

TRAFFIC-IMPACT AND ACCESS STUDY

**357 MAIN STREET
TEWKSBURY, MASSACHUSETTS**

Revised February 12, 2026

Prepared for LandPlex, LLC

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TEPP LLC

TRANSPORTATION ENGINEERING, PLANNING, AND POLICY

93 Stiles Road, Suite 201, Salem, New Hampshire 03079 USA
800 Turnpike Street, Suite 300, North Andover, Massachusetts 01845 USA
Phone (603) 212-9133 and Fax (603) 226-4108
Email tepp@teppllc.com and Web www.teppllc.com

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SUMMARY

PROJECT DESCRIPTION

LandPlex, LLC TEPP LLC to prepare this traffic-impact and access study (TIAS) regarding the proposed redevelopment at 357 Main Street in the Town of Tewksbury, Massachusetts.

The redevelopment:

- replaces previous land uses with senior-adult-multi-family housing, 90 dwelling units
- has one proposed unsignalized driveway along the west side of Main Street opposite and north of Old Main Street connector near Vic’s Waffle House

STUDY APPROACH

The TIAS study area consists of the following intersections:

- Main Street/Astle Street/Pike Street/Veranda Street/Old Main Street south (hereinafter Main Street/Astle Street intersection)
- Main Street/Old Main Street north
- Main Street/proposed driveway

This TIAS analyzes traffic operations for the following time periods:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

The TIAS analyzed traffic operations under the following conditions:

- 2025 existing
- 2032 no build (with background-traffic growth)
- 2032 build (with background-traffic growth and the proposed redevelopment)

Differences in traffic operations between the no-build and build conditions approximate traffic impacts of the proposed redevelopment.

TRIP GENERATION

Site trips due to the proposed redevelopment are:

- weekday daily, 292 (total of in and out)
- weekday AM-street-peak hour, 18 (6 in and 12 out)
- weekday PM-street-peak hour, 23 (13 in and 12 out)

CAPACITY ANALYSIS

TEPP LLC conducted capacity analysis as relevant:

- for study-area intersections
- under 2025 existing, 2032 no-build, and 2032 build conditions, as described above
- for the weekday AM-street-peak hour and weekday PM-street-peak hour
- to calculate levels of service (LOS), delays, volume-to-capacity ratios (V/C), and/or queues

Without or with the project, the:

- Main Street/Astle Street intersection shows overall low-to-moderate peak-hour delays, with higher delays on some approaches
- Main Street/Old Main Street north intersection shows low-to-moderate peak-hour delays
- Main Street/proposed driveway intersection shows low-to-moderate peak-hour delays

The project does not show a significant impact on overall area traffic operations.

INTRODUCTION

PROJECT DESCRIPTION

LandPlex, LLC TEPP LLC to prepare this TIAS regarding the proposed redevelopment at 357 Main Street in the Town of Tewksbury, Massachusetts. Figure 1 shows the site location and the project plan is in Appendix A.

The redevelopment:

- replaces previous land uses with senior-adult-multi-family housing, 90 dwelling units
- has one proposed unsignalized driveway along the west side of Main Street opposite and north of Old Main Street connector near Vic’s Waffle House

STUDY APPROACH

Figure 2 shows the TIAS study area. The study area consists of the following intersections:

- Main Street/Astle Street
- Main Street/Old Main Street north
- Main Street/proposed driveway

This TIAS analyzes traffic operations for the following time periods:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

The TIAS analyzed traffic operations under the following conditions:

- 2025 existing
- 2032 no build (with background-traffic growth)
- 2032 build (with background-traffic growth and the proposed redevelopment)

Differences in traffic operations between the no-build and build conditions approximate traffic impacts of the proposed redevelopment.

