grand Total	0	0	0	0	28	0	5	0	2	0	15	2	52
Apprch %	0	0	0	0	100	0	71.4	0	28.6	0	88.2	11.8	
Total %	0	0	0	0	53.8	0	9.6	0	3.8	0	28.8	3.8	



978-664-2565

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 10

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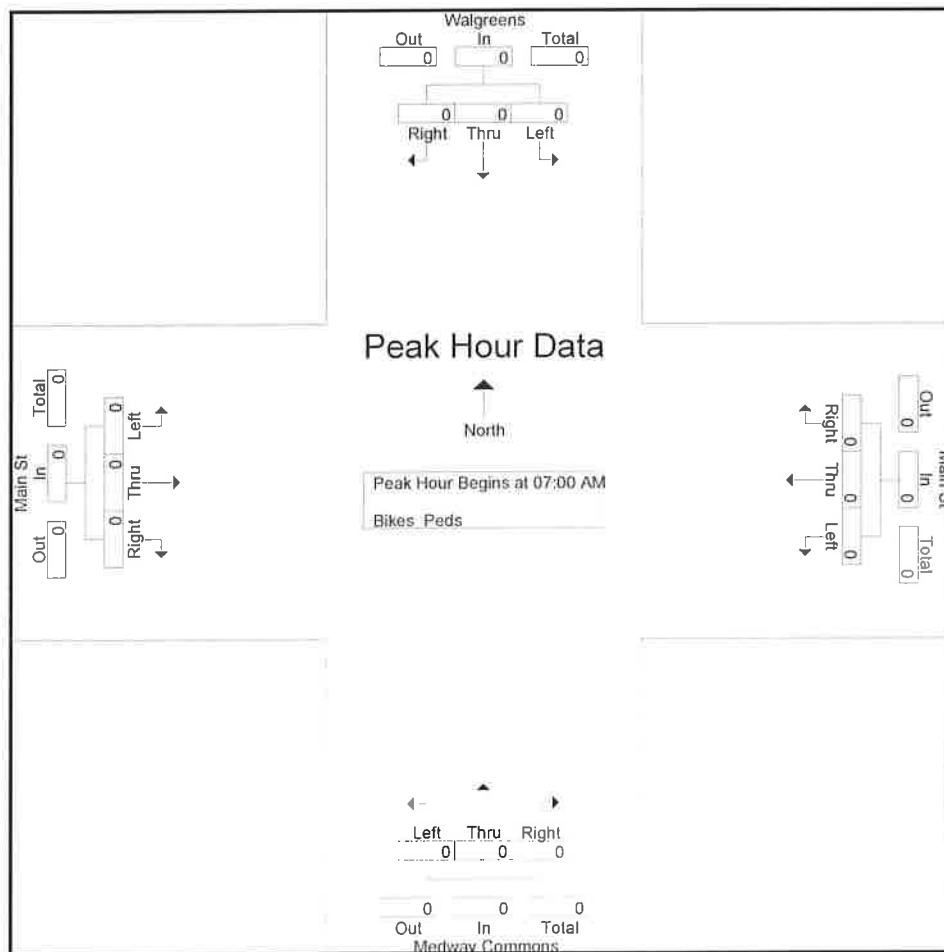
# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 11

	Walgreens From North				Main St From East				Medway Commons From South				Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 1

Groups Printed- Cars - Trucks													
Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	4	5	2	33	116	2	14	2	27	8	74	31	318
04:15 PM	8	4	6	26	107	5	16	1	25	3	87	35	323
04:30 PM	0	1	4	19	102	3	19	2	20	4	91	39	304
04:45 PM	1	0	5	26	100	4	16	2	21	4	95	24	298
Total	13	10	17	104	425	14	65	7	93	19	347	129	1243
05:00 PM	3	2	6	25	106	2	18	1	21	1	79	28	292
05:15 PM	0	2	4	25	108	2	14	3	18	4	99	19	298
05:30 PM	1	3	3	24	95	4	22	0	17	4	84	28	285
05:45 PM	2	2	5	19	107	5	25	3	23	3	70	18	282
Total	6	9	18	93	416	13	79	7	79	12	332	93	1157
Grand Total	19	19	35	197	841	27	144	14	172	31	679	222	2400
Apprch %	26	26	47.9	18.5	79	2.5	43.6	4.2	52.1	3.3	72.9	23.8	
Total %	0.8	0.8	1.5	8.2	35	1.1	6	0.6	7.2	1.3	28.3	9.2	
Cars	19	19	34	196	834	27	143	14	172	30	674	222	2384
% Cars	100	100	97.1	99.5	99.2	100	99.3	100	100	96.8	99.3	100	99.3
Trucks	0	0	1	1	7	0	1	0	0	1	5	0	16
% Trucks	0	0	2.9	0.5	0.8	0	0.7	0	0	3.2	0.7	0	0.7

# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

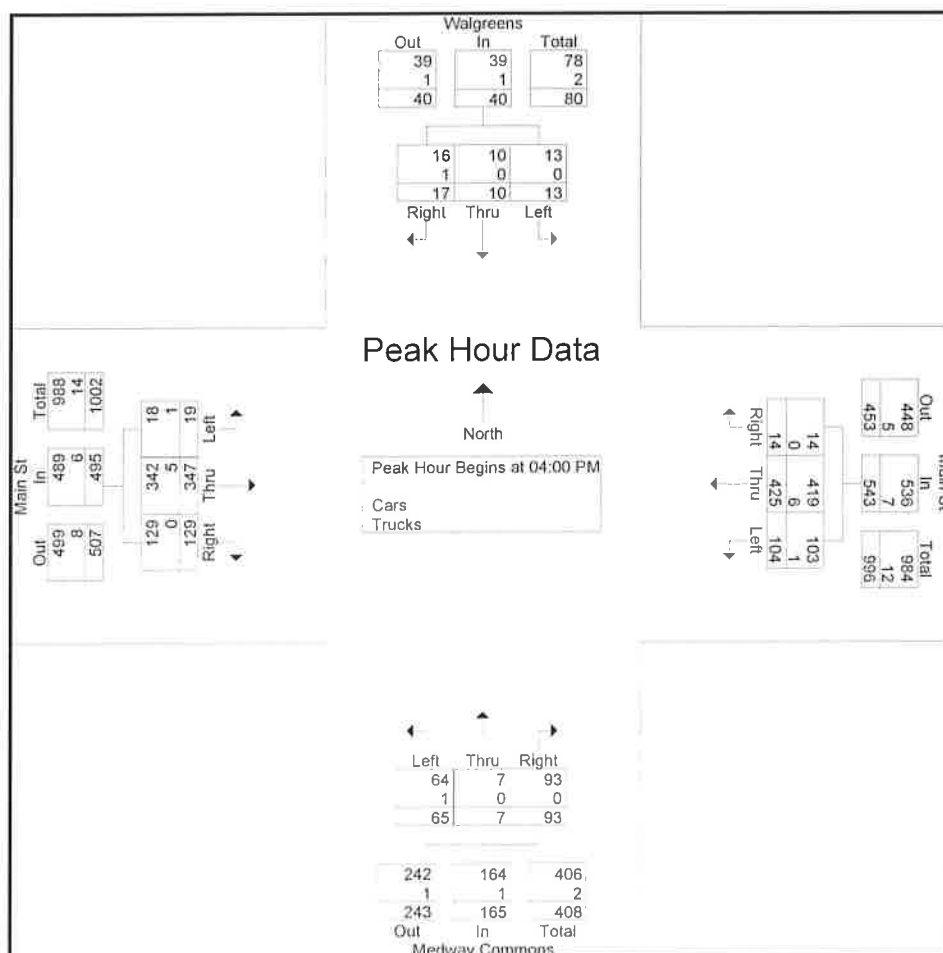
File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 2

	Walgreens From North				Main St From East				Medway Commons From South				Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total

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

Peak Hour for Entire Intersection Begins at 04:00 PM

04:00 PM	4	5	2	11	33	116	2	151	14	2	27	43	8	74	31	113	318
04:15 PM	8	4	6	18	26	107	5	138	16	1	25	42	3	87	35	125	323
04:30 PM	0	1	4	5	19	102	3	124	19	2	20	41	4	91	39	134	304
04:45 PM	1	0	5	6	26	100	4	130	16	2	21	39	4	95	24	123	298
Total Volume	13	10	17	40	104	425	14	543	65	7	93	165	19	347	129	495	1243
% App. Total	32.5	25	42.5		19.2	78.3	2.6		39.4	4.2	56.4		3.8	70.1	26.1		
PHF	.406	.500	.708	.556	.788	.916	.700	.899	.855	.875	.861	.959	.594	.913	.827	.924	.962
Cars	13	10	16	39	103	419	14	536	64	7	93	164	18	342	129	489	1228
% Cars	100	100	94.1	97.5	99.0	98.6	100	98.7	98.5	100	100	99.4	94.7	98.6	100	98.8	98.8
Trucks	0	0	1	1	1	6	0	7	1	0	0	1	1	5	0	6	15
% Trucks	0	0	5.9	2.5	1.0	1.4	0	1.3	1.5	0	0	0.6	5.3	1.4	0	1.2	1.2



# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 4

## Groups Printed- Cars

Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	4	5	2	33	114	2	14	2	27	7	73	31	314
04:15 PM	8	4	5	26	104	5	15	1	25	3	87	35	318
04:30 PM	0	1	4	18	101	3	19	2	20	4	89	39	300
04:45 PM	1	0	5	26	100	4	16	2	21	4	93	24	296
Total	13	10	16	103	419	14	64	7	93	18	342	129	1228
05:00 PM	3	2	6	25	105	2	18	1	21	1	79	28	291
05:15 PM	0	2	4	25	108	2	14	3	18	4	99	19	298
05:30 PM	1	3	3	24	95	4	22	0	17	4	84	28	285
05:45 PM	2	2	5	19	107	5	25	3	23	3	70	18	282
Total	6	9	18	93	415	13	79	7	79	12	332	93	1156
Grand Total	19	19	34	196	834	27	143	14	172	30	674	222	2384
Apprch %	26.4	26.4	47.2	18.5	78.9	2.6	43.5	4.3	52.3	3.2	72.8	24	
Total %	0.8	0.8	1.4	8.2	35	1.1	6	0.6	7.2	1.3	28.3	9.3	

# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 7

## Groups Printed- Trucks

Start Time	Walgreens From North			Main St From East			Medway Commons From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	0	0	0	2	0	0	0	0	1	1	0	4
04:15 PM	0	0	1	0	3	0	1	0	0	0	0	0	5
04:30 PM	0	0	0	1	1	0	0	0	0	0	2	0	4
04:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	2
Total	0	0	1	1	6	0	1	0	0	1	5	0	15
05:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	0	0	0	0	0	1
Grand Total	0	0	1	1	7	0	1	0	0	1	5	0	16
Apprch %	0	0	100	12.5	87.5	0	100	0	0	16.7	83.3	0	
Total %	0	0	6.2	6.2	43.8	0	6.2	0	0	6.2	31.2	0	

# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 10

## Groups Printed- Bikes Peds

Start Time	Walgreens From North				Main St From East				Medway Commons From South				Main St From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	3	5
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	3	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	4	6
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	5
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	5
Grand Total	0	3	0	1	0	0	0	0	0	0	0	0	0	1	0	6	7	4	11
Apprch %	0	100	0		0	0	0		0	0	0		0	100	0				
Total %	0	75	0		0	0	0		0	0	0		0	25	0		63.6	36.4	

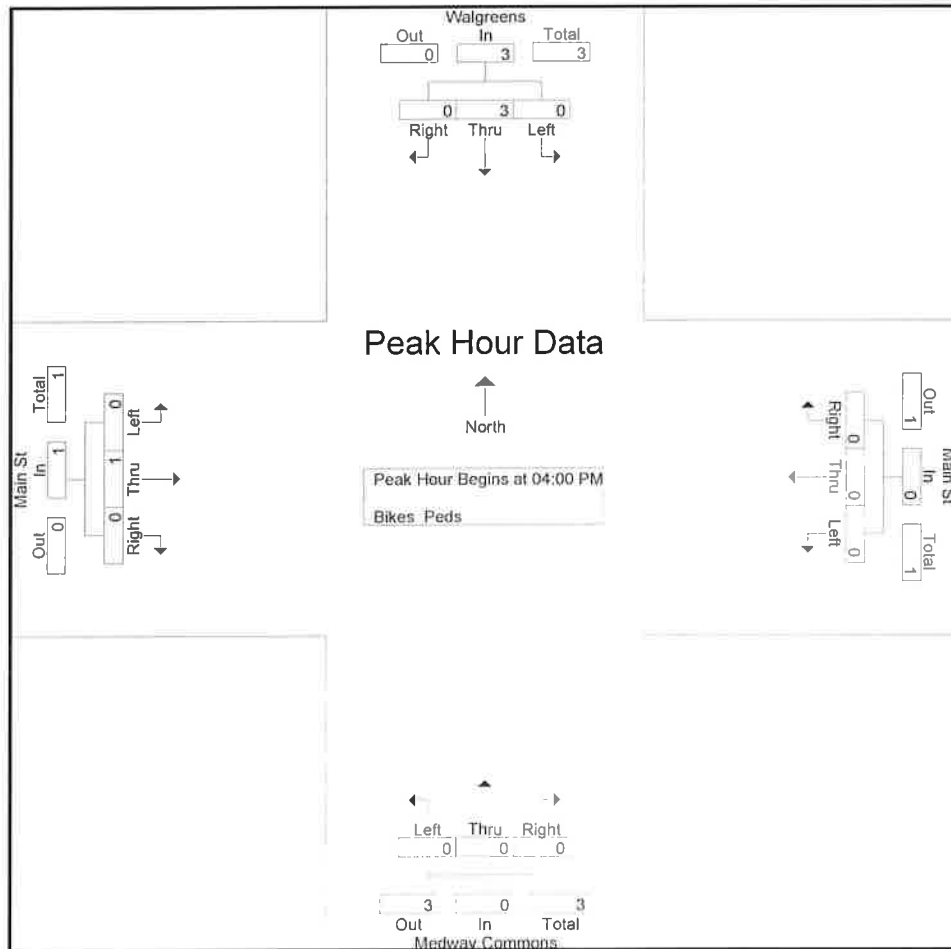
# Accurate Counts

978-664-2565

N/S Street : Walgreens / Medway Commons  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320001  
Site Code : 80320001  
Start Date : 10/2/2018  
Page No : 11

	Walgreens From North				Main St From East				Medway Commons From South				Main St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	3	0	3	0	0	0	0	0	0	0	0	0	1	0	1	4
% App. Total	0	100	0		0	0	0		0	0	0		0	100	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.333





# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 1

## Groups Printed- Cars - Trucks

Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
07:00 AM	25	0	81	5	0	128	239
07:15 AM	20	0	63	10	0	123	216
07:30 AM	17	0	82	14	0	122	235
07:45 AM	25	1	80	8	1	117	232
Total	87	1	306	37	1	490	922
08:00 AM	25	0	76	1	0	142	244
08:15 AM	28	1	79	8	0	108	224
08:30 AM	24	1	85	14	0	101	225
08:45 AM	22	0	75	12	0	116	225
Total	99	2	315	35	0	467	918
Grand Total	186	3	621	72	1	957	1840
Apprch %	98.4	1.6	89.6	10.4	0.1	99.9	
Total %	10.1	0.2	33.8	3.9	0.1	52	
Cars	177	2	598	70	1	941	1789
% Cars	95.2	66.7	96.3	97.2	100	98.3	97.2
Trucks	9	1	23	2	0	16	51
% Trucks	4.8	33.3	3.7	2.8	0	1.7	2.8

# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

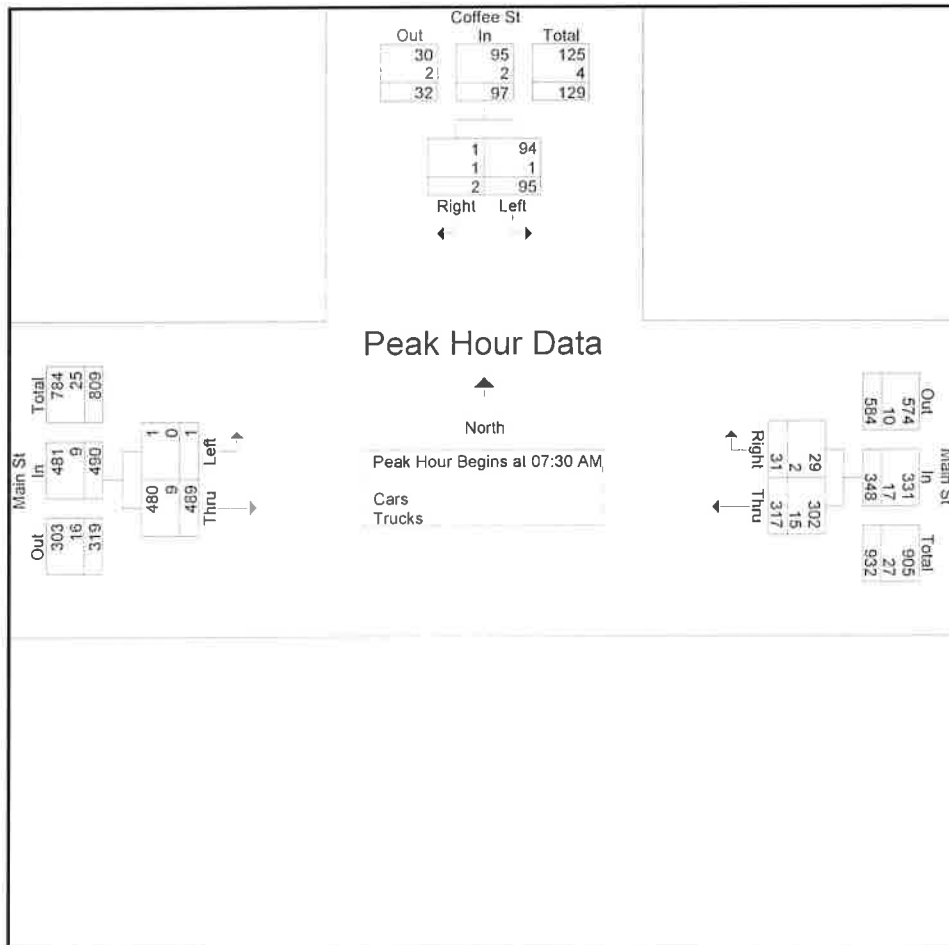
File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 2

	Coffee St From North			Main St From East			Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total

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

Peak Hour for Entire Intersection Begins at 07:30 AM

07:30 AM	17	0	17	82	14	96	0	122	122	235
07:45 AM	25	1	26	80	8	88	1	117	118	232
08:00 AM	25	0	25	76	1	77	0	142	142	244
08:15 AM	28	1	29	79	8	87	0	108	108	224
Total Volume	95	2	97	317	31	348	1	489	490	935
% App. Total	97.9	2.1		91.1	8.9		0.2	99.8		
PHF	.848	.500	.836	.966	.554	.906	.250	.861	.863	.958
Cars	94	1	95	302	29	331	1	480	481	907
% Cars	98.9	50.0	97.9	95.3	93.5	95.1	100	98.2	98.2	97.0
Trucks	1	1	2	15	2	17	0	9	9	28
% Trucks	1.1	50.0	2.1	4.7	6.5	4.9	0	1.8	1.8	3.0



# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 4

## Groups Printed- Cars

Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
07:00 AM	25	0	81	5	0	126	237
07:15 AM	20	0	59	10	0	122	211
07:30 AM	17	0	75	13	0	117	222
07:45 AM	24	1	78	8	1	115	227
Total	86	1	293	36	1	480	897
08:00 AM	25	0	75	1	0	142	243
08:15 AM	28	0	74	7	0	106	215
08:30 AM	20	1	82	14	0	100	217
08:45 AM	18	0	74	12	0	113	217
Total	91	1	305	34	0	461	892
Grand Total	177	2	598	70	1	941	1789
Apprch %	98.9	1.1	89.5	10.5	0.1	99.9	
Total %	9.9	0.1	33.4	3.9	0.1	52.6	

# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 7

Groups Printed- Trucks							
Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
07:00 AM	0	0	0	0	0	2	2
07:15 AM	0	0	4	0	0	1	5
07:30 AM	0	0	7	1	0	5	13
07:45 AM	1	0	2	0	0	2	5
Total	1	0	13	1	0	10	25
08:00 AM	0	0	1	0	0	0	1
08:15 AM	0	1	5	1	0	2	9
08:30 AM	4	0	3	0	0	1	8
08:45 AM	4	0	1	0	0	3	8
Total	8	1	10	1	0	6	26
Grand Total	9	1	23	2	0	16	51
Apprch %	90	10	92	8	0	100	
Total %	17.6	2	45.1	3.9	0	31.4	

978-664-2565

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 10

[illegible]

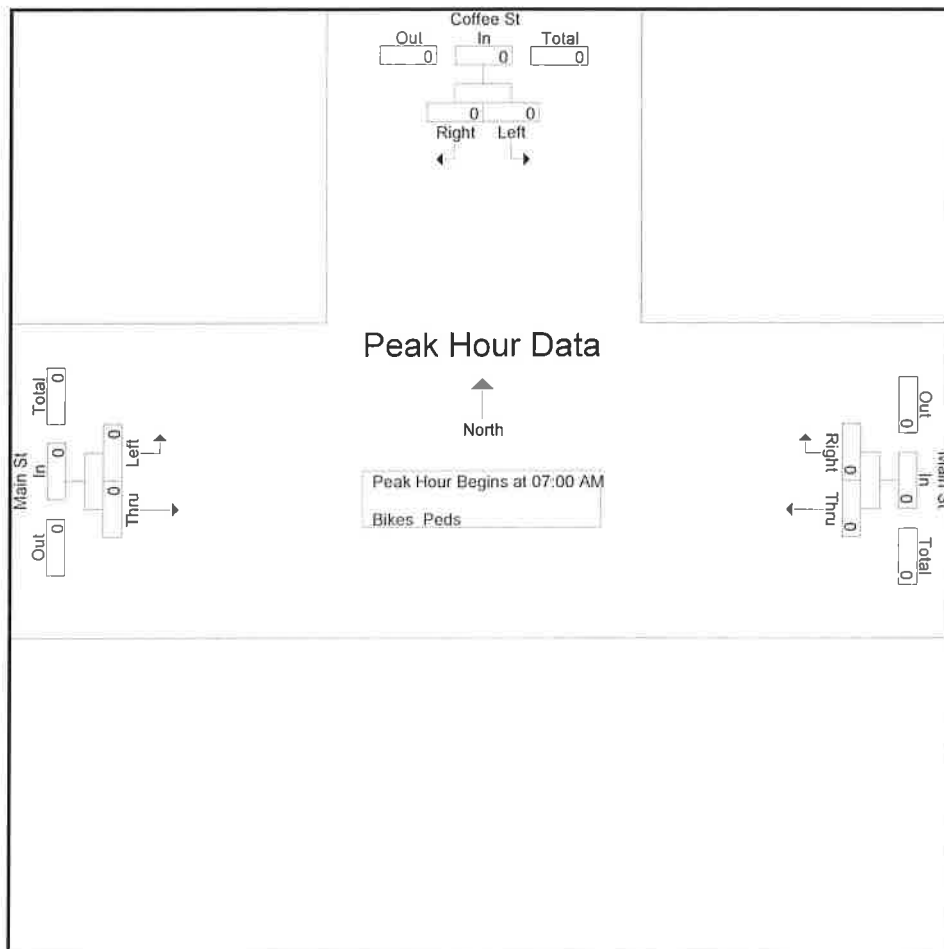
# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Cloudy

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 11

	Coffee St From North			Main St From East			Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	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	.000



# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 1

## Groups Printed- Cars - Trucks

Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
04:00 PM	19	1	168	19	1	90	298
04:15 PM	7	1	111	20	1	105	245
04:30 PM	5	0	164	14	2	116	301
04:45 PM	9	0	117	22	0	104	252
Total	40	2	560	75	4	415	1096
05:00 PM	6	0	154	23	3	89	275
05:15 PM	20	1	125	21	0	118	285
05:30 PM	12	1	126	22	1	96	258
05:45 PM	13	0	142	19	1	90	265
Total	51	2	547	85	5	393	1083
Grand Total	91	4	1107	160	9	808	2179
Apprch %	95.8	4.2	87.4	12.6	1.1	98.9	
Total %	4.2	0.2	50.8	7.3	0.4	37.1	
Cars	89	4	1098	160	9	803	2163
% Cars	97.8	100	99.2	100	100	99.4	99.3
Trucks	2	0	9	0	0	5	16
% Trucks	2.2	0	0.8	0	0	0.6	0.7

# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
 E/W Street : Main Street  
 City/State : Medway, MA  
 Weather : Rain

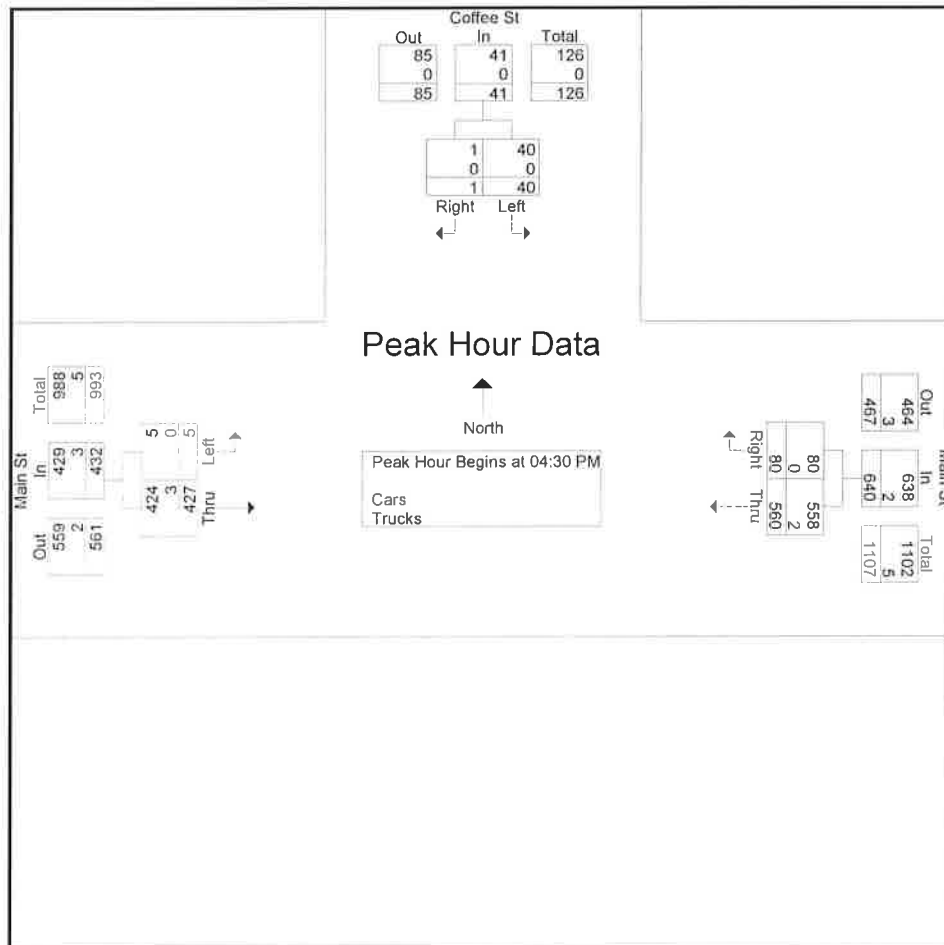
File Name : 80320002  
 Site Code : 80320002  
 Start Date : 10/2/2018  
 Page No : 2

	Coffee St From North			Main St From East			Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total

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

Peak Hour for Entire Intersection Begins at 04:30 PM

04:30 PM	5	0	5	164	14	178	2	116	118	301
04:45 PM	9	0	9	117	22	139	0	104	104	252
05:00 PM	6	0	6	154	23	177	3	89	92	275
05:15 PM	20	1	21	125	21	146	0	118	118	285
Total Volume	40	1	41	560	80	640	5	427	432	1113
% App. Total	97.6	2.4		87.5	12.5		1.2	98.8		
PHF	.500	.250	.488	.854	.870	.899	.417	.905	.915	.924
Cars	40	1	41	558	80	638	5	424	429	1108
% Cars	100	100	100	99.6	100	99.7	100	99.3	99.3	99.6
Trucks	0	0	0	2	0	2	0	3	3	5
% Trucks	0	0	0	0.4	0	0.3	0	0.7	0.7	0.4





# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 4

## Groups Printed- Cars

Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
04:00 PM	17	1	165	19	1	89	292
04:15 PM	7	1	108	20	1	105	242
04:30 PM	5	0	163	14	2	114	298
04:45 PM	9	0	117	22	0	103	251
Total	38	2	553	75	4	411	1083
05:00 PM	6	0	153	23	3	89	274
05:15 PM	20	1	125	21	0	118	285
05:30 PM	12	1	126	22	1	96	258
05:45 PM	13	0	141	19	1	89	263
Total	51	2	545	85	5	392	1080
Grand Total	89	4	1098	160	9	803	2163
Apprch %	95.7	4.3	87.3	12.7	1.1	98.9	
Total %	4.1	0.2	50.8	7.4	0.4	37.1	

**Accurate Counts**  
978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 7

Groups Printed- Trucks							
Start Time	Coffee St From North		Main St From East		Main St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
04:00 PM	2	0	3	0	0	1	6
04:15 PM	0	0	3	0	0	0	3
04:30 PM	0	0	1	0	0	2	3
04:45 PM	0	0	0	0	0	1	1
Total	2	0	7	0	0	4	13
05:00 PM	0	0	1	0	0	0	1
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	1	0	0	1	2
Total	0	0	2	0	0	1	3
Grand Total	2	0	9	0	0	5	16
Apprch %	100	0	100	0	0	100	
Total %	12.5	0	56.2	0	0	31.2	

978-664-2565

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 10

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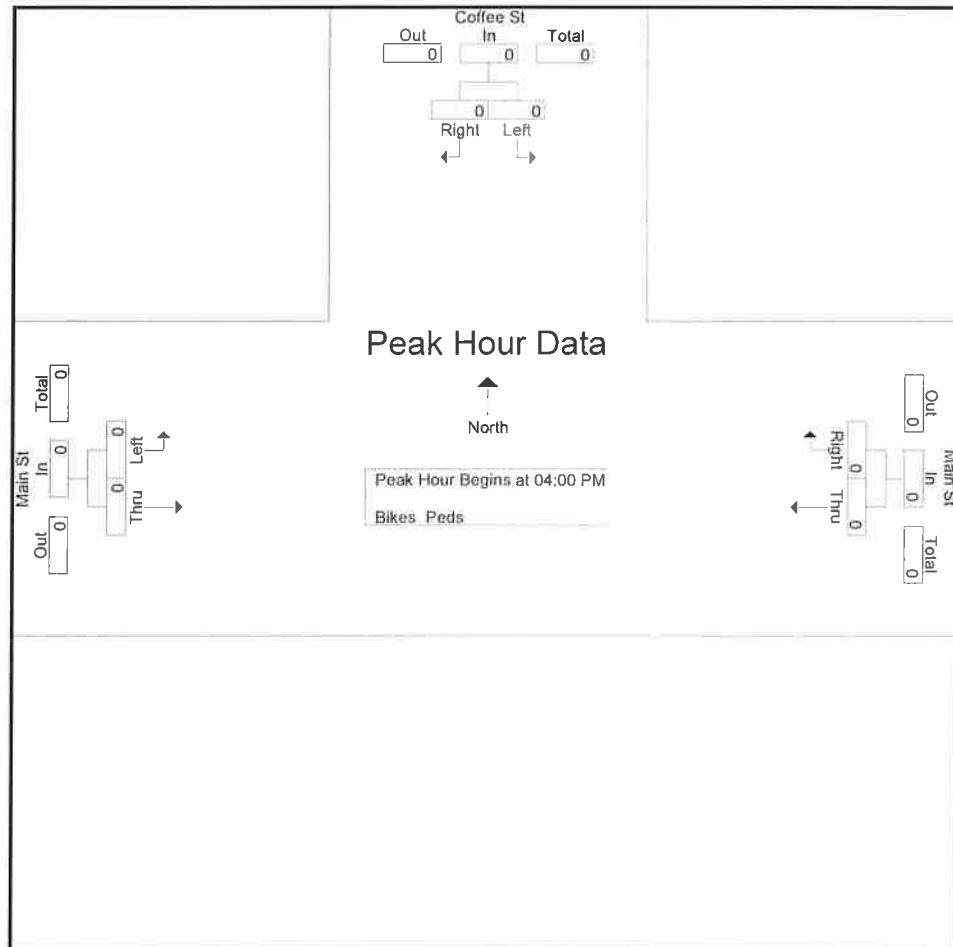
# Accurate Counts

978-664-2565

N/S Street : Coffee Street  
E/W Street : Main Street  
City/State : Medway, MA  
Weather : Rain

File Name : 80320002  
Site Code : 80320002  
Start Date : 10/2/2018  
Page No : 11

	Coffee St From North			Main St From East			Main St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	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	.000

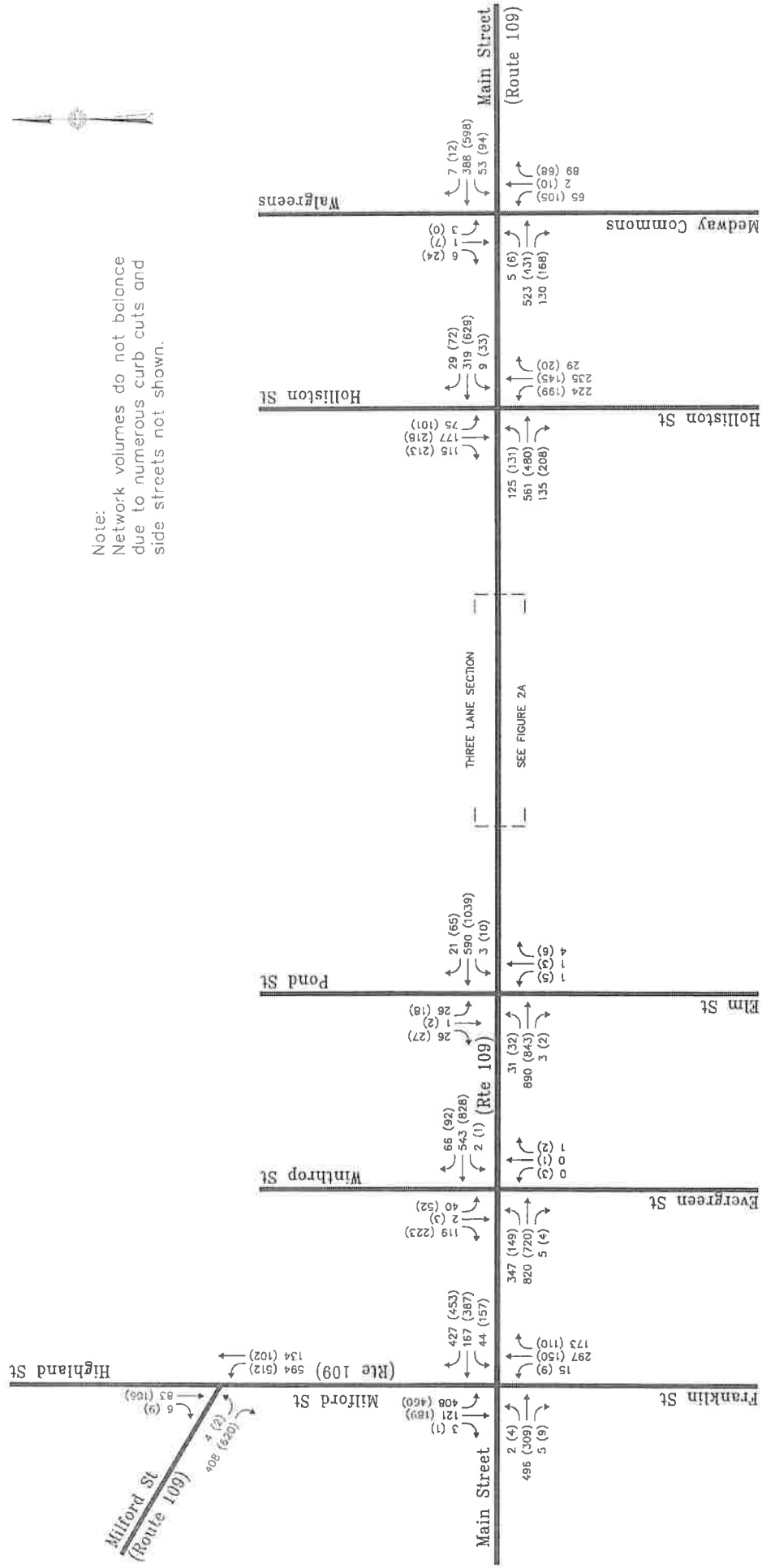


## 2011 TRAFFIC-VOLUME NETWORKS

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# FUNCTIONAL DESIGN REPORT

Reconstruction of Route 109 - Medway, MA



## SEASONAL ADJUSTMENT DATA



Vanasse & Associates, Inc.  
Transportation Engineers & Planners

## Calculations

35 New England Business Center Drive  
Suite 140  
Andover, MA 01810-1066  
Office 978-474-8800  
Fax 978-688-6508

Job: 39 Main Street  
Location: Medway, MA  
Title: Seasonal Adjustment  
Calculated by: BG

Job Number: 8032  
Date: 11/2/18  
Sheet \_\_\_\_\_ of \_\_\_\_\_  
Checked by: \_\_\_\_\_

MassDOT Station # 6213

located on Main Street at the Medway/Millis Town line

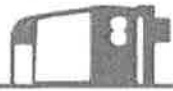
October Count = 14,696

2017 Yearly Average = 15,299

$$\frac{15,299}{14,696} \approx 1.041$$



## PUBLIC TRANSPORTATION SCHEDULES



## Welcome Aboard ... Rules Regulations Guidelines Tips

- Drivers are not permitted to handle luggage, packages, boxes, etc.
- Passengers may not stand while the Shuttle is in operation.
- It is requested that you be at your designated stop at least five minutes prior to pick-up time.
- Kindly refrain from extended mobile phone use.
- In consideration of others on-board, please do not eat, drink nor play an audio device.
- There is **NO SMOKING** on the Shuttle.
- When exiting the Shuttle, use the handrail.
- In case of inclement weather, please call **508.533.3210**.