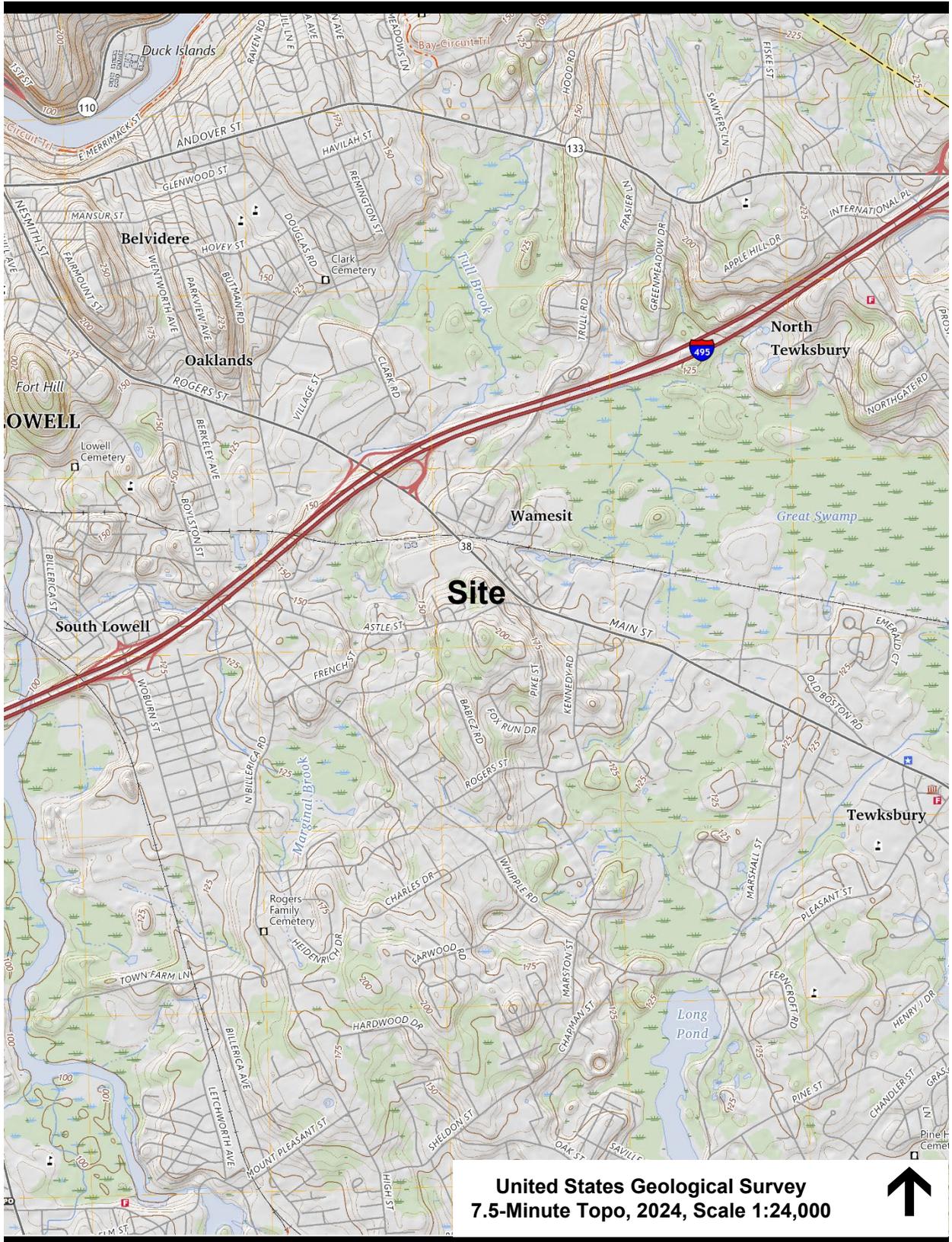


Figure 1. Site location.



Figure 2. Study area.

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EXISTING CONDITIONS

INTRODUCTION

Existing conditions include:

- physical conditions of the transportation network, roads, and intersections
- traffic volumes
- other relevant information

PHYSICAL CONDITIONS

INTRODUCTION

Figures 1 and 2 show the transportation network, which includes Main Street (Massachusetts Route 38 or MA 38).

Figure 2 shows the following existing intersections:

- Main Street/Astle Street
- Main Street/Old Main Street north

MAIN STREET

Main Street in the study area:

- is overall roughly north-south
- is an arterial highway
- to/from the north, connects with the City of Lowell, Massachusetts
- to/from the south, connects with the Town of Wilmington, Massachusetts
- has a horizontal alignment with minor curvature
- has minor grades
- generally has a two-to-four undivided divided cross-section
- has asphaltic cement concrete (ACC) pavement in overall fair-to-good condition
- has a posted speed limit of 40 miles per hour (mph) northbound and 35 mph southbound
- has sidewalk on both sides

- has utility poles along or near the east side, some with luminaires
- has nearby mixed land uses, including commercial, residential, and a park
- is under the jurisdiction of Commonwealth of Massachusetts

MAIN STREET/ASTLE STREET INTERSECTION

The intersection:

- has a six-legged configuration
- has Main Street as the major north-south street
- has Astle Street as the minor northwest leg
- has Pike Street as the minor west leg
- has Veranda Avenue as the minor east leg
- has Old Main Street south as the minor northeast leg
- on the Main Street northbound approach, has two general-purpose lanes
- on the Main Street southbound approach, has one left-turn lane and one through-movement and right-turn lane
- on the Astle Street, Pike Street, and Veranda Avenue approaches, has one general-purpose lane
- for the Old Main Street leg, has a one-lane departure with no approach
- shows marked crosswalks on all legs except for the Main Street north leg with completion of ongoing construction
- is under traffic-signal control, with protected-permitted left turns on the Main Street southbound approach, with Astle Street having a phase, and with Pike Street and Veranda Avenue sharing a phase
- has an exclusive pedestrian phase with push-button actuation
- prohibits right turns on red from the Main Street southbound approach, the Pike Street approach, and the Veranda Avenue approach
- is illuminated
- has nearby mixed land uses, including commercial, residential, and a park
- is under the jurisdiction of the Commonwealth of Massachusetts

MAIN STREET/OLD MAIN STREET NORTH INTERSECTION

The intersection:

- has a three-legged configuration
- has Main Street as the major north-south street
- has Old Main Street as the minor east leg
- on Main Street, has approaches with two general-purpose lanes
- on Old Main Street, has a one-lane approach
- on the Old Main Street approach, has STOP-sign control
- is illuminated
- has nearby mixed land uses, including commercial, residential, and a park
- is under the jurisdiction of the Commonwealth of Massachusetts

TRAFFIC VOLUMES

TRAFFIC COUNTS

TEPP LLC obtained turning movement counts (TMCs):

- from 7:00 to 9:00 AM and from 3:00 to 6:00 PM on Thursday, June 25, 2025
- at the Main Street/Astle Street intersection
- at the Main Street/Old Main Street north intersection

The traffic-count data are in Appendix B.

MONTHLY VARIATION

As shown in Appendix C, the Massachusetts Department of Transportation (MassDOT) reported average-month volumes as 91 percent of June volumes.¹ Conservatively, TEPP LLC did not reduce the TMCs.

RESULTS

Table 1 and Figure 3 show 2025 existing traffic volumes.

Main Street showed about:

¹ MassDOT, Statewide Traffic Data Collection, 2024 Weekday Seasonal Factors, Factor Group U3.

Table 1. 2025 existing traffic volumes.

Location	Weekday AM-Street-Peak Hour		Weekday PM-Street-Peak Hour	
	Volume (vph)	Direction (%)	Volume (vph)	Direction (%)
Main Street North of Site	1,344	50 Southbound	1,736	60 Northbound

- 1,344 vehicles during the weekday AM-street-peak hour, 50-percent southbound and 50-percent northbound
- 1,736 vehicles during the weekday PM-street-peak hour, 60-percent northbound and 40-percent southbound

VEHICLE SPEEDS

TEPP LLC obtained vehicle speeds using an automatic traffic recorder (ATR):

- on Main Street northbound from Thursday, July 10, 2025, through Saturday, July 12, 2025
- on Main Street southbound from Thursday, July 24, 2025, through Saturday, July 26, 2025

Appendix D has the speed data. Table 2 is a summary.

Table 2 indicates that on Main Street northbound the:

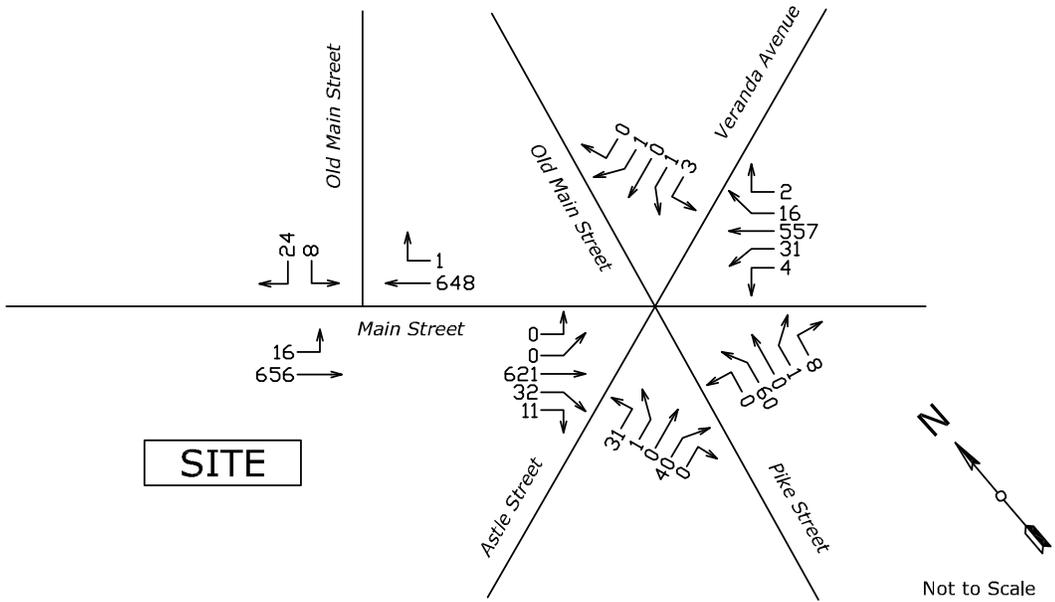
- speed limit was 40 mph
- the mean speed² was 31 mph and the 85th-percentile speed³ was 33 mph

Table 2 indicates that on Main Street southbound the:

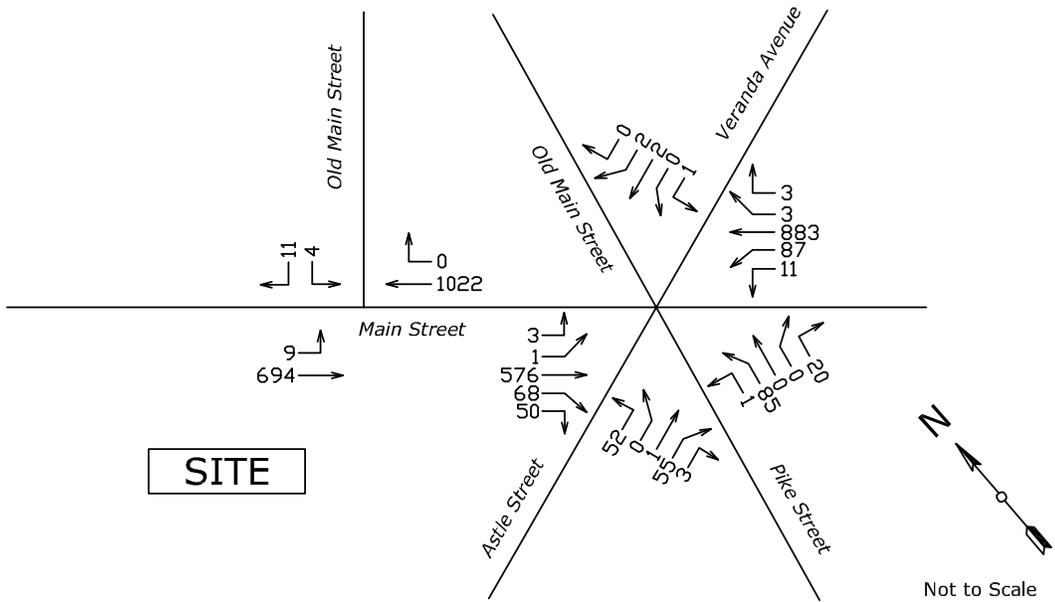
- speed limit was 35 mph
- the mean speed was 38 mph and the 85th-percentile speed was 41 mph

² Mean speed is the average speed.

³ 85th percentile speed is the speed at which or below 85 percent of vehicles travel.



Weekday AM-Street-Peak-Hour



Weekday PM-Street-Peak Hour

Figure 3. 2025 existing traffic volumes.

Table 2. Vehicle speeds.

Location and Direction	Speed Limit (mph)	Observed Speeds (mph) ^a		
		Mean ^b	Pace ^c	85 th Percentile ^d
Main Street North of Site				
Northbound	40	31	26-35	33
Southbound	35	38	34-43	41

^a Northbound ATR from Thursday, July 10, 2025, through Saturday, July 12, 2025. Southbound ATR from Thursday, July 24, 2025, through Saturday, July 26, 2025.

^b Mean speed is the average speed.

^c Pace is the 10-mph speed range with the greatest number of observed speeds.

^d 85th percentile speed is the speed at which or below 85 percent of vehicles travel.

SIGHT DISTANCES

The American Association of State Highway and Transportation Officials (AASHTO) has established authoritative policy for sight distances at unsignalized intersections in terms of:

- fundamental stopping sight distance (SSD)
- desirable intersection sight distance (ISD)⁴

Fundamental SSD:⁵

- provides for safety
- enables a driver, on the major road, to perceive and react accordingly to a vehicle entering the major road from a minor road
- is conservative because it encompasses a wide range of brake-reaction times and deceleration rates

Desirable ISD:⁶

- is ordinarily greater than fundamental SSD
- may enhance traffic operations
- is not required for safety

⁴ AASHTO, *A Policy on Geometric Design of Highways and Streets*, 7th Edition (Washington, DC, 2018), pages 9-35 to 9-36.

⁵ AASHTO, pages 3-2 to 3-6.

⁶ AASHTO, pages 9-35 to 9-59.

Table 3 shows adequate available fundamental SSD at the at the Main Street/proposed driveway intersection. Desirable ISD is also available.

CRASH HISTORY

TEPP LLC obtained crash data from MassDOT for:

- 2017 through 2021, the most recent available and finalized 5 years
- the Main Street/Astle Street intersection
- the Main Street/Old Main Street north intersection

Table 4 is a summary of crash history. MassDOT crash-rate worksheets are in Appendix E.

The Main Street/Astle Street intersection showed:

- an observed crash rate greater than MassDOT averages
- angle collisions as the most common type
- 81 percent of reported crash severities as property-damage only
- 24 percent of reported crash severities with non-fatal injuries
- no reported fatality

The Main Street/Old Main Street north intersection showed:

- an observed crash rate less than MassDOT averages
- rear-end collisions as the most common type
- 50 percent of reported crash severities as property-damage only
- 50 percent of reported crash severities with non-fatal injuries
- no reported fatality

PEDESTRIANS, BICYCLES, AND TRANSIT

PEDESTRIANS

Counts showed low pedestrian volumes.

Main Street has sidewalks on both sides.

The proposed driveway includes a sidewalk along the north side.

Table 3. Sight distances.

Intersection and Movement ^a	Control	View To/From	Sight Distance (ft) ^b	Speeds (mph)			
				Limit	85 ^{thc}	SSD ^d	ISD ^e
Main Street/Proposed Driveway							
Main Street NB L	---	Main Street North	1,000+	35	41	60+	60+
Proposed Driveway EB L	STOP	Main Street North	1,000+	35	41	60+	60+
Proposed Driveway EB L	STOP	Main Street South	900+	40	33	60+	60+
Proposed Driveway EB R	STOP	Main Street North	900+	35	41	60+	60+

^a NB = northbound. EB = eastbound. L = left turn. R = right turn.

^b Sight distance that will be available.

^c ATR from Thursday, June 26, 2025, through Saturday, June 28, 2025.

^d Fundamental SSD is the design speed that available sight distance will provide. AASHTO, pages 3-2 to 3-6.

^e Optional ISD is the design speed that available sight distance will provide. AASHTO, pages 9-35 to 9-59.

Table 4. Crash history.

	Intersection	
	Main Street/Astle Street	Main Street/Old Main Street North
Crashes by Year ^a		
2017	16	0
2018	13	0
2019	8	1
2020	6	1
<u>2021</u>	<u>4</u>	<u>0</u>
Total	47	2
Average Per Year	9.60	0.40
Crash Rates		
This Location	1.22	0.06
MassDOT District 4 Average ^b	0.73	0.57
MassDOT State Average ^b	0.78	0.57
Crashes by Severity ^a		
Fatal Injury	0	0
Non-Fatal Injury	9	1
Property-Damage Only	38	1
Crashes by Type ^a		
Angle	15	0
Front-to-Rear	1	0
Head-On	2	0
Rear-End	12	2
Rear-to-Side	1	0
Sideswipe—Opposite Direction	3	0
Sideswipe—Same Direction	7	0
Single-Vehicle	6	0
Crashes by Road Surface ^a		
Dry	36	2
Wet	7	0
Snow	3	0
Not Reported	1	0

^a MassDOT IMPACT crash data obtained July 7, 2025.

^b From <https://www.mass.gov/info-details/intersection-and-roadway-crash-rate-data-for-analysis#intersection-crash-rates>, accessed August 28, 2025. MEV = 1,000,000 entering vehicles.

Table 4. Crash history, continued.