*The Town of Medway and GATRA reserve the right to change the schedule as necessary.*

Your feedback is important to us. Please let us know of any problems or concerns you had while utilizing the Shuttle. Please direct all communications to:

508.533.3210  
[medwaycoa@townofmedway.org](mailto:medwaycoa@townofmedway.org)

***Thank you for riding with us!***

## Hours of Service

Monday - Friday

5:55 a.m. - 8:00 a.m.

and

5:00 p.m. - 7:00 p.m.

## No Service

Labor Day

Columbus Day

Veteran's Day

Thanksgiving and day after

Christmas Eve, Day & Day After

New Year's Eve & Day

Martin Luther King, Jr. Day

President's Day

Good Friday

Patriots' Day

Memorial Day

Independence Day

## Medway



## Shuttle

is operated by

Medway Council on Aging

76 Oakland Street

Medway, MA 02053

**508.533.3210**

[www.townofmedway.org](http://www.townofmedway.org)

# Medway



# Shuttle

EFFECTIVE 5/1/2016

**\$1.00 Each Way**

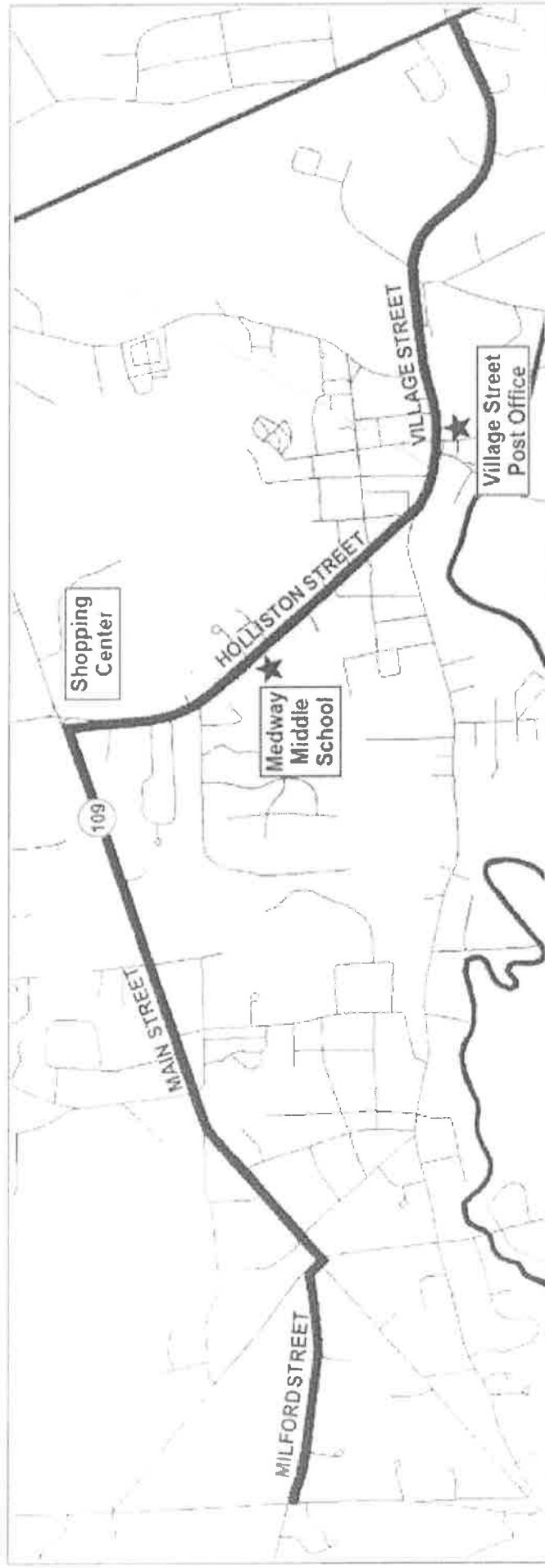
***"We'll Get You There!"***

Sponsored By



Greater Attleboro Taunton Regional Transit Authority

# Medway **T** Shuttle Route Map



## SERVING COMMUTERS FROM:

Medway Middle School . . . . . 5:57 a.m. & 6:28 a.m. & 6:55 a.m. (Free Parking)  
 Village Street Post Office . . . . . 5:59 a.m., 6:30 a.m. & 6:57 a.m. (No Parking Available)

**ARRIVE:** Norfolk Commuter Rail Station . . . 6:10 a.m., 6:40 a.m. & 7:07 a.m.

**RETURN SERVICE** for 4:45 p.m., 5:20 p.m. & 5:45 p.m. Trains from South Station.

Monday to Friday

Inbound to Boston

TRAIN #	790	700	702	704	706	708	742
6	4:55	5:30	6:03	6:35	7:06	7:50	8:45
6	5:02	5:37	6:10	6:42	7:13	7:57	8:45
5	5:08	5:44	6:17	6:49	7:20	8:04	8:45
5	5:15	5:51	6:24	6:56	7:28	8:11	8:45
4	5:19	5:54	6:28	7:01	7:42	8:15	8:45
4	5:23	5:58	6:34	7:06	7:35	7:47	8:21
4	5:26	6:01	6:37	7:09	7:50	7:50	8:36
3	5:29	6:02	6:41	7:13	7:54	7:54	8:40
3	5:32	6:05	6:44	7:16	7:41	7:57	8:27
3	5:35	6:08	6:48	7:20	7:45	8:01	8:30
3	5:38	6:11	6:53	7:25	7:50	8:06	8:34
2	5:41	6:14	6:56	7:28	7:53	8:39	8:51
2	5:44	6:17	6:59	7:31	7:56	8:42	8:57
2A	5:47	6:20	7:02	7:34	7:59	8:45	8:54
2A	5:50	6:23	7:05	7:37	8:02	8:48	8:53
1	5:53	6:26	7:08	7:40	8:11	8:57	9:02
1	5:56	6:29	7:11	7:43	8:14	9:00	9:05
1	5:59	6:32	7:14	7:46	8:17	9:03	9:08
1	6:02	6:35	7:17	7:49	8:20	9:06	9:11
1	6:05	6:38	7:20	7:52	8:23	9:09	9:14
1	6:08	6:41	7:23	7:55	8:26	9:12	9:17
1	6:11	6:44	7:26	7:58	8:29	9:15	9:20
1	6:14	6:47	7:29	8:01	8:32	9:18	9:23
1	6:17	6:50	7:32	8:04	8:35	9:21	9:26
1	6:20	6:53	7:35	8:07	8:38	9:24	9:29
1	6:23	6:56	7:38	8:10	8:41	9:27	9:32
1	6:26	6:59	7:41	8:13	8:44	9:30	9:35
1	6:29	7:02	7:44	8:16	8:47	9:33	9:38
1	6:32	7:05	7:47	8:19	8:50	9:36	9:41
1	6:35	7:08	7:50	8:22	8:53	9:39	9:44
1	6:38	7:11	7:53	8:25	8:56	9:42	9:47
1	6:41	7:14	7:56	8:28	8:59	9:45	9:50
1	6:44	7:17	7:59	8:31	9:02	9:48	9:53
1	6:47	7:20	8:02	8:34	9:05	9:51	9:56
1	6:50	7:23	8:05	8:37	9:08	9:54	9:59
1	6:53	7:26	8:08	8:40	9:11	9:57	10:02
1	6:56	7:29	8:11	8:43	9:14	10:00	10:05
1	6:59	7:32	8:14	8:46	9:17	10:03	10:08
1	7:02	7:35	8:17	8:49	9:20	10:06	10:11
1	7:05	7:38	8:20	8:52	9:23	10:09	10:14
1	7:08	7:41	8:23	8:55	9:26	10:12	10:17
1	7:11	7:44	8:26	8:58	9:29	10:15	10:20
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1	7:47	8:20	9:02	9:34	10:05	10:51	10:56
1	7:50	8:23	9:05	9:37	10:08	10:54	11:00
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1	9:35	10:08	10:50	11:22	11:53	12:39	12:44
1	9:38	10:11	10:53	11:25	11:56	12:42	12:47
1	9:41	10:14	10:56	11:28	11:59	12:45	12:50
1	9:44	10:17	10:59	11:31	12:02	12:48	12:53
1	9:47	10:20	11:02	11:34	12:05	12:51	12:56
1	9:50	10:23	11:05	11:37	12:08	12:54	13:00
1	9:53	10:26	11:08	11:40	12:11	12:57	13:02
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1	9:59	10:32	11:14	11:46	12:17	13:03	13:08
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1	10:08	10:41	11:23	11:55	12:26	13:12	13:17
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1	10:50	11:23	12:05	12:37	13:08	13:54	14:00
1	10:53	11:26	12:08	12:40	13:11	13:57	14:02
1	10:56	11:29	12:11	12:43	13:14	14:00	14:05
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1	11:02	11:35	12:17	12:49	13:20	14:06	14:11
1	11:05	11:38	12:20	12:52	13:23	14:09	14:14
1	11:08	11:41	12:23	12:55	13:26	14:12	14:17
1	11:11	11:44	12:26	12:58	13:29	14:15	14:20
1	11:14	11:47	12:29	13:01	13:32	14:18	14:23
1	11:17	11:50	12:32	13:04	13:35	14:21	14:26
1	11:20	11:53	12:35	13:07	13:38	14:24	14:29
1	11:23	11:56	12:38	13:10	13:41	14:27	14:32
1	11:26	11:59	12:41	13:13	13:44	14:30	14:35
1	11:29	12:02	12:44	13:16	13:47	14:33	14:38
1	11:32	12:05	12:47	13:19	13:50	14:36	14:41
1	11:35	12:08	12:50	13:22	13:53	14:39	14:44
1	11:38	12:11	12:53	13:25	13:56	14:42	14:47
1	11:41	12:14	12:56	13:28	13:59	14:45	14:50
1	11:44	12:17	12:59	13:31	14:02	14:48	14:53
1	11:47	12:20	13:02	13:34	14:05	14:51	14:56
1	11:50	12:23	13:05	13:37	14:08	14:54	15:00
1	11:53	12:26	13:08	13:40	14:11	14:57	15:02
1	11:56	12:29	13:11	13:43	14:14	15:00	15:05
1	11:59	12:32	13:14	13:46	14:17	15:03	15:08
1	12:02	12:35	13:17	13:49	14:20	15:06	15:11
1	12:05	12:38	13:20	13:52	14:23	15:09	15:14
1	12:08	12:41	13:23	13:55	14:26	15:12	15:17
1	12:11	12:44	13:26	13:58	14:29	15:15	15:20
1	12:14	12:47	13:29	14:01	14:32	15:18	15:23
1	12:17	12:50	13:32	14:04	14:35	15:21	15:26
1	12:20	12:53	13:35	14:07	14:38	15:24	15:29
1	12:23	12:56	13:38	14:10	14:41	15:27	15:32
1	12:26	12:59	13:41	14:13	14:44	15:30	15:35
1	12:29	13:02	13:44	14:16	14:47	15:33	15:38
1	12:32	13:05	13:47	14:19	14:50	15:36	15:41
1	12:35	13:08	13:50	14:22	14:53	15:39	15:44
1	12:38	13:11	13:53	14:25	14:56	15:42	15:47
1	12:41	13:14	13:56	14:28	14:59	15:45	15:50
1	12:44	13:17	13:59	14:31	15:02	15:48	15:53
1	12:47	13:20	14:02	14:34	15:05	15:51	15:56
1	12:50	13:23	14:05	14:37	15:08	15:54	16:00
1	12:53	13:26	14:08	14:40	15:11	15:57	16:02
1	12:56	13:29	14:11	14:43	15:14	16:00	16:05
1	12:59	13:32	14:14	14:46	15:17	16:03	16:08
1	13:02	13:35	14:17	14:49	15:20	16:06	16:11
1	13:05	13:38	14:20</				

Trains in purple box indicate peak period trains

Monday to Friday

Outbound from Boston

TRAIN #	701	741	703	705	707	709	711	713	715	743	717	745	719	721	723	725	727	729	731
1A South Station	6:30	6:40	8:04	9:40	11:00	12:20	1:35	2:40	3:48	4:15	4:43	5:02	5:20	5:45	6:20	7:45	9:00	10:30	11:50
1A Back Bay	6:33	6:43	8:07	9:43	11:03	12:23	1:38	2:43	3:51	4:18	4:46	5:05	5:23	5:48	6:23	7:48	9:13	10:43	12:03
1A Ruggles	6:36	6:46	8:10	9:46	11:06	12:26	1:41	2:46	3:54	4:21	4:49	5:08	5:26	5:51	6:26	7:51	9:26	10:56	12:16
1 Hyde Park	6:39	6:49	8:13	9:49	11:09	12:29	1:44	2:49	3:57	4:24	4:52	5:11	5:29	5:54	6:29	7:54	9:29	10:59	12:19
1 Readville	6:42	6:52	8:16	9:52	11:12	12:32	1:47	2:52	4:00	4:27	4:55	5:14	5:32	5:57	6:32	7:57	9:32	11:02	12:22
2 Endicott	6:45	6:55	8:19	9:55	11:15	12:35	1:50	2:55	4:03	4:30	4:58	5:17	5:42	6:17	6:52	8:17	9:52	11:22	12:42
2 Dedham Corp. Ctr.	6:48	6:58	8:22	9:58	11:18	12:38	1:53	2:58	4:06	4:33	5:01	5:20	5:45	6:20	6:55	8:20	9:55	11:25	12:45
3 Islington	6:51	7:01	8:25	10:01	11:21	12:41	1:56	3:01	4:09	4:36	5:04	5:23	5:48	6:23	6:58	8:23	9:58	11:28	12:48
3 Norwood Depot	6:54	7:04	8:28	10:04	11:24	12:44	1:59	3:04	4:12	4:39	5:07	5:26	5:51	6:26	7:01	8:26	9:56	11:26	12:46
3 Norwood Central	6:57	7:07	8:31	10:07	11:27	12:47	2:02	3:07	4:15	4:42	5:10	5:29	5:54	6:29	7:04	8:29	9:59	11:29	12:49
4 Windsor Gardens	7:00	7:10	8:34	10:10	11:30	12:50	2:05	3:10	4:18	4:45	5:13	5:32	5:57	6:32	7:07	8:32	10:02	11:32	12:52
4 Plimptonville	7:03	7:13	8:37	10:13	11:33	12:53	2:08	3:13	4:21	4:48	5:16	5:35	5:60	6:35	7:10	8:35	10:05	11:35	12:55
4 Walpole	7:06	7:16	8:40	10:16	11:36	12:56	2:11	3:16	4:24	4:51	5:19	5:38	5:63	6:38	7:13	8:38	10:08	11:38	12:58
5 Norfolk	7:09	7:19	8:43	10:19	11:39	12:59	2:14	3:19	4:27	4:54	5:22	5:41	5:66	6:41	7:16	8:41	10:11	11:41	13:01
6 Franklin/Dean Coll.	7:12	7:22	8:46	10:22	11:42	13:02	2:17	3:22	4:30	4:57	5:25	5:44	5:69	6:44	7:19	8:44	10:14	11:44	13:04
6 Forge Park/495	7:15	7:25	8:49	10:25	11:45	13:05	2:20	3:25	4:33	5:00	5:28	5:47	5:72	6:47	7:22	8:47	10:17	11:47	13:07

Keep in Mind:

This schedule will be effective from October 29, 2018 and will replace the schedule of May 21, 2018.

Presidents' Day and 4th of July operate on a **Saturday service schedule**.

New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, and Christmas Day operate on a **Sunday service schedule**.

For all other holiday schedules, please check MBTA.com or call 617-222-3200.

Times in purple with "f" indicate a flag stop:

Passengers must tell the conductor that they wish to leave. 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.

High level platform and bridge plate available. Visit [mbta.com/accessibility](http://mbta.com/accessibility) for more information.

VIA FAIRMOUNT LINE: Operates via the Fairmount Line between Readville and South Station. See the Fairmount Line schedule for all stops.

For additional service to Readville Station, refer to the Fairmount Line schedule for particular trains.

For additional service to Ruggles Station, refer to the Providence and Needham Line schedules for particular trains.

For additional service to Hyde Park Station, refer to the Providence Line schedule for particular trains.

Schedules may change in the event of severe weather

The MBTA and Keolis closely monitor weather forecasts to determine if conditions necessitate changes to the Commuter Rail schedule.

During weather events, the symbols below will communicate service level and impact on passengers. Service level for the following day will be announced mid-afternoon on the prior day.

Saturday & Sunday

Inbound to Boston

ZONE STATION	SATURDAY TRAIN #	1702	1704	1706	1708	1710	1712	1714	1716	1718
6 Forge Park/495	6	6:40	8:40	10:40	12:40	2:40	4:40	6:40	8:40	10:40
6 Franklin/Dean Coll.	6	6:47	8:47	10:47	12:47	2:47	4:47	6:47	8:47	10:47
5 Norfolk	6	6:54	8:54	10:54	12:54	2:54	4:54	6:54	8:54	10:54
4 Walpole	6	7:01	9:01	11:01	1:01	3:01	5:01	7:01	9:01	11:01
4 Windsor Gardens	6	7:06	9:06	11:06	1:06	3:06	5:06	7:06	9:06	11:06
3 Norwood Central	6	7:10	9:10	11:10	1:10	3:10	5:10	7:10	9:10	11:10
3 Norwood Depot	6	7:12	9:12	11:12	1:12	3:12	5:12	7:12	9:12	11:12
3 Islington	6	7:16	9:16	11:16	1:16	3:16	5:16	7:16	9:16	11:16
2 Dedham Corp. Ctr.	6	7:19	9:19	11:19	1:19	3:19	5:19	7:19	9:19	11:19
2 Endicott	6	7:21	9:21	11:21	1:21	3:21	5:21	7:21	9:21	11:21
2 Readville	6	7:24	9:24	11:24	1:24	3:24	5:24	7:24	9:24	11:24
1A Ruggles	6	7:34	9:34	11:34	1:34	3:34	5:34	7:34	9:34	11:34
1A Back Bay	6	7:38	9:38	11:38	1:38	3:38	5:38	7:38	9:38	11:38
1A South Station	6	7:43	9:43	11:43	1:43	3:43	5:43	7:43	9:43	11:43

Trains 1702 and 1704 are Saturday only trains and will not operate on Sunday.

Saturday & Sunday

Outbound from Boston

ZONE STATION	SATURDAY TRAIN #	1703	1705	1707	1709	1711	1713	1715	1717	1719
1A South Station	6	7:20	9:20	11:20	1:20	3:20	5:20	7:20	9:20	11:20
1A Back Bay	6	7:25	9:25	11:25	1:25	3:25	5:25	7:25	9:25	11:25
1A Ruggles	6	7:28	9:28	11:28	1:28	3:28	5:28	7:28	9:28	11:28
2 Readville	6	7:38	9:38	11:38	1:38	3:38	5:38	7:38	9:38	11:38
2 Endicott	6	7:41	9:41	11:41	1:41	3:41	5:41	7:41	9:41	11:41
2 Dedham Corp. Ctr.	6	7:45	9:45	11:45	1:45	3:45	5:45	7:45	9:45	11:45
3 Islington	6	7:47	9:47	11:47	1:47	3:47	5:47	7:47	9:47	11:47
3 Norwood Depot	6	7:50	9:50	11:50	1:50	3:50	5:50	7:50	9:50	11:50
3 Norwood Central	6	7:53	9:53	11:53	1:53	3:53	5:53	7:53	9:53	11:53
4 Windsor Gardens	6	7:57	9:57	11:57	1:57	3:57	5:57	7:57	9:57	11:57
4 Walpole	6	8:03	10:03	12:03	2:03	4:03	6:03	8:03	10:03	12:03
5 Norfolk	6	8:10	10:10	12:10	2:10	4:10	6:10	8:10	10:10	12:10
6 Franklin/Dean Coll.	6	8:17	10:17	12:17	2:17	4:17	6:17	8:17	10:17	12:17
6 Forge Park/495	6	8:24	10:24	12:24	2:24	4:24	6:24	8:24	10:24	12:24

Trains 1703 and 1705 are Saturday only trains and will not operate on Sunday.



**REGULAR SCHEDULE**  
Trains will operate on a normal schedule.



**STORM SCHEDULE**  
Major changes to the regular schedule. Schedules will be available on [mbta.com](http://mbta.com), and in Boston stations.



**NO SERVICE**  
No passenger service on



Massachusetts Bay



Visit



Customer Service



Download the



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## VEHICLE TRAVEL SPEED DATA

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# Accurate Counts

978-664-2565

Page 1

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032SPD1

EB

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total
10/02/18	0	0	0	0	3	2	4	0	0	0	0	0	0	0	0	9
01:00	0	0	0	0	2	2	3	0	0	0	0	0	0	0	0	7
02:00	0	0	0	0	0	3	2	2	0	0	0	0	0	0	0	7
03:00	0	0	1	0	4	5	5	1	1	0	0	0	0	0	0	17
04:00	0	0	0	5	13	23	15	9	5	1	0	0	0	0	0	71
05:00	4	0	1	25	64	139	86	8	1	0	0	0	0	0	0	328
06:00	22	0	4	89	321	328	85	6	0	0	0	0	0	0	0	855
07:00	33	0	1	49	224	254	98	11	0	1	0	0	0	0	0	671
08:00	38	1	12	55	204	234	94	10	0	0	0	0	0	0	0	648
09:00	13	3	3	33	88	219	112	21	0	0	0	0	0	0	0	492
10:00	18	1	14	60	71	146	59	8	0	0	0	0	0	0	0	377
11:00	12	0	2	20	74	149	94	8	1	0	0	0	0	0	0	360
12 PM	17	2	6	25	77	171	89	9	2	0	0	0	0	0	0	398
13:00	21	0	9	30	74	167	79	17	0	0	0	0	0	0	0	397
14:00	21	0	0	15	104	139	67	17	1	0	0	0	0	0	0	364
15:00	45	0	3	20	83	179	85	12	1	0	0	0	0	0	0	428
16:00	49	0	2	28	105	182	77	7	0	0	0	0	0	0	0	450
17:00	40	0	2	26	117	185	76	7	1	0	0	0	0	0	0	454
18:00	32	4	3	32	97	138	45	4	0	0	0	0	0	0	0	355
19:00	12	0	0	15	71	109	36	3	0	0	0	0	0	0	0	246
20:00	2	1	0	12	38	68	40	5	0	0	0	0	0	0	0	166
21:00	1	0	1	10	34	66	22	7	0	0	0	0	0	0	0	141
22:00	2	0	0	1	14	20	18	8	0	0	0	0	0	0	0	63
23:00	0	0	0	5	7	11	4	0	0	0	0	0	0	0	0	27
Total	382	12	64	555	1889	2939	1295	180	13	2	0	0	0	0	0	7331

Daily

15th Percentile : 30 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH

10 MPH Pace Speed : 31-40 MPH

Number in Pace : 4828

Percent in Pace : 65.9%

Number of Vehicles > 35 MPH : 4429

Percent of Vehicles > 35 MPH : 60.4%

# Accurate Counts

978-664-2565

Page 2

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032SPD1

EB

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total
10/03/18	0	0	0	2	1	8	3	0	0	0	0	0	0	0	0	14
01:00	0	0	0	0	2	3	2	0	0	0	0	0	0	0	0	7
02:00	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
03:00	1	0	0	1	4	8	4	3	1	0	0	0	0	0	0	22
04:00	1	0	2	1	9	13	20	12	2	0	0	0	0	0	0	60
05:00	6	0	1	16	72	148	72	11	0	0	0	0	0	0	0	326
06:00	28	0	12	106	302	308	96	4	0	0	0	0	0	0	0	856
07:00	23	0	10	45	174	251	115	11	1	0	0	0	0	0	0	630
08:00	41	3	6	51	207	276	60	8	0	0	0	0	0	0	0	652
09:00	22	2	2	14	133	181	82	22	1	0	0	0	0	0	0	459
10:00	16	0	5	32	95	167	88	8	0	0	0	0	0	0	0	411
11:00	21	1	2	24	93	157	82	14	0	0	0	0	0	0	0	394
12 PM	21	0	2	25	99	189	84	11	0	0	0	0	0	0	0	431
13:00	17	1	5	45	99	136	57	13	0	0	0	0	0	0	0	373
14:00	31	0	2	22	96	170	73	7	1	0	0	0	0	0	0	402
15:00	36	0	5	29	81	182	95	14	0	0	0	0	0	0	0	442
16:00	51	0	4	26	81	190	93	7	2	0	0	0	0	0	0	454
17:00	41	0	1	16	78	198	97	15	0	0	0	0	0	0	0	446
18:00	37	0	4	25	96	171	70	11	1	0	0	0	0	0	0	415
19:00	17	0	1	9	75	134	53	7	0	0	0	0	0	0	0	296
20:00	3	0	0	10	50	111	37	3	0	1	0	0	0	0	0	215
21:00	3	0	2	2	22	56	26	8	0	0	0	0	0	0	0	119
22:00	0	0	0	0	15	21	14	5	1	0	0	0	0	0	0	56
23:00	0	0	0	2	6	17	9	3	0	0	0	0	0	0	0	37
Total	416	7	66	503	1890	3097	1332	197	10	1	0	0	0	0	0	7519

Daily

15th Percentile : 30 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH

10 MPH Pace Speed : 31-40 MPH

Number in Pace : 4987

Percent in Pace : 66.3%

Number of Vehicles > 35 MPH : 4637

Percent of Vehicles > 35 MPH : 61.7%

Grand Total

798 19 130 1058 3779 6036 2627 377 23 3 0 0 0 0 14850

Overall

15th Percentile : 30 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH

10 MPH Pace Speed : 31-40 MPH

Number in Pace : 9815

Percent in Pace : 66.1%

Number of Vehicles > 35 MPH : 9066

Percent of Vehicles > 35 MPH : 61.1%

# **Accurate Counts** 978-664-2565

Page 3

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032SPD1

WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
10/02/18	0	0	0	0	3	9	8	2	0	0	0	0	0	0	22
01:00	0	0	0	0	3	4	0	2	0	0	0	0	0	0	9
02:00	0	0	0	0	0	1	1	3	0	0	0	0	0	0	5
03:00	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
04:00	0	0	0	1	3	6	5	3	0	1	0	0	0	0	19
05:00	3	0	0	1	7	31	33	7	1	1	0	0	0	0	84
06:00	12	0	6	4	35	78	43	4	0	0	0	0	0	0	182
07:00	24	2	2	18	59	169	80	4	0	1	0	0	0	0	359
08:00	24	2	5	28	79	144	73	10	2	0	0	0	0	0	367
09:00	15	1	7	32	75	152	67	10	1	0	0	0	0	0	360
10:00	20	2	12	29	90	146	75	8	2	0	0	0	0	0	384
11:00	20	2	6	24	71	151	83	10	2	0	0	0	0	0	369
12 PM	14	2	11	40	100	164	103	12	0	0	0	0	0	0	446
13:00	13	2	8	16	87	178	111	9	0	0	0	0	0	0	424
14:00	23	12	20	40	104	221	87	6	0	0	0	0	0	0	513
15:00	27	3	19	66	164	234	98	8	1	0	0	0	0	0	620
16:00	37	32	45	85	252	241	37	1	0	0	0	0	0	0	730
17:00	34	6	30	124	238	213	61	4	0	0	0	0	0	0	710
18:00	20	9	35	125	250	141	19	0	0	0	0	0	0	0	599
19:00	14	3	5	64	121	137	23	0	0	0	0	0	0	0	367
20:00	2	3	7	14	73	94	36	5	0	0	0	0	0	0	234
21:00	2	0	0	16	55	69	36	10	0	0	0	0	0	0	188
22:00	1	0	0	1	11	36	29	5	1	1	0	0	0	0	85
23:00	0	0	0	1	27	31	14	3	0	2	0	0	0	0	78
Total	305	81	218	729	1907	2652	1122	126	10	6	0	0	0	0	7156

Daily

15th Percentile : 28 MPH  
50th Percentile : 35 MPH  
85th Percentile : 40 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH  
10 MPH Pace Speed : 31-40 MPH

Number in Pace : 4559  
Percent in Pace : 63.7%

Number of Vehicles > 35 MPH : 3916  
Percent of Vehicles > 35 MPH : 54.7%



# Accurate Counts

Page 4

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032SPD1

WB

Start	1	16	21	26	31	36	41	46	51	56	61	66	71	76	
Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total
10/03/18	0	0	0	1	11	9	8	0	1	0	0	0	0	0	30
01:00	0	0	0	0	4	4	2	1	0	0	0	0	0	0	11
02:00	0	0	0	0	1	4	0	0	0	0	0	0	0	0	5
03:00	0	0	0	0	0	1	1	0	1	0	0	0	0	0	3
04:00	1	0	0	0	2	9	6	0	1	1	0	0	0	0	20
05:00	4	0	0	0	12	27	29	9	0	0	0	0	0	0	81
06:00	26	0	1	16	53	90	40	5	0	0	0	0	0	0	231
07:00	19	0	4	8	61	150	90	17	2	0	0	0	0	0	351
08:00	22	7	14	30	79	153	72	8	1	0	0	0	0	0	386
09:00	12	0	3	13	64	137	96	20	0	0	0	0	0	0	345
10:00	10	0	5	16	61	135	96	17	0	0	0	0	0	0	340
11:00	15	3	7	21	98	176	73	5	0	0	0	0	0	0	398
12 PM	11	4	2	21	126	158	105	12	2	0	0	0	0	1	442
13:00	14	2	13	27	111	189	86	7	0	0	0	0	0	0	449
14:00	18	2	2	44	116	205	91	14	1	0	0	0	0	0	493
15:00	42	12	30	61	173	232	70	10	1	0	0	0	0	0	631
16:00	67	26	27	85	194	231	74	9	0	0	0	0	0	0	713
17:00	35	11	35	99	196	239	114	8	0	0	0	0	0	0	737
18:00	34	7	32	63	220	251	43	3	0	0	0	0	0	0	653
19:00	9	3	19	61	104	177	49	7	0	0	0	0	0	0	429
20:00	4	0	7	14	67	107	54	5	1	0	0	0	0	0	259
21:00	1	0	0	16	39	89	22	8	0	0	0	0	0	0	175
22:00	1	0	0	5	33	54	35	4	2	0	0	0	0	0	134
23:00	0	0	0	4	8	23	24	7	1	1	0	0	0	0	68
Total	345	77	201	605	1833	2850	1280	176	14	2	0	0	0	1	7384

Daily

15th Percentile : 29 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH

10 MPH Pace Speed : 31-40 MPH

Number in Pace : 4683

Percent in Pace : 63.4%

Number of Vehicles > 35 MPH : 4323

Percent of Vehicles > 35 MPH : 58.5%

Grand  
Total

650 158 419 1334 3740 5502 2402 302 24 8 0 0 0 0 1 14540

Overall

15th Percentile : 28 MPH  
50th Percentile : 35 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH

10 MPH Pace Speed : 31-40 MPH

Number in Pace : 9242

Percent in Pace : 63.6%

Number of Vehicles > 35 MPH : 8239

Percent of Vehicles > 35 MPH : 56.7%

# Accurate Counts

978-664-2565

Page 5

Location : Main Street  
 Location : East of Oakland Street  
 City/State: Medway, MA

8032SPD1

EB, WB

Start	1	16	21	26	31	36	41	46	51	56	61	66	71	76	
Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total
10/02/18	0	0	0	0	6	11	12	2	0	0	0	0	0	0	31
01:00	0	0	0	0	5	6	3	2	0	0	0	0	0	0	16
02:00	0	0	0	0	0	4	3	5	0	0	0	0	0	0	12
03:00	0	0	1	0	4	7	5	1	1	0	0	0	0	0	19
04:00	0	0	0	6	16	29	20	12	5	2	0	0	0	0	90
05:00	7	0	1	26	71	170	119	15	2	1	0	0	0	0	412
06:00	34	0	10	93	356	406	128	10	0	0	0	0	0	0	1037
07:00	57	2	3	67	283	423	178	15	0	2	0	0	0	0	1030
08:00	62	3	17	83	283	378	167	20	2	0	0	0	0	0	1015
09:00	28	4	10	65	163	371	179	31	1	0	0	0	0	0	852
10:00	38	3	26	89	161	292	134	16	2	0	0	0	0	0	761
11:00	32	2	8	44	145	300	177	18	3	0	0	0	0	0	729
12 PM	31	4	17	65	177	335	192	21	2	0	0	0	0	0	844
13:00	34	2	17	46	161	345	190	26	0	0	0	0	0	0	821
14:00	44	12	20	55	208	360	154	23	1	0	0	0	0	0	877
15:00	72	3	22	86	247	413	183	20	2	0	0	0	0	0	1048
16:00	86	32	47	113	357	423	114	8	0	0	0	0	0	0	1180
17:00	74	6	32	150	355	398	137	11	1	0	0	0	0	0	1164
18:00	52	13	38	157	347	279	64	4	0	0	0	0	0	0	954
19:00	26	3	5	79	192	246	59	3	0	0	0	0	0	0	613
20:00	4	4	7	26	111	162	76	10	0	0	0	0	0	0	400
21:00	3	0	1	26	89	135	58	17	0	0	0	0	0	0	329
22:00	3	0	0	2	25	56	47	13	1	1	0	0	0	0	148
23:00	0	0	0	6	34	42	18	3	0	2	0	0	0	0	105
Total	687	93	282	1284	3796	5591	2417	306	23	8	0	0	0	0	14487

Daily

15th Percentile : 29 MPH  
 50th Percentile : 35 MPH  
 85th Percentile : 41 MPH  
 95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH  
 10 MPH Pace Speed : 31-40 MPH

Number in Pace : 9387  
 Percent in Pace : 64.8%

Number of Vehicles > 35 MPH : 8345  
 Percent of Vehicles > 35 MPH : 57.6%

# **Accurate Counts** 978-664-2565

Page 6

Location : Main Street  
Location : East of Oakland Street  
City/State: Medway, MA

8032SPD1

EB, WB

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total
10/03/18	0	0	0	3	12	17	11	0	1	0	0	0	0	0	0	44
01:00	0	0	0	0	6	7	4	1	0	0	0	0	0	0	0	18
02:00	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	7
03:00	1	0	0	1	4	9	5	3	2	0	0	0	0	0	0	25
04:00	2	0	2	1	11	22	26	12	3	1	0	0	0	0	0	80
05:00	10	0	1	16	84	175	101	20	0	0	0	0	0	0	0	407
06:00	54	0	13	122	355	398	136	9	0	0	0	0	0	0	0	1087
07:00	42	0	14	53	235	401	205	28	3	0	0	0	0	0	0	981
08:00	63	10	20	81	286	429	132	16	1	0	0	0	0	0	0	1038
09:00	34	2	5	27	197	318	178	42	1	0	0	0	0	0	0	804
10:00	26	0	10	48	156	302	184	25	0	0	0	0	0	0	0	751
11:00	36	4	9	45	191	333	155	19	0	0	0	0	0	0	0	792
12 PM	32	4	4	46	225	347	189	23	2	0	0	0	0	0	1	873
13:00	31	3	18	72	210	325	143	20	0	0	0	0	0	0	0	822
14:00	49	2	4	66	212	375	164	21	2	0	0	0	0	0	0	895
15:00	78	12	35	90	254	414	165	24	1	0	0	0	0	0	0	1073
16:00	118	26	31	111	275	421	167	16	2	0	0	0	0	0	0	1167
17:00	76	11	36	115	274	437	211	23	0	0	0	0	0	0	0	1183
18:00	71	7	36	88	316	422	113	14	1	0	0	0	0	0	0	1068
19:00	26	3	20	70	179	311	102	14	0	0	0	0	0	0	0	725
20:00	7	0	7	24	117	218	91	8	1	1	0	0	0	0	0	474
21:00	4	0	2	18	61	145	48	16	0	0	0	0	0	0	0	294
22:00	1	0	0	5	48	75	49	9	3	0	0	0	0	0	0	190
23:00	0	0	0	6	14	40	33	10	1	1	0	0	0	0	0	105
Total	761	84	267	1108	3723	5947	2612	373	24	3	0	0	0	0	1	14903

Daily

15th Percentile : 30 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH  
10 MPH Pace Speed : 31-40 MPH  
Number in Pace : 9670  
Percent in Pace : 64.9%  
Number of Vehicles > 35 MPH : 8960  
Percent of Vehicles > 35 MPH : 60.1%

Grand Total

1448 177 549 2392 7519 11538 5029 679 47 11 0 0 0 0 1 29390

Overall

15th Percentile : 29 MPH  
50th Percentile : 36 MPH  
85th Percentile : 41 MPH  
95th Percentile : 44 MPH

Mean Speed(Average) : 35 MPH  
10 MPH Pace Speed : 31-40 MPH  
Number in Pace : 19057  
Percent in Pace : 64.8%  
Number of Vehicles > 35 MPH : 17305  
Percent of Vehicles > 35 MPH : 58.9%

## MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Medway COUNT DATE : Oct-18

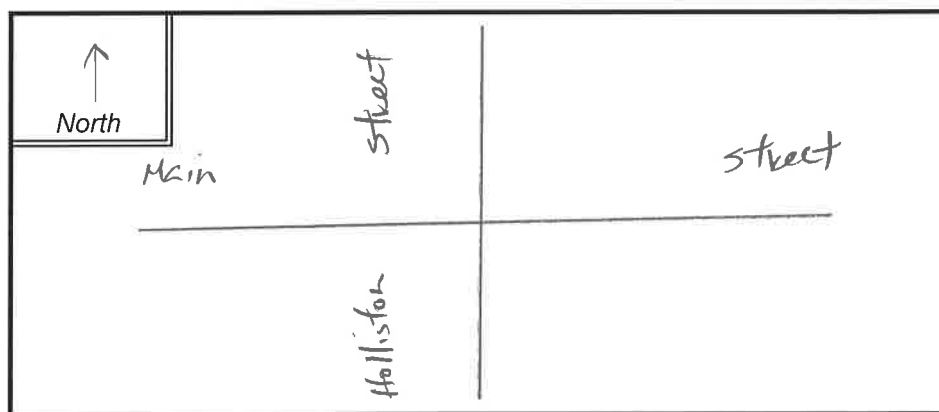
DISTRICT : 3 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Holliston Street

INTERSECTION  
 DIAGRAM  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	819	734	364	532		2,449

"K" FACTOR : 0.090 INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : 27,211

TOTAL # OF CRASHES : 21 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR ( A ) : 4.20

CRASH RATE CALCULATION :