	Intersection	
	Main Street/Astle Street	Main Street/Old Main Street North
Crashes by Weather Condition ^a		
Clear	38	2
Cloudy	2	0
Rain	3	0
Fog, Smog, Smoke	3	0
Crashes by Light Condition ^a		
Daylight	30	2
Dusk	2	0
Dark—Lighted Road	10	0
Dark—Unlighted Road	4	0
Other	1	0

^a MassDOT IMPACT crash data obtained July 7, 2025.

The Main Street/Astle Street intersection shows:

- marked crosswalks across all legs except for the Main Street north leg
- an exclusive pedestrian signal phase

The Main Street/Old Main Street north intersection has a marked crosswalk across the Old Main Street leg.

The Main Street/proposed driveway intersection shows a marked crosswalk across the proposed driveway leg.

BICYCLES

Counts showed low bicycle volumes. Bicycles and other vehicles may share travel lanes with motor vehicles as applicable.

TRANSIT

Transit information is in Appendix F.

Lowell Regional Transit Authority (LRTA) operates bus route 12, Tewksbury via Route 38/Wilmington train station. The route includes:

- Kenedy Center in the City of Lowell, which includes other LRTA bus routes and Massachusetts Bay Transportation Authority (MBTA) commuter rail
- Rogers Street in the City of Lowell
- Main Street in the Town of Tewksbury
- stops on Main Street opposite the Waffle House and at Veranda Avenue
- the MBTA commuter-rail station in the Town of Wilmington, Massachusetts

FUTURE CONDITIONS

INTRODUCTION

Future conditions include:

- road modifications independent of the proposed redevelopment
- future no-build traffic volumes, with background-traffic growth and without the proposed redevelopment
- future build traffic volumes, with background-traffic growth and with the proposed redevelopment

ROAD MODIFICATIONS

MassDOT project 608774:

- is under construction
- is providing an adaptive traffic-signal-control system at seven locations along Massachusetts Route 38 (Rogers Street and Main Street) in the City of Lowell and the Town of Tewksbury
- includes the Main Street/Astle Street intersection

BACKGROUND-TRAFFIC GROWTH

Background-traffic growth:

- is independent of the proposed project
- may relate to area or regional changes in land development
- may relate to area or regional changes in population, economic development, and travel patterns
- may consider a general traffic-growth rate or specific land developments in the immediate area

Background-traffic growth for this TIAS reflects a 1.36-percent annual traffic-growth rate that yields about 9.9-percent growth from 2025 to 2032. This rate is based on MassDOT count station 4111, Tewksbury, Main Street south of Interstate Route 495, as Appendix G shows.

NO-BUILD TRAFFIC VOLUMES

TEPP LLC applied the background-traffic growth described above to 2025 existing traffic volumes. Figure 4 shows resulting 2032 no-build traffic volumes.

TRIP GENERATION

The Institute of Transportation Engineers (ITE) compiles and publishes trip-generation information for a variety of land uses in *Trip Generation Manual*.⁷ This authoritative guide for estimating site traffic includes land use 252, senior-adult-multi-family housing based on dwelling units.⁸

Table 5 shows calculated weekday trip generation for current site-redevelopment proposal as:

- daily, 292 (total of in and out)
- AM-street-peak hour, 18 (6 in and 12 out)
- PM-street-peak hour, 23 (13 in and 10 out)

TRIP DISTRIBUTION AND NETWORK ASSIGNMENT

Trip distribution and network assignment of vehicle trips to and from the site may consider such factors as:

- trip distribution and network assignment for the existing site
- area or regional travel patterns
- area or regional population distribution
- area or regional land development
- desirability of alternative site access or egress routes