**0.42**

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

Comments : Below MassDOT District 3 crash rate

Project Title & Date : Proposed Residential Development November 2018

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Medway COUNT DATE : Oct-18

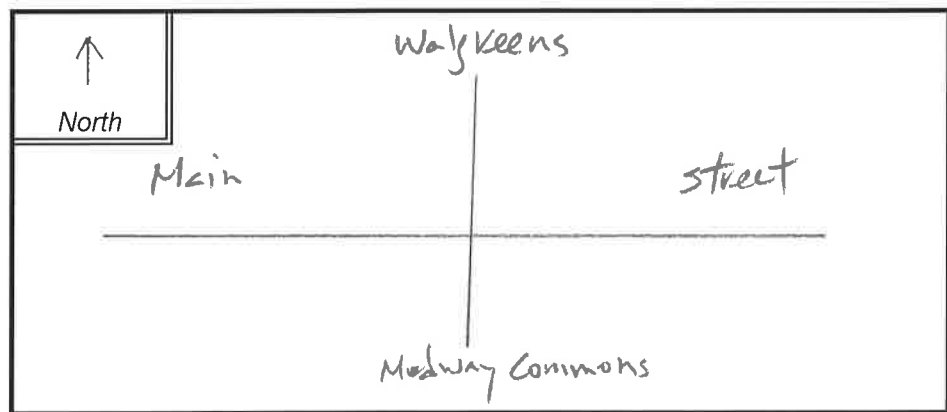
DISTRICT : 3 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Medway Commons/Walgreens Driveway

INTERSECTION  
 DIAGRAM  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	605	704	183	31		1,523

" K " FACTOR : 0.090 INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : 16,922

TOTAL # OF CRASHES : 12 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR ( A ) : 2.40

CRASH RATE CALCULATION :

**0.39**

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

Comments : Below MassDOT District 3 crash rate

Project Title & Date : Proposed Residential Development November 2018

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Medway COUNT DATE : Oct-18

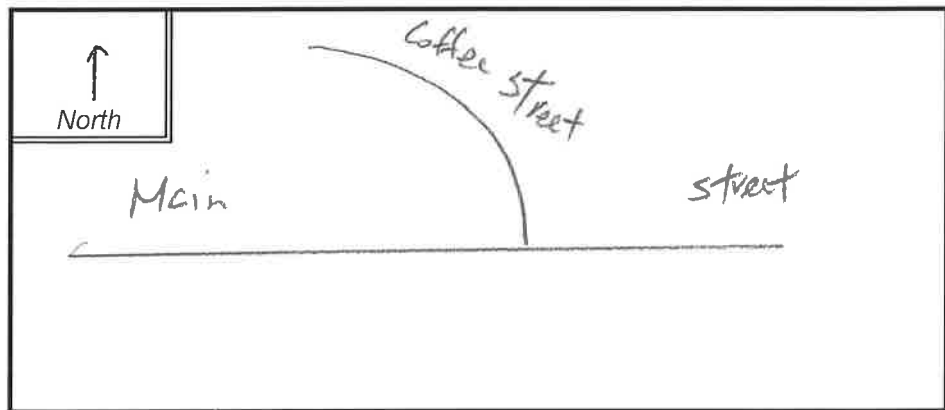
DISTRICT : 3 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : Main Street

MINOR STREET(S) : Coffee Street

INTERSECTION  
 DIAGRAM  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	432	640		41		1,113

" K " FACTOR : 0.090 INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : 12,367

TOTAL # OF CRASHES : 1 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR ( A ) : 0.20

CRASH RATE CALCULATION :

**0.04**

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

Comments : Below MassDOT District 3 crash rate

Project Title & Date : Proposed Residential Development November 2018

# Top Crash Locations

Accessible Version



Coffee St, Medway, MA, 02053, I X



Show search results for Coffee St, Me...

SADDLE HILL RD

SPRUCE RD

HILLVIEW TER

ELLS ST

APPLEGATE RD

VIRGINIA RD

LOVERING ST

MARC RD

SUNSET DR

GORWIN DR

MERYL ST

COFFEE ST

WANN ST

109

VERNON RD

ROBINSON ST

WANN ST

109

MALLOY ST

HENRY ST

KELLEY ST

CREST ST

45

0.2mi

71.38242157 Degrees

Oakland  
Street Park

OAKLAND ST

## Legend

### CrashClusters

Top 200 Intersection Cluster 2013-2015



2013-2015 HSIP Cluster



2006-2015 HSIP Bicycle Cluster



2006-2015 HSIP Pedestrian Cluster





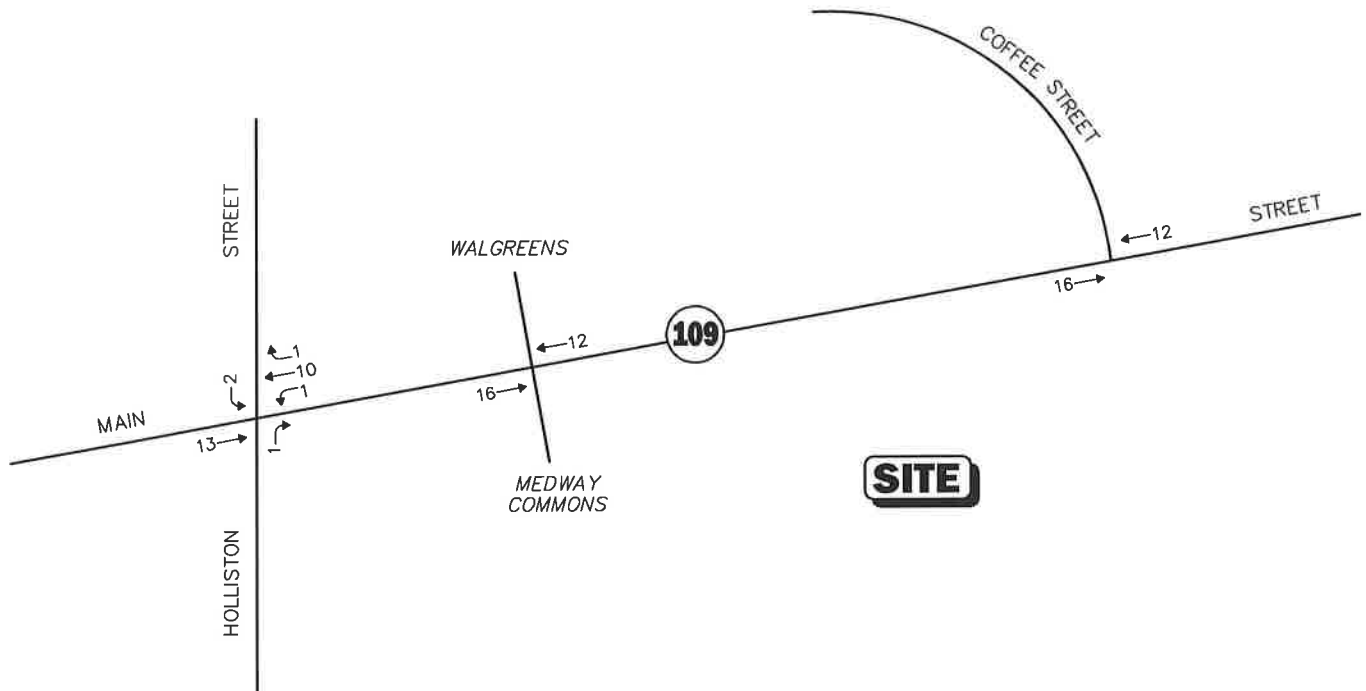
## GENERAL BACKGROUND TRAFFIC GROWTH

# General Background Traffic Growth - Daily Traffic Volumes

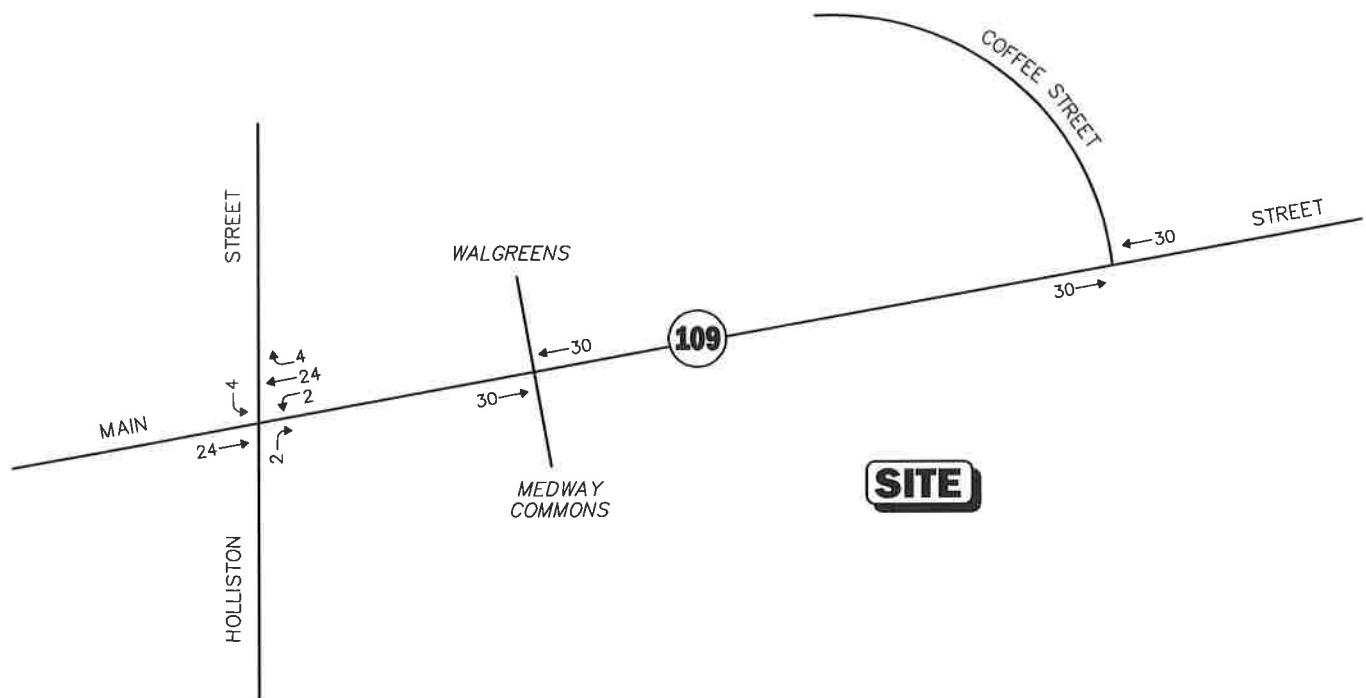
CITY/TOWN	ROUTE/STREET	LOCATION	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average Annual
Medway	Route 109	at the Millis Townline - Sta. 6213	14,970	14,532	14,500	14,551	14,736	13,426	13,526	14,270	14,939	15,133	15,299	0.23%

## **BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS**

**WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)**



**WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)**



**Figure A-1**

**Medical Marijuana Dispensary  
1525 Main Street  
Peak Hour Traffic Volumes**

## TRIP-GENERATION CALCULATIONS

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# Multifamily Housing (Mid-Rise) (221)

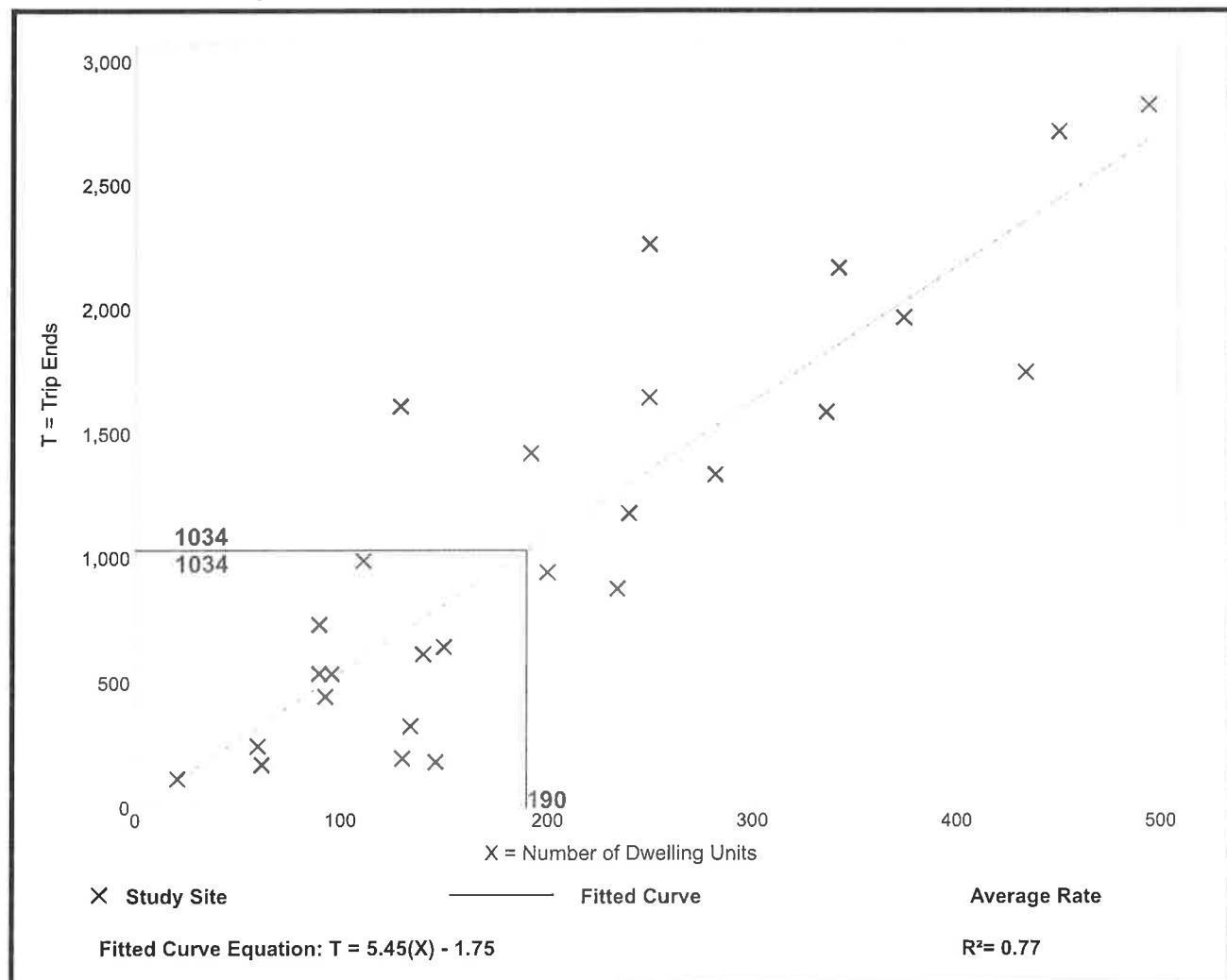
Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban  
Number of Studies: 27  
Avg. Num. of Dwelling Units: 205  
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
5.44	1.27 - 12.50	2.03

## Data Plot and Equation



# Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,  
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 53

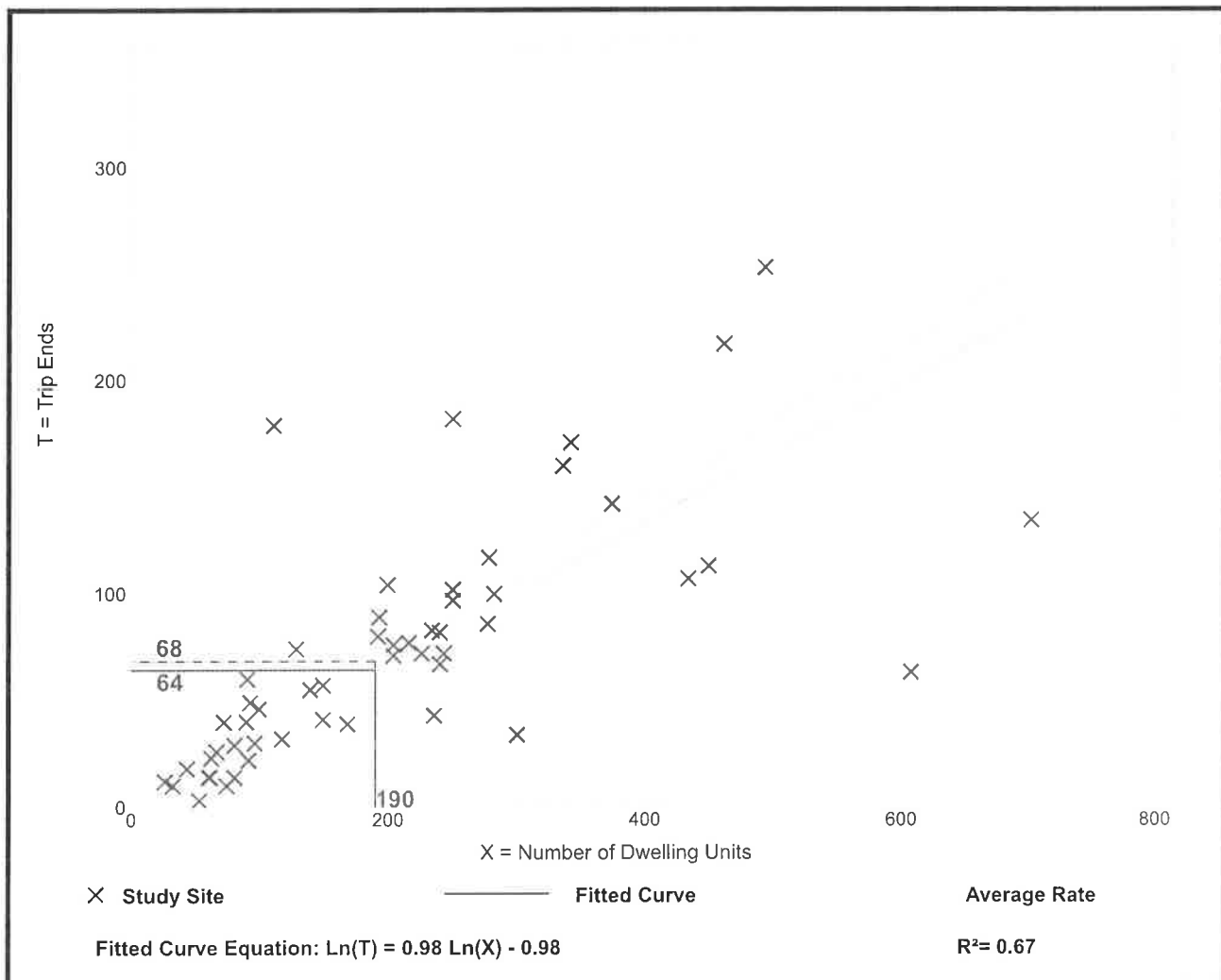
Avg. Num. of Dwelling Units: 207

Directional Distribution: 26% entering, 74% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.36	0.06 - 1.61	0.19

## Data Plot and Equation



## Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 60

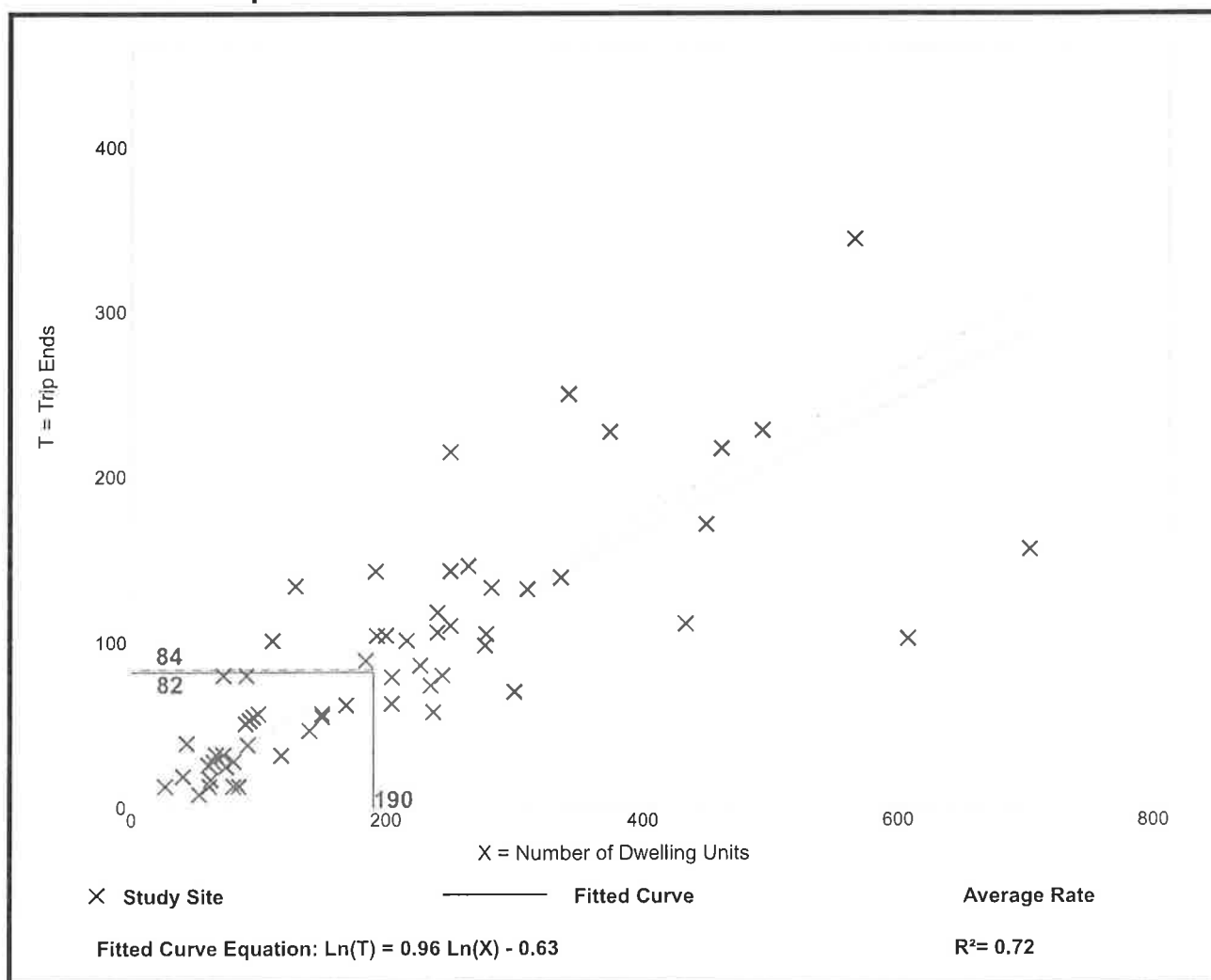
Avg. Num. of Dwelling Units: 208

Directional Distribution: 61% entering, 39% exiting

### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.11	0.19

### Data Plot and Equation





## JOURNEY-TO-WORK TRIP DISTRIBUTIONS

Proposed Residential Development - Medway, MA

Residence			Work Place		Number	Route 109 (East)	Route 109 (West)	Holliston Street (North)	Holliston Street (South)
State	County	MCD	County	MCD					
Massachusetts	Norfolk County	Medway town	Norfolk County	Medway town	921	41	450	230	190
Massachusetts	Norfolk County	Medway town	Suffolk County	Boston city	532	106	426		
Massachusetts	Norfolk County	Medway town	Middlesex County	Framingham town	467		234	233	
Massachusetts	Norfolk County	Medway town	Norfolk County	Franklin Town city	321				321
Massachusetts	Norfolk County	Medway town	Middlesex County	Natick town	261	209		52	
Massachusetts	Norfolk County	Medway town	Norfolk County	Wellesley town	235	235			
Massachusetts	Norfolk County	Medway town	Middlesex County	Newton city	199	199			
Massachusetts	Norfolk County	Medway town	Worcester County	Milford town	198		198		
Massachusetts	Norfolk County	Medway town	Middlesex County	Holliston town	191			191	
Massachusetts	Norfolk County	Medway town	Middlesex County	Waltham city	160	80	80		
Massachusetts	Norfolk County	Medway town	Norfolk County	Norwood town	153	153			
Massachusetts	Norfolk County	Medway town	Norfolk County	Needham town	146	146			
Massachusetts	Norfolk County	Medway town	Norfolk County	Bellingham town	138		138		
Massachusetts	Norfolk County	Medway town	Norfolk County	Millis town	134	134			
Massachusetts	Norfolk County	Medway town	Worcester County	Westborough town	117		117		
Massachusetts	Norfolk County	Medway town	Norfolk County	Medfield town	111	111			
Massachusetts	Norfolk County	Medway town	Middlesex County	Cambridge city	105	105			
Massachusetts	Norfolk County	Medway town	Middlesex County	Hopkinton town	104		78	26	
					4,493	1,519	1,721	732	511

SAY

34% 39% 16% 11%  
35% 40% 15% 10%

## CAPACITY ANALYSIS WORKSHEETS

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Main Street at Holliston Street

Main Street at the Medway Commons and Walgreens Driveways

Main Street at Coffee Street

























Main Street at the Project Site Driveway

Main Street at Holliston Street

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2018 Existing Wkdy Morning Peak Hour  
1: Holliston Street & Main Street













11/09/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	581	140	9	330	30	232	243	30	78	183	119
Future Volume (vph)	129	581	140	9	330	30	232	243	30	78	183	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1831	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1831	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		6				129
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	632	152	10	359	33	252	297	0	85	199	129
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		13.0	37.0		17.0	22.0		16.0	21.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		18.9%	24.4%		17.8%	23.3%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	10.9	47.2	90.0	8.5	34.9	90.0	13.0	20.2		10.2	15.2	28.6
Actuated g/C Ratio	0.12	0.52	1.00	0.09	0.39	1.00	0.14	0.22		0.11	0.17	0.32
v/c Ratio	0.68	0.65	0.09	0.06	0.50	0.02	0.99	0.71		0.44	0.65	0.22
Control Delay	55.5	21.7	0.1	45.6	21.5	0.0	94.4	43.9		44.0	45.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	55.5	21.7	0.1	45.6	21.5	0.0	94.4	43.9		44.0	45.2	5.1
LOS	E	C	A	D	C	A	F	D		D	D	A
Approach Delay		23.3			20.3			67.1			32.4	
Approach LOS		C			C			E			C	
Queue Length 50th (ft)	77	239	0	5	169	0	145	156		45	104	0
Queue Length 95th (ft)	#158	#529	0	m20	139	0	#295	#288		90	175	37
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	976	1689	171	721	1689	255	416		228	340	576

# 2018 Existing Wkdy Morning Peak Hour

## 1: Holliston Street & Main Street

11/09/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.67	0.65	0.09	0.06	0.50	0.02	0.99	0.71		0.37	0.59	0.22

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 34.9

Intersection LOS: C

Intersection Capacity Utilization 70.6%

ICU Level of Service C









Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

























### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
16 s	22 s	13 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
17 s	21 s	15 s	37 s

## 2018 Existing Wkdy Morning Peak Hour

## 1: Holliston Street &amp; Main Street

11/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	581	140	9	330	30	232	243	30	78	183	119
Future Volume (vph)	129	581	140	9	330	30	232	243	30	78	183	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1832		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1832		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	632	152	10	359	33	252	264	33	85	199	129
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	92
Lane Group Flow (vph)	140	632	152	10	359	33	252	292	0	85	199	37
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.4	38.5	90.0	1.3	31.4	90.0	12.0	19.2		8.0	15.2	23.6
Effective Green, g (s)	10.9	41.0	90.0	3.8	33.9	90.0	13.0	20.2		9.0	16.2	25.6
Actuated g/C Ratio	0.12	0.46	1.00	0.04	0.38	1.00	0.14	0.22		0.10	0.18	0.28
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	207	848	1689	72	701	1689	255	411		171	324	435
v/s Ratio Prot	c0.08	c0.34		0.01	0.19		c0.14	c0.16		0.05	0.11	0.01
v/s Ratio Perm			0.09			0.02						0.02
v/c Ratio	0.68	0.75	0.09	0.14	0.51	0.02	0.99	0.71		0.50	0.61	0.08
Uniform Delay, d1	37.9	20.2	0.0	41.5	21.7	0.0	38.4	32.2		38.4	34.0	23.6
Progression Factor	1.00	1.00	1.00	1.21	0.87	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.4	5.9	0.1	0.9	2.6	0.0	52.5	5.7		2.3	3.4	0.1
Delay (s)	46.3	26.1	0.1	51.0	21.3	0.0	91.0	37.9		40.6	37.5	23.7
Level of Service	D	C	A	D	C	A	F	D		D	D	C
Approach Delay (s)		24.9			20.3			62.3			33.8	
Approach LOS		C			C			E			C	

























## Intersection Summary

HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# 2018 Existing Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018













												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	497	215	34	651	75	206	150	21	105	226	221
Future Volume (vph)	136	497	215	34	651	75	206	150	21	105	226	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1827	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1827	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		7				109
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	540	234	37	708	82	224	186	0	114	246	240
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		15.0	39.0		17.0	19.0		17.0	19.0	15.0
Total Split (%)	16.7%	43.3%		16.7%	43.3%		18.9%	21.1%		18.9%	21.1%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	11.0	41.6	90.0	9.7	35.3	90.0	13.0	18.7		11.3	14.7	28.2
Actuated g/C Ratio	0.12	0.46	1.00	0.11	0.39	1.00	0.14	0.21		0.13	0.16	0.31
v/c Ratio	0.71	0.63	0.14	0.20	0.97	0.05	0.88	0.48		0.53	0.84	0.43
Control Delay	57.9	24.5	0.2	44.3	51.1	0.1	71.9	37.0		45.8	61.8	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	57.9	24.5	0.2	44.3	51.1	0.1	71.9	37.0		45.8	61.8	15.7
LOS	E	C	A	D	D	A	E	D		D	E	B
Approach Delay		23.7			45.7			56.1			40.3	
Approach LOS		C			D			E			D	
Queue Length 50th (ft)	82	253	0	17	402	0	126	94		61	137	55
Queue Length 95th (ft)	#171	386	0	m49	#627	0	#256	164		114	#260	121
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	860	1689	209	731	1689	255	385		247	300	554



# 2018 Existing Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.71	0.63	0.14	0.18	0.97	0.05	0.88	0.48		0.46	0.82	0.43

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 38.7

Intersection LOS: D

Intersection Capacity Utilization 78.4%

ICU Level of Service D









Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

























### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
17 s	19 s	15 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
17 s	19 s	15 s	39 s

# 2018 Existing Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	497	215	34	651	75	206	150	21	105	226	221
Future Volume (vph)	136	497	215	34	651	75	206	150	21	105	226	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1828		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1828		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	540	234	37	708	82	224	163	23	114	246	240
RTOR Reduction (vph)	0	0	0	0	0	0	0	6	0	0	0	78
Lane Group Flow (vph)	148	540	234	37	708	82	224	180	0	114	246	162
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.5	35.5	90.0	4.8	31.8	90.0	12.0	17.7		9.0	14.7	23.2
Effective Green, g (s)	11.0	38.0	90.0	7.3	34.3	90.0	13.0	18.7		10.0	15.7	25.2
Actuated g/C Ratio	0.12	0.42	1.00	0.08	0.38	1.00	0.14	0.21		0.11	0.17	0.28
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	786	1689	138	710	1689	255	379		190	314	428
v/s Ratio Prot	c0.09	c0.29		0.02	c0.38		c0.13	0.10		0.07	c0.14	0.04
v/s Ratio Perm			c0.14			0.05						0.07
v/c Ratio	0.71	0.69	0.14	0.27	1.00	0.05	0.88	0.48		0.60	0.78	0.38
Uniform Delay, d1	38.0	21.2	0.0	38.8	27.8	0.0	37.7	31.3		38.1	35.5	26.1
Progression Factor	1.00	1.00	1.00	1.16	0.90	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.5	4.9	0.2	0.9	31.4	0.0	27.0	0.9		5.0	12.0	0.6
Delay (s)	48.4	26.0	0.2	45.9	56.5	0.0	64.8	32.3		43.1	47.6	26.6
Level of Service	D	C	A	D	E	A	E	C		D	D	C
Approach Delay (s)		23.1			50.4			50.0			38.4	
Approach LOS		C			D			D			D	

























### Intersection Summary

HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

# 2025 No-Build Wkdy Morning Peak Hour

## 1: Holliston Street & Main Street













11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	615	145	10	352	32	240	252	32	83	190	123
Future Volume (vph)	136	615	145	10	352	32	240	252	32	83	190	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1831	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1831	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		7				134
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	668	158	11	383	35	261	309	0	90	207	134
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		13.0	37.0		19.0	24.0		14.0	19.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		21.1%	26.7%		15.6%	21.1%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	11.0	46.3	90.0	8.5	33.9	90.0	15.0	22.0		9.3	14.1	27.6
Actuated g/C Ratio	0.12	0.51	1.00	0.09	0.38	1.00	0.17	0.24		0.10	0.16	0.31
v/c Ratio	0.71	0.70	0.09	0.07	0.55	0.02	0.88	0.68		0.51	0.73	0.24
Control Delay	57.9	23.6	0.1	45.6	22.8	0.0	68.4	40.3		48.5	52.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	57.9	23.6	0.1	45.6	22.8	0.0	68.4	40.3		48.5	52.4	5.4
LOS	E	C	A	D	C	A	E	D		D	D	A
Approach Delay		25.0			21.5			53.2			36.9	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	82	261	0	6	182	0	147	161		49	112	0
Queue Length 95th (ft)	#171	#575	0	m20	144	0	#285	#281		97	#204	39
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	958	1689	171	702	1689	295	453		190	300	562

# 2025 No-Build Wkdy Morning Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.71	0.70	0.09	0.06	0.55	0.02	0.88	0.68		0.47	0.69	0.24

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 33.2

Intersection LOS: C

Intersection Capacity Utilization 73.2%

ICU Level of Service D









Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

























### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
14 s	24 s	13 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
19 s	19 s	15 s	37 s

## 2025 No-Build Wkdy Morning Peak Hour

## 1: Holliston Street &amp; Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	615	145	10	352	32	240	252	32	83	190	123
Future Volume (vph)	136	615	145	10	352	32	240	252	32	83	190	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1831		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1831		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	668	158	11	383	35	261	274	35	90	207	134
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	97
Lane Group Flow (vph)	148	668	158	11	383	35	261	304	0	90	207	37
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.5	37.6	90.0	1.3	30.4	90.0	14.0	21.0		7.1	14.1	22.6
Effective Green, g (s)	11.0	40.1	90.0	3.8	32.9	90.0	15.0	22.0		8.1	15.1	24.6
Actuated g/C Ratio	0.12	0.45	1.00	0.04	0.37	1.00	0.17	0.24		0.09	0.17	0.27
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	830	1689	72	681	1689	295	447		153	302	418
v/s Ratio Prot	c0.09	c0.36		0.01	0.21		c0.15	c0.17		0.05	0.11	0.01
v/s Ratio Perm			0.09			0.02						0.01
v/c Ratio	0.71	0.80	0.09	0.15	0.56	0.02	0.88	0.68		0.59	0.69	0.09
Uniform Delay, d1	38.0	21.6	0.0	41.5	22.8	0.0	36.7	30.8		39.3	35.2	24.3
Progression Factor	1.00	1.00	1.00	1.21	0.87	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.5	8.2	0.1	1.0	3.2	0.0	25.4	4.1		5.7	6.3	0.1
Delay (s)	48.4	29.7	0.1	51.1	23.0	0.0	62.1	34.9		45.0	41.5	24.4
Level of Service	D	C	A	D	C	A	E	C		D	D	C
Approach Delay (s)		27.8			21.8			47.3			36.9	
Approach LOS		C			C			D			D	

























## Intersection Summary

HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

# 2025 No-Build Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street













11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	539	223	37	698	82	213	155	23	113	234	229
Future Volume (vph)	141	539	223	37	698	82	213	155	23	113	234	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1827	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1827	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		7				103
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	586	242	40	759	89	232	193	0	123	254	249
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		15.0	39.0		17.0	19.0		17.0	19.0	15.0
Total Split (%)	16.7%	43.3%		16.7%	43.3%		18.9%	21.1%		18.9%	21.1%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	11.0	41.4	90.0	9.8	35.2	90.0	13.0	16.3		11.5	14.8	28.3
Actuated g/C Ratio	0.12	0.46	1.00	0.11	0.39	1.00	0.14	0.18		0.13	0.16	0.31
v/c Ratio	0.73	0.68	0.14	0.22	1.04	0.05	0.91	0.57		0.56	0.86	0.45
Control Delay	59.8	26.6	0.2	44.7	69.7	0.0	77.3	40.7		46.9	64.3	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	59.8	26.6	0.2	44.7	69.7	0.0	77.3	40.7		46.9	64.3	17.0
LOS	E	C	A	D	E	A	E	D		D	E	B
Approach Delay		25.3			61.6			60.7			42.1	
Approach LOS		C			E			E			D	
Queue Length 50th (ft)	85	285	0	19	~480	0	132	99		66	142	62
Queue Length 95th (ft)	#179	#468	0	m50	#681	0	#267	170		121	#272	131
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	857	1689	209	728	1689	255	336		247	300	552

# 2025 No-Build Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.73	0.68	0.14	0.19	1.04	0.05	0.91	0.57		0.50	0.85	0.45

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 45.1

Intersection LOS: D

Intersection Capacity Utilization 82.0%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.









Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

























### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
17 s	19 s	15 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
17 s	19 s	15 s	39 s

# 2025 No-Build Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	539	223	37	698	82	213	155	23	113	234	229
Future Volume (vph)	141	539	223	37	698	82	213	155	23	113	234	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1827		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1827		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	586	242	40	759	89	232	168	25	123	254	249
RTOR Reduction (vph)	0	0	0	0	0	0	0	6	0	0	0	75
Lane Group Flow (vph)	153	586	242	40	759	89	232	187	0	123	254	174
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.5	36.3	90.0	4.9	32.7	90.0	12.0	15.3		10.5	13.8	22.3
Effective Green, g (s)	11.0	38.8	90.0	7.4	35.2	90.0	13.0	16.3		11.5	14.8	24.3
Actuated g/C Ratio	0.12	0.43	1.00	0.08	0.39	1.00	0.14	0.18		0.13	0.16	0.27
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	803	1689	140	728	1689	255	330		218	296	413
v/s Ratio Prot	c0.09	c0.31		0.02	c0.41		c0.13	0.10		0.07	c0.14	0.04
v/s Ratio Perm			c0.14			0.05						0.07
v/c Ratio	0.73	0.73	0.14	0.29	1.04	0.05	0.91	0.57		0.56	0.86	0.42
Uniform Delay, d1	38.1	21.2	0.0	38.8	27.4	0.0	37.9	33.6		36.9	36.6	27.1
Progression Factor	1.00	1.00	1.00	1.16	0.90	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	5.8	0.2	1.0	43.0	0.1	33.0	2.2		3.3	21.0	0.7
Delay (s)	50.5	27.0	0.2	46.2	67.7	0.1	70.9	35.9		40.2	57.6	27.7
Level of Service	D	C	A	D	E	A	E	D		D	E	C
Approach Delay (s)		24.1			60.0			55.0			42.3	
Approach LOS		C			E			D			D	

























### Intersection Summary

HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



2025 Build Wkdy Morning Peak Hour  
1: Holliston Street & Main Street













11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	622	145	15	371	39	240	252	34	85	190	123
Future Volume (vph)	136	622	145	15	371	39	240	252	34	85	190	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1829	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1829	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		7				134
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	676	158	16	403	42	261	311	0	92	207	134
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		13.0	37.0		19.0	24.0		14.0	19.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		21.1%	26.7%		15.6%	21.1%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	11.0	46.3	90.0	8.6	33.9	90.0	15.0	22.0		9.3	14.1	27.6
Actuated g/C Ratio	0.12	0.51	1.00	0.10	0.38	1.00	0.17	0.24		0.10	0.16	0.31
v/c Ratio	0.71	0.71	0.09	0.10	0.57	0.02	0.88	0.69		0.52	0.73	0.24
Control Delay	57.9	23.9	0.1	46.7	23.5	0.0	68.4	40.6		48.9	52.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	57.9	23.9	0.1	46.7	23.5	0.0	68.4	40.6		48.9	52.4	5.4
LOS	E	C	A	D	C	A	E	D		D	D	A
Approach Delay		25.2			22.1			53.3			37.1	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	82	265	0	9	194	0	147	163		50	112	0
Queue Length 95th (ft)	#171	#585	0	m29	151	0	#285	#283		99	#204	39
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	958	1689	171	702	1689	295	452		190	300	562

# 2025 Build Wkdy Morning Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.71	0.71	0.09	0.09	0.57	0.02	0.88	0.69		0.48	0.69	0.24

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 33.3

Intersection LOS: C

Intersection Capacity Utilization 73.5%

ICU Level of Service D









Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

























### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
14 s	24 s	13 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
19 s	19 s	15 s	37 s

## 2025 Build Wkdy Morning Peak Hour

## 1: Holliston Street &amp; Main Street

11/07/2018

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	622	145	15	371	39	240	252	34	85	190	123
Future Volume (vph)	136	622	145	15	371	39	240	252	34	85	190	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1830		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1830		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	676	158	16	403	42	261	274	37	92	207	134
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	97
Lane Group Flow (vph)	148	676	158	16	403	42	261	306	0	92	207	37
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.5	37.6	90.0	1.3	30.4	90.0	14.0	21.0		7.1	14.1	22.6
Effective Green, g (s)	11.0	40.1	90.0	3.8	32.9	90.0	15.0	22.0		8.1	15.1	24.6
Actuated g/C Ratio	0.12	0.45	1.00	0.04	0.37	1.00	0.17	0.24		0.09	0.17	0.27
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	830	1689	72	681	1689	295	447		153	302	418
v/s Ratio Prot	c0.09	c0.36		0.01	0.22		c0.15	c0.17		0.05	0.11	0.01
v/s Ratio Perm			0.09			0.02						0.01
v/c Ratio	0.71	0.81	0.09	0.22	0.59	0.02	0.88	0.68		0.60	0.69	0.09
Uniform Delay, d1	38.0	21.7	0.0	41.7	23.1	0.0	36.7	30.8		39.4	35.2	24.3
Progression Factor	1.00	1.00	1.00	1.22	0.87	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.5	8.6	0.1	1.5	3.6	0.0	25.4	4.3		6.5	6.3	0.1
Delay (s)	48.4	30.3	0.1	52.4	23.7	0.0	62.1	35.1		45.9	41.5	24.4
Level of Service	D	C	A	D	C	A	E	D		D	D	C
Approach Delay (s)		28.2			22.5			47.4			37.2	
Approach LOS		C			C			D			D	

## Intersection Summary

HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

2025 Build Wkdy Evening Peak Hour  
1: Holliston Street & Main Street













11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	559	223	40	711	87	213	155	28	121	234	229
Future Volume (vph)	141	559	223	40	711	87	213	155	28	121	234	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	14	11	12	14	12	12	12	11	11	11
Storage Length (ft)	225		250	125		125	200		0	150		150
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1820	0	1711	1801	1531
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1820	0	1711	1801	1531
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			242		9				103
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		553			669			413			319	
Travel Time (s)		12.6			15.2			9.4			7.3	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	608	242	43	773	95	232	198	0	132	254	249
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Detector Phase	7	4		3	8		5	2		1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.5	23.0		11.5	23.0		10.0	13.0		10.0	13.0	11.5
Total Split (s)	15.0	39.0		15.0	39.0		17.0	19.0		17.0	19.0	15.0
Total Split (%)	16.7%	43.3%		16.7%	43.3%		18.9%	21.1%		18.9%	21.1%	16.7%
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	None
Act Effct Green (s)	11.0	41.4	90.0	9.8	35.2	90.0	13.0	16.1		11.7	14.8	28.3
Actuated g/C Ratio	0.12	0.46	1.00	0.11	0.39	1.00	0.14	0.18		0.13	0.16	0.31
v/c Ratio	0.73	0.71	0.14	0.23	1.06	0.06	0.91	0.60		0.59	0.86	0.45
Control Delay	59.8	27.6	0.2	45.1	75.6	0.1	77.3	41.3		48.0	64.3	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	59.8	27.6	0.2	45.1	75.6	0.1	77.3	41.3		48.0	64.3	17.0
LOS	E	C	A	D	E	A	E	D		D	E	B
Approach Delay		25.9			66.3			60.7			42.4	
Approach LOS		C			E			E			D	
Queue Length 50th (ft)	85	302	0	21	~498	0	132	101		71	142	62
Queue Length 95th (ft)	#179	#498	0	m51	#700	m0	#267	174		129	#272	131
Internal Link Dist (ft)		473			589			333			239	
Turn Bay Length (ft)	225		250	125		125	200			150		150
Base Capacity (vph)	209	856	1689	209	728	1689	255	332		247	300	552

# 2025 Build Wkdy Evening Peak Hour

## 1: Holliston Street & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.73	0.71	0.14	0.21	1.06	0.06	0.91	0.60		0.53	0.85	0.45

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 46.8

Intersection LOS: D

Intersection Capacity Utilization 82.7%

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.
























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

### Splits and Phases: 1: Holliston Street & Main Street

 Ø1	 Ø2	 Ø3	 Ø4 (R)
17 s	19 s	15 s	39 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
17 s	19 s	15 s	39 s

2025 Build Wkdy Evening Peak Hour  
1: Holliston Street & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	559	223	40	711	87	213	155	28	121	234	229
Future Volume (vph)	141	559	223	40	711	87	213	155	28	121	234	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	14	11	12	14	12	12	12	11	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1711	1863	1689	1711	1863	1689	1770	1820		1711	1801	1531
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1711	1863	1689	1711	1863	1689	1770	1820		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	608	242	43	773	95	232	168	30	132	254	249
RTOR Reduction (vph)	0	0	0	0	0	0	0	7	0	0	0	75
Lane Group Flow (vph)	153	608	242	43	773	95	232	191	0	132	254	174
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		5	2		1	6	7
Permitted Phases			Free			Free						6
Actuated Green, G (s)	8.5	36.3	90.0	4.9	32.7	90.0	12.0	15.1		10.7	13.8	22.3
Effective Green, g (s)	11.0	38.8	90.0	7.4	35.2	90.0	13.0	16.1		11.7	14.8	24.3
Actuated g/C Ratio	0.12	0.43	1.00	0.08	0.39	1.00	0.14	0.18		0.13	0.16	0.27
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	209	803	1689	140	728	1689	255	325		222	296	413
v/s Ratio Prot	c0.09	c0.33		0.03	c0.41		c0.13	0.10		0.08	c0.14	0.04
v/s Ratio Perm			c0.14			0.06						0.07
v/c Ratio	0.73	0.76	0.14	0.31	1.06	0.06	0.91	0.59		0.59	0.86	0.42
Uniform Delay, d1	38.1	21.6	0.0	38.9	27.4	0.0	37.9	33.9		36.9	36.6	27.1
Progression Factor	1.00	1.00	1.00	1.17	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.4	6.6	0.2	1.1	48.9	0.1	33.0	2.7		4.2	21.0	0.7
Delay (s)	50.5	28.2	0.2	46.5	73.8	0.1	70.9	36.6		41.1	57.6	27.7
Level of Service	D	C	A	D	E	A	E	D		D	E	C
Approach Delay (s)		24.8			64.8			55.1			42.5	
Approach LOS		C			E			E			D	

Intersection Summary























HCM 2000 Control Delay	45.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Main Street at the Medway Commons and Walgreens Driveways

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2018 Existing Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street













11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	542	135	55	401	7	67	2	92	3	1	6
Future Volume (vph)	5	542	135	55	401	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1981	0	0	1777	1583	1770	1565	0
Flt Permitted	0.950			0.950				0.726		0.708		
Satd. Flow (perm)	1711	1863	1583	1888	1981	0	0	1352	1583	1319	1565	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			121		2				109		7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			2280			297			253	
Travel Time (s)		15.2			51.8			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	589	147	60	444	0	0	75	100	3	8	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.7	62.0	62.0	9.7	71.1			11.7	11.7	11.6	11.6	
Actuated g/C Ratio	0.09	0.69	0.69	0.11	0.79			0.13	0.13	0.13	0.13	
v/c Ratio	0.03	0.46	0.13	0.29	0.28			0.43	0.33	0.02	0.04	
Control Delay	43.0	4.5	0.7	40.4	4.8			43.0	9.4	32.7	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	43.0	4.5	0.7	40.4	4.8			43.0	9.4	32.7	20.7	
LOS	D	A	A	D	A			D	A	C	C	
Approach Delay		4.0			9.1			23.8			24.0	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)	3	57	0	32	57			40	0	2	1	
Queue Length 95th (ft)	m4	73	m3	69	166			81	38	9	13	
Internal Link Dist (ft)		589			2200			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	152	1284	1128	230	1564			210	338	205	249	



2018 Existing Wkdy Morning Peak Hour  
 2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.03	0.46	0.13	0.26	0.28			0.36	0.30	0.01	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 8.3

Intersection LOS: A







Intersection Capacity Utilization 53.2%

ICU Level of Service A

Analysis Period (min) 15























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

Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)
18 s	15 s	57 s
 Ø6	 Ø7	 Ø8 (R)
18 s	12 s	60 s

2018 Existing Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	542	135	55	401	7	67	2	92	3	1	6
Future Volume (vph)	5	542	135	55	401	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1982			1776	1583	1770	1564	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.73	1.00	0.71	1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1982			1353	1583	1319	1564	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	589	147	60	436	8	73	2	100	3	1	7
RTOR Reduction (vph)	0	0	42	0	1	0	0	0	88	0	6	0
Lane Group Flow (vph)	5	589	105	60	443	0	0	75	12	3	2	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	56.9	56.9	6.6	62.3			8.5	8.5	8.5	8.5	
Effective Green, g (s)	3.2	58.9	58.9	8.6	64.3			10.5	10.5	10.5	10.5	
Actuated g/C Ratio	0.04	0.65	0.65	0.10	0.71			0.12	0.12	0.12	0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	60	1219	1035	180	1416			157	184	153	182	
v/s Ratio Prot	0.00	c0.32		c0.03	0.22						0.00	
v/s Ratio Perm			0.07					c0.06	0.01	0.00		
v/c Ratio	0.08	0.48	0.10	0.33	0.31			0.48	0.06	0.02	0.01	
Uniform Delay, d1	42.0	7.9	5.8	38.0	4.7			37.2	35.4	35.2	35.2	
Progression Factor	1.13	0.37	0.23	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	1.1	0.2	1.1	0.6			2.3	0.1	0.1	0.0	
Delay (s)	48.0	4.0	1.5	39.1	5.3			39.5	35.5	35.2	35.2	
Level of Service	D	A	A	D	A			D	D	D	D	
Approach Delay (s)		3.8			9.3			37.2			35.2	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			













2018 Existing Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	446	174	97	619	12	109	10	70	0	7	25
Future Volume (vph)	6	446	174	97	619	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1981	0	0	1781	1583	1863	1592	0
Flt Permitted	0.950			0.950				0.719				
Satd. Flow (perm)	1711	1863	1583	1888	1981	0	0	1339	1583	1863	1592	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			156		2				109		27	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			2280			297			253	
Travel Time (s)		15.2			51.8			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	485	189	105	686	0	0	129	76	0	35	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.8	53.3	53.3	11.9	64.3			15.3	15.3		15.3	
Actuated g/C Ratio	0.09	0.59	0.59	0.13	0.71			0.17	0.17		0.17	
v/c Ratio	0.05	0.44	0.19	0.42	0.48			0.57	0.21		0.12	
Control Delay	30.8	13.2	5.4	40.7	8.6			43.6	4.2		15.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	30.8	13.2	5.4	40.7	8.6			43.6	4.2		15.1	
LOS	C	B	A	D	A			D	A		B	
Approach Delay		11.2			12.8			29.0			15.1	
Approach LOS		B			B			C			B	
Queue Length 50th (ft)	4	97	0	55	130			68	0		4	
Queue Length 95th (ft)	m7	208	51	103	349			120	19		28	
Internal Link Dist (ft)		589			2200			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	153	1103	1001	293	1415			282	420		357	

2018 Existing Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.05	0.44	0.19	0.36	0.48			0.46	0.18		0.10	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 2 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 14.2

Intersection LOS: B







Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15























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

Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)
23 s	18 s	49 s
 Ø6	 Ø7	 Ø8 (R)
23 s	12 s	55 s























2018 Existing Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	446	174	97	619	12	109	10	70	0	7	25
Future Volume (vph)	6	446	174	97	619	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1981			1781	1583		1592	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.72	1.00		1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1981			1339	1583		1592	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	485	189	105	673	13	118	11	76	0	8	27
RTOR Reduction (vph)	0	0	66	0	1	0	0	0	63	0	22	0
Lane Group Flow (vph)	7	485	123	105	685	0	0	129	13	0	13	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	50.1	50.1	8.6	57.5			13.3	13.3		13.3	
Effective Green, g (s)	3.2	52.1	52.1	10.6	59.5			15.3	15.3		15.3	
Actuated g/C Ratio	0.04	0.58	0.58	0.12	0.66			0.17	0.17		0.17	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	60	1078	916	222	1309			227	269		270	
v/s Ratio Prot	0.00	0.26		c0.06	c0.35						0.01	
v/s Ratio Perm			0.08					c0.10	0.01			
v/c Ratio	0.12	0.45	0.13	0.47	0.52			0.57	0.05		0.05	
Uniform Delay, d1	42.0	10.8	8.7	37.1	7.9			34.3	31.3		31.2	
Progression Factor	0.81	0.96	1.58	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.7	1.1	0.2	1.6	1.5			3.2	0.1		0.1	
Delay (s)	34.6	11.5	13.9	38.7	9.4			37.6	31.3		31.3	
Level of Service	C	B	B	D	A			D	C		C	
Approach Delay (s)		12.4			13.3			35.3			31.3	
Approach LOS		B			B			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			60.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												













2025 No-Build Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	577	135	55	437	7	67	2	92	3	1	6
Future Volume (vph)	5	577	135	55	437	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1983	0	0	1777	1583	1770	1565	0
Flt Permitted	0.950			0.950				0.726		0.708		
Satd. Flow (perm)	1711	1863	1583	1888	1983	0	0	1352	1583	1319	1565	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			114		2				109		7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			2280			297			253	
Travel Time (s)		15.2			51.8			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	627	147	60	483	0	0	75	100	3	8	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.7	62.0	62.0	9.7	71.1			11.7	11.7	11.6	11.6	
Actuated g/C Ratio	0.09	0.69	0.69	0.11	0.79			0.13	0.13	0.13	0.13	
v/c Ratio	0.03	0.49	0.13	0.29	0.31			0.43	0.33	0.02	0.04	
Control Delay	42.2	4.5	0.8	40.4	5.0			43.0	9.4	32.7	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	42.2	4.5	0.8	40.4	5.0			43.0	9.4	32.7	20.7	
LOS	D	A	A	D	A			D	A	C	C	
Approach Delay		4.0			8.9			23.8			24.0	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)	3	61	0	32	63			40	0	2	1	
Queue Length 95th (ft)	m4	78	m3	69	184			81	38	9	13	
Internal Link Dist (ft)		589			2200			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	152	1284	1126	230	1566			210	338	205	249	

2025 No-Build Wkdy Morning Peak Hour  
 2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.03	0.49	0.13	0.26	0.31			0.36	0.30	0.01	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 8.2

Intersection LOS: A







Intersection Capacity Utilization 55.0%

ICU Level of Service B

Analysis Period (min) 15






















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

Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)	
18 s	15 s	57 s	
 Ø6	 Ø7	 Ø8 (R)	
18 s	12 s	60 s	

2025 No-Build Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street























11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	577	135	55	437	7	67	2	92	3	1	6
Future Volume (vph)	5	577	135	55	437	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1982			1776	1583	1770	1564	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.73	1.00	0.71	1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1982			1353	1583	1319	1564	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	627	147	60	475	8	73	2	100	3	1	7
RTOR Reduction (vph)	0	0	39	0	1	0	0	0	88	0	6	0
Lane Group Flow (vph)	5	627	108	60	482	0	0	75	12	3	2	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	56.9	56.9	6.6	62.3			8.5	8.5	8.5	8.5	
Effective Green, g (s)	3.2	58.9	58.9	8.6	64.3			10.5	10.5	10.5	10.5	
Actuated g/C Ratio	0.04	0.65	0.65	0.10	0.71			0.12	0.12	0.12	0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	60	1219	1035	180	1416			157	184	153	182	
v/s Ratio Prot	0.00	c0.34		c0.03	0.24						0.00	
v/s Ratio Perm			0.07					c0.06	0.01	0.00		
v/c Ratio	0.08	0.51	0.10	0.33	0.34			0.48	0.06	0.02	0.01	
Uniform Delay, d1	42.0	8.1	5.8	38.0	4.8			37.2	35.4	35.2	35.2	
Progression Factor	1.11	0.36	0.23	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.1	0.1	1.1	0.7			2.3	0.1	0.1	0.0	
Delay (s)	47.0	4.1	1.5	39.1	5.5			39.5	35.5	35.2	35.2	
Level of Service	D	A	A	D	A			D	D	D	D	
Approach Delay (s)		3.9			9.2			37.2			35.2	
Approach LOS		A			A			D			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.9			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			90.0						12.0			
Intersection Capacity Utilization			55.0%						B			
Analysis Period (min)			15									
c Critical Lane Group												















2025 No-Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	492	174	97	671	12	109	10	70	0	7	25
Future Volume (vph)	6	492	174	97	671	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1981	0	0	1781	1583	1863	1592	0
Flt Permitted	0.950			0.950				0.719				
Satd. Flow (perm)	1711	1863	1583	1888	1981	0	0	1339	1583	1863	1592	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			141		2				109		27	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			2280			297			253	
Travel Time (s)		15.2			51.8			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	535	189	105	742	0	0	129	76	0	35	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.8	53.3	53.3	11.9	64.3			15.3	15.3		15.3	
Actuated g/C Ratio	0.09	0.59	0.59	0.13	0.71			0.17	0.17		0.17	
v/c Ratio	0.05	0.49	0.19	0.42	0.52			0.57	0.21		0.12	
Control Delay	29.2	14.3	6.4	40.7	9.1			43.6	4.2		15.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	29.2	14.3	6.4	40.7	9.1			43.6	4.2		15.1	
LOS	C	B	A	D	A			D	A		B	
Approach Delay		12.4			13.0			29.0			15.1	
Approach LOS		B			B			C			B	
Queue Length 50th (ft)	4	123	6	55	147			68	0		4	
Queue Length 95th (ft)	m6	225	m47	103	396			120	19		28	
Internal Link Dist (ft)		589			2200			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	153	1103	995	293	1415			282	420		357	

2025 No-Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.05	0.49	0.19	0.36	0.52			0.46	0.18		0.10	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 2 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 14.6

Intersection LOS: B







Intersection Capacity Utilization 63.4%

ICU Level of Service B

Analysis Period (min) 15























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

Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)
23 s	18 s	49 s
 Ø6	 Ø7	 Ø8 (R)
23 s	12 s	55 s























2025 No-Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	492	174	97	671	12	109	10	70	0	7	25
Future Volume (vph)	6	492	174	97	671	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Flt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1982			1781	1583		1592	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.72	1.00		1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1982			1339	1583		1592	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	535	189	105	729	13	118	11	76	0	8	27
RTOR Reduction (vph)	0	0	59	0	1	0	0	0	63	0	22	0
Lane Group Flow (vph)	7	535	130	105	741	0	0	129	13	0	13	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	50.1	50.1	8.6	57.5			13.3	13.3		13.3	
Effective Green, g (s)	3.2	52.1	52.1	10.6	59.5			15.3	15.3		15.3	
Actuated g/C Ratio	0.04	0.58	0.58	0.12	0.66			0.17	0.17		0.17	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	60	1078	916	222	1310			227	269		270	
v/s Ratio Prot	0.00	0.29		c0.06	c0.37						0.01	
v/s Ratio Perm			0.08					c0.10	0.01			
v/c Ratio	0.12	0.50	0.14	0.47	0.57			0.57	0.05		0.05	
Uniform Delay, d1	42.0	11.2	8.7	37.1	8.3			34.3	31.3		31.2	
Progression Factor	0.76	1.01	1.63	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.7	1.2	0.2	1.6	1.8			3.2	0.1		0.1	
Delay (s)	32.6	12.5	14.4	38.7	10.0			37.6	31.3		31.3	
Level of Service	C	B	B	D	B			D	C		C	
Approach Delay (s)		13.2			13.6			35.3			31.3	
Approach LOS		B			B			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			63.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												













2025 Build Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	588	135	55	468	7	67	2	92	3	1	6
Future Volume (vph)	5	588	135	55	468	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1983	0	0	1777	1583	1770	1565	0
Flt Permitted	0.950			0.950				0.726		0.708		
Satd. Flow (perm)	1711	1863	1583	1888	1983	0	0	1352	1583	1319	1565	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			112		2				109		7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			1695			297			253	
Travel Time (s)		15.2			38.5			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	639	147	60	517	0	0	75	100	3	8	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.7	62.0	62.0	9.7	71.1			11.7	11.7	11.6	11.6	
Actuated g/C Ratio	0.09	0.69	0.69	0.11	0.79			0.13	0.13	0.13	0.13	
v/c Ratio	0.03	0.50	0.13	0.29	0.33			0.43	0.33	0.02	0.04	
Control Delay	41.4	4.6	0.8	40.4	5.1			43.0	9.4	32.7	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	41.4	4.6	0.8	40.4	5.1			43.0	9.4	32.7	20.7	
LOS	D	A	A	D	A			D	A	C	C	
Approach Delay		4.1			8.8			23.8			24.0	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)	3	63	0	32	69			40	0	2	1	
Queue Length 95th (ft)	m4	81	m3	69	200			81	38	9	13	
Internal Link Dist (ft)		589			1615			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	152	1284	1125	230	1566			210	338	205	249	

2025 Build Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.03	0.50	0.13	0.26	0.33			0.36	0.30	0.01	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 8.2

Intersection LOS: A







Intersection Capacity Utilization 55.6%

ICU Level of Service B

Analysis Period (min) 15























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

Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)
18 s	15 s	57 s
 Ø6	 Ø7	 Ø8 (R)
18 s	12 s	60 s

2025 Build Wkdy Morning Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	588	135	55	468	7	67	2	92	3	1	6
Future Volume (vph)	5	588	135	55	468	7	67	2	92	3	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1982			1776	1583	1770	1564	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.73	1.00	0.71	1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1982			1353	1583	1319	1564	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	639	147	60	509	8	73	2	100	3	1	7
RTOR Reduction (vph)	0	0	39	0	1	0	0	0	88	0	6	0
Lane Group Flow (vph)	5	639	108	60	516	0	0	75	12	3	2	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	56.9	56.9	6.6	62.3			8.5	8.5	8.5	8.5	
Effective Green, g (s)	3.2	58.9	58.9	8.6	64.3			10.5	10.5	10.5	10.5	
Actuated g/C Ratio	0.04	0.65	0.65	0.10	0.71			0.12	0.12	0.12	0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	60	1219	1035	180	1416			157	184	153	182	
v/s Ratio Prot	0.00	c0.34		c0.03	0.26						0.00	
v/s Ratio Perm			0.07					c0.06	0.01	0.00		
v/c Ratio	0.08	0.52	0.10	0.33	0.36			0.48	0.06	0.02	0.01	
Uniform Delay, d1	42.0	8.2	5.8	38.0	5.0			37.2	35.4	35.2	35.2	
Progression Factor	1.09	0.36	0.23	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.2	0.1	1.1	0.7			2.3	0.1	0.1	0.0	
Delay (s)	46.1	4.1	1.5	39.1	5.7			39.5	35.5	35.2	35.2	
Level of Service	D	A	A	D	A			D	D	D	D	
Approach Delay (s)		3.9			9.2			37.2			35.2	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			













2025 Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	525	174	97	692	12	109	10	70	0	7	25
Future Volume (vph)	6	525	174	97	692	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	14	14	12	12	12	12	12	11	12
Storage Length (ft)	100		100	230		0	0		0	0		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1863	1583	1888	1981	0	0	1781	1583	1863	1592	0
Flt Permitted	0.950			0.950				0.719				
Satd. Flow (perm)	1711	1863	1583	1888	1981	0	0	1339	1583	1863	1592	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132		2				109		27	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			1725			297			253	
Travel Time (s)		15.2			39.2			6.8			5.8	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	571	189	105	765	0	0	129	76	0	35	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0		18.0	18.0	18.0	18.0	18.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	
Act Effct Green (s)	7.8	53.3	53.3	11.9	64.3			15.3	15.3		15.3	
Actuated g/C Ratio	0.09	0.59	0.59	0.13	0.71			0.17	0.17		0.17	
v/c Ratio	0.05	0.52	0.19	0.42	0.54			0.57	0.21		0.12	
Control Delay	28.8	15.0	7.1	40.7	9.4			43.6	4.2		15.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	28.8	15.0	7.1	40.7	9.4			43.6	4.2		15.1	
LOS	C	B	A	D	A			D	A		B	
Approach Delay		13.2			13.2			29.0			15.1	
Approach LOS		B			B			C			B	
Queue Length 50th (ft)	4	143	10	55	155			68	0		4	
Queue Length 95th (ft)	m5	240	m46	103	416			120	19		28	
Internal Link Dist (ft)		589			1645			217			173	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	153	1103	991	293	1415			282	420		357	

2025 Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.05	0.52	0.19	0.36	0.54			0.46	0.18		0.10	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 2 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 14.9

Intersection LOS: B







Intersection Capacity Utilization 64.5%

ICU Level of Service C

Analysis Period (min) 15

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























Splits and Phases: 2: Medway Commons/Walgreens & Main Street

 Ø2	 Ø3	 Ø4 (R)
23 s	18 s	49 s
 Ø6	 Ø7	 Ø8 (R)
23 s	12 s	55 s



2025 Build Wkdy Evening Peak Hour  
2: Medway Commons/Walgreens & Main Street

11/07/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	525	174	97	692	12	109	10	70	0	7	25
Future Volume (vph)	6	525	174	97	692	12	109	10	70	0	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00		1.00	
Satd. Flow (prot)	1711	1863	1583	1888	1982			1781	1583		1592	
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.72	1.00		1.00	
Satd. Flow (perm)	1711	1863	1583	1888	1982			1339	1583		1592	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	571	189	105	752	13	118	11	76	0	8	27
RTOR Reduction (vph)	0	0	56	0	1	0	0	0	63	0	22	0
Lane Group Flow (vph)	7	571	133	105	764	0	0	129	13	0	13	0
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		
Actuated Green, G (s)	1.2	50.1	50.1	8.6	57.5			13.3	13.3		13.3	
Effective Green, g (s)	3.2	52.1	52.1	10.6	59.5			15.3	15.3		15.3	
Actuated g/C Ratio	0.04	0.58	0.58	0.12	0.66			0.17	0.17		0.17	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	60	1078	916	222	1310			227	269		270	
v/s Ratio Prot	0.00	0.31		c0.06	c0.39						0.01	
v/s Ratio Perm			0.08					c0.10	0.01			
v/c Ratio	0.12	0.53	0.15	0.47	0.58			0.57	0.05		0.05	
Uniform Delay, d1	42.0	11.5	8.7	37.1	8.4			34.3	31.3		31.2	
Progression Factor	0.75	1.02	1.63	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.6	1.4	0.2	1.6	1.9			3.2	0.1		0.1	
Delay (s)	32.3	13.1	14.4	38.7	10.3			37.6	31.3		31.3	
Level of Service	C	B	B	D	B			D	C		C	
Approach Delay (s)		13.6			13.7			35.3			31.3	
Approach LOS		B			B			D			C	

Intersection Summary










HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Main Street at Coffee Street

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2018 Existing Wkdy Morning Peak Hour  
3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	509	330	33	99	2
Future Volume (vph)	1	509	330	33	99	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1925	1846	0	1728	0
Flt Permitted					0.953	
Satd. Flow (perm)	0	1925	1846	0	1728	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2280	423		256	
Travel Time (s)		51.8	9.6		5.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	5%	6%	1%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	531	378	0	105	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 39.9% ICU Level of Service A

Analysis Period (min) 15

2018 Existing Wkdy Morning Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	1	509	330	33	99	2
Future Vol, veh/h	1	509	330	33	99	2
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	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	6	1	0
Mvmt Flow	1	530	344	34	103	2










Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	378	0	-	0	893
Stage 1	-	-	-	-	361
Stage 2	-	-	-	-	532
Critical Hdwy	4.1	-	-	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	2.2	-	-	-	3.509
Pot Cap-1 Maneuver	1192	-	-	-	313
Stage 1	-	-	-	-	707
Stage 2	-	-	-	-	591
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1192	-	-	-	313
Mov Cap-2 Maneuver	-	-	-	-	313
Stage 1	-	-	-	-	706
Stage 2	-	-	-	-	591

Approach	EB	WB	SB
HCM Control Delay, s	0	0	22
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1192	-	-	-	316
HCM Lane V/C Ratio	0.001	-	-	-	0.333
HCM Control Delay (s)	8	0	-	-	22
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1.4

2018 Existing Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	445	583	83	41	1
Future Volume (vph)	5	445	583	83	41	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1942	1930	0	1745	0
Flt Permitted		0.999			0.953	
Satd. Flow (perm)	0	1942	1930	0	1745	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2280	423		256	
Travel Time (s)		51.8	9.6		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	489	724	0	46	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.7% ICU Level of Service A

Analysis Period (min) 15

2018 Existing Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	5	445	583	83	41	1
Future Vol, veh/h	5	445	583	83	41	1
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, %	0	1	0	0	0	0
Mvmt Flow	5	484	634	90	45	1

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	724	0	-	0	1173
Stage 1	-	-	-	-	679
Stage 2	-	-	-	-	494
Critical Hdwy	4.1	-	-	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	2.2	-	-	-	3.5
Pot Cap-1 Maneuver	888	-	-	-	214
Stage 1	-	-	-	-	507
Stage 2	-	-	-	-	617
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	888	-	-	-	212
Mov Cap-2 Maneuver	-	-	-	-	212
Stage 1	-	-	-	-	503
Stage 2	-	-	-	-	617










Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	26.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	888	-	-	-	215
HCM Lane V/C Ratio	0.006	-	-	-	0.212
HCM Control Delay (s)	9.1	0	-	-	26.2
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.8

# 2025 No-Build Wkdy Morning Peak Hour

## 3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	543	354	34	103	2
Future Volume (vph)	1	543	354	34	103	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1925	1846	0	1730	0
Flt Permitted					0.953	
Satd. Flow (perm)	0	1925	1846	0	1730	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2280	423		256	
Travel Time (s)		51.8	9.6		5.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	5%	6%	1%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	567	404	0	109	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 41.9%			ICU Level of Service A			
Analysis Period (min) 15						

2025 No-Build Wkdy Morning Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	↰
Traffic Vol, veh/h	1	543	354	34	103	2
Future Vol, veh/h	1	543	354	34	103	2
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	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	6	1	0
Mvmt Flow	1	566	369	35	107	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	404	0	0 955 387
Stage 1	-	-	- 387 -
Stage 2	-	-	- 568 -
Critical Hdwy	4.1	-	- 6.41 6.2
Critical Hdwy Stg 1	-	-	- 5.41 -
Critical Hdwy Stg 2	-	-	- 5.41 -
Follow-up Hdwy	2.2	-	- 3.509 3.3
Pot Cap-1 Maneuver	1166	-	- 288 665
Stage 1	-	-	- 688 -
Stage 2	-	-	- 569 -
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1166	-	- 288 665
Mov Cap-2 Maneuver	-	-	- 288 -
Stage 1	-	-	- 687 -
Stage 2	-	-	- 569 -










Approach	EB	WB	SB
HCM Control Delay, s	0	0	24.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1166	-	-	-	291
HCM Lane V/C Ratio	0.001	-	-	-	0.376
HCM Control Delay (s)	8.1	0	-	-	24.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1.7



2025 No-Build Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	491	634	86	42	1
Future Volume (vph)	5	491	634	86	42	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1944	1932	0	1745	0
Flt Permitted					0.953	
Satd. Flow (perm)	0	1944	1932	0	1745	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		2280	423		256	
Travel Time (s)		51.8	9.6		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	539	782	0	47	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 48.6%

ICU Level of Service A

Analysis Period (min) 15

2025 No-Build Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	5	491	634	86	42	1
Future Vol, veh/h	5	491	634	86	42	1
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, %	0	1	0	0	0	0
Mvmt Flow	5	534	689	93	46	1

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	782	0	0 1280 736
Stage 1	-	-	- 736 -
Stage 2	-	-	- 544 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	845	-	- 185 422
Stage 1	-	-	- 477 -
Stage 2	-	-	- 586 -
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	845	-	- 184 422
Mov Cap-2 Maneuver	-	-	- 184 -
Stage 1	-	-	- 473 -
Stage 2	-	-	- 586 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	30.7
HCM LOS			D










  

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	845	-	-	-	186
HCM Lane V/C Ratio	0.006	-	-	-	0.251
HCM Control Delay (s)	9.3	0	-	-	30.7
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	1

# 2025 Build Wkdy Morning Peak Hour

## 3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	559	360	33	103	2
Future Volume (vph)	1	559	360	33	103	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1925	1848	0	1730	0
Flt Permitted					0.953	
Satd. Flow (perm)	0	1925	1848	0	1730	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		585	423		256	
Travel Time (s)		13.3	9.6		5.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	5%	6%	1%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	583	409	0	109	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	42.7%			ICU Level of Service A		
Analysis Period (min)	15					

2025 Build Wkdy Morning Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	1	559	360	33	103	2
Future Vol, veh/h	1	559	360	33	103	2
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	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	6	1	0
Mvmt Flow	1	582	375	34	107	2










Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	409	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.1	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.2	-	-
Pot Cap-1 Maneuver	1161	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1161	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	25.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1161	-	-	-	283
HCM Lane V/C Ratio	0.001	-	-	-	0.386
HCM Control Delay (s)	8.1	0	-	-	25.5
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	1.7

2025 Build Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	502	651	86	42	1
Future Volume (vph)	5	502	651	86	42	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	13	12	11	12
Satd. Flow (prot)	0	1944	1932	0	1745	0
Flt Permitted					0.953	
Satd. Flow (perm)	0	1944	1932	0	1745	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		555	423		256	
Travel Time (s)		12.6	9.6		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	551	801	0	47	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	49.5%			ICU Level of Service A		
Analysis Period (min)	15					

2025 Build Wkdy Evening Peak Hour  
3: Main Street & Coffee Street

11/08/2018

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	4		4	
Traffic Vol, veh/h	5	502	651	86	42	1
Future Vol, veh/h	5	502	651	86	42	1
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, %	0	1	0	0	0	0
Mvmt Flow	5	546	708	93	46	1

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	801	0	-	0	1311 755
Stage 1	-	-	-	-	755 -
Stage 2	-	-	-	-	556 -
Critical Hdwy	4.1	-	-	-	6.4 6.2
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	831	-	-	-	177 412
Stage 1	-	-	-	-	468 -
Stage 2	-	-	-	-	578 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	831	-	-	-	175 412
Mov Cap-2 Maneuver	-	-	-	-	175 -
Stage 1	-	-	-	-	464 -
Stage 2	-	-	-	-	578 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	32.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	831	-	-	-	177
HCM Lane V/C Ratio	0.007	-	-	-	0.264
HCM Control Delay (s)	9.4	0	-	-	32.5
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	1

Main Street at the Project Site Driveway

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2025 Build Wkdy Morning Peak Hour  
4: Site Drive & Main Street

11/08/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	544	11	6	356	31	16
Future Volume (vph)	544	11	6	356	31	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1857	0	0	1861	1722	0
Flt Permitted				0.999	0.968	
Satd. Flow (perm)	1857	0	0	1861	1722	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1695			585	315	
Travel Time (s)	38.5			13.3	7.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	603	0	0	394	51	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 39.3%

ICU Level of Service A

Analysis Period (min) 15



2025 Build Wkdy Morning Peak Hour  
4: Site Drive & Main Street

11/08/2018

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↰	↱
Traffic Vol, veh/h	544	11	6	356	31	16
Future Vol, veh/h	544	11	6	356	31	16
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, %	2	2	2	2	2	2
Mvmt Flow	591	12	7	387	34	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	603
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	975
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	975
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	18.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	319	-	-	975	-
HCM Lane V/C Ratio	0.16	-	-	0.007	-
HCM Control Delay (s)	18.4	-	-	8.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

2025 Build Wkdy Evening Peak Hour  
4: Site Drive & Main Street

11/08/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	496	33	17	635	21	11
Future Volume (vph)	496	33	17	635	21	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1848	0	0	1861	1720	0
Flt Permitted				0.999	0.968	
Satd. Flow (perm)	1848	0	0	1861	1720	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1725			555	265	
Travel Time (s)	39.2			12.6	6.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	575	0	0	708	35	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 57.1% ICU Level of Service B

Analysis Period (min) 15

2025 Build Wkdy Evening Peak Hour  
4: Site Drive & Main Street

11/08/2018

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Vol, veh/h	496	33	17	635	21	11
Future Vol, veh/h	496	33	17	635	21	11
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, %	2	2	2	2	2	2
Mvmt Flow	539	36	18	690	23	12

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	575
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	998
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	998
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	23.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	230	-	-	998	-
HCM Lane V/C Ratio	0.151	-	-	0.019	-
HCM Control Delay (s)	23.4	-	-	8.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-