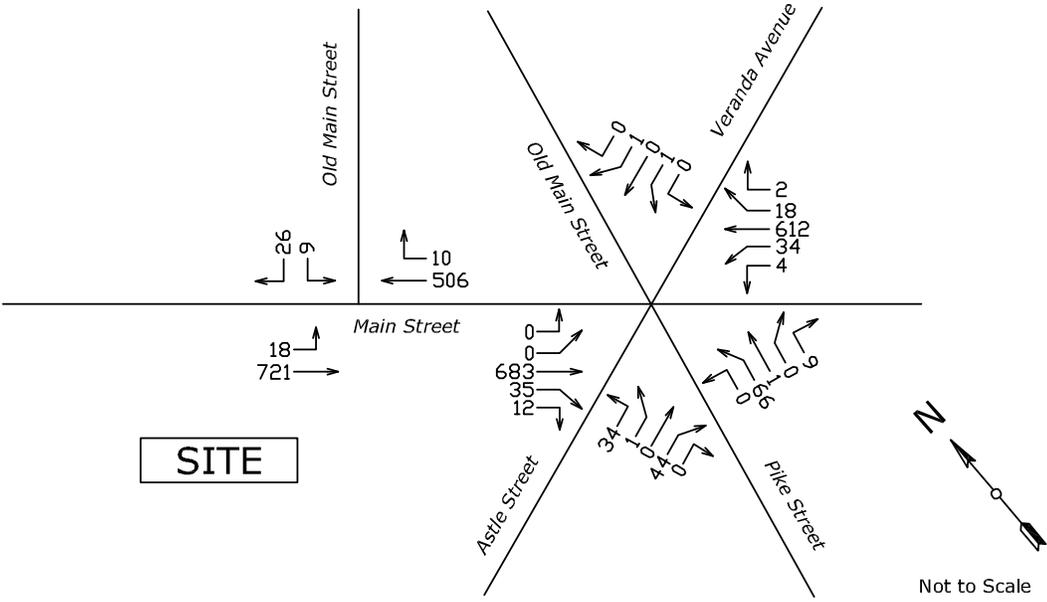
Table 6 shows approximate trip distribution and network assignment based on Appendix H. Figure 5 shows site trips due to the project.

BUILD TRAFFIC VOLUMES

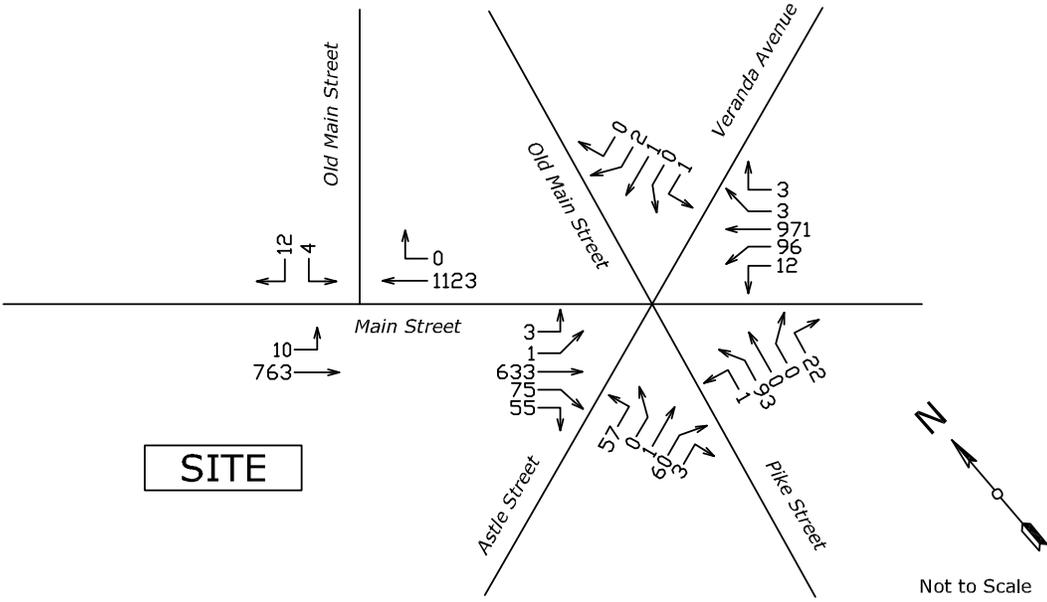
TEPP LLC superimposed changes in site traffic volumes on the no-build traffic volumes to estimate build traffic volumes. Figure 6 shows the resulting 2032 build traffic volumes.

⁷ ITE, *Trip Generation Manual*, 11th edition (Washington DC, 2021).

⁸ ITE, *Trip Generation Manual*, volume 3, pages 414 to 425.



Weekday AM-Street-Peak-Hour



Weekday PM-Street-Peak Hour

Figure 4. 2032 no-build traffic volumes.

Table 5. Trip generation.

Weekday Vehicle-Trips ^a						
Daily	AM-Street-Peak Hour			PM-Street-Peak Hour		
	Total	In	Out	Total	In	Out
292	18	6	12	23	13	10

^a Based on ITE, *Trip Generation Manual*, 11th edition. Land use 252, senior-adult-multi-family housing. 90 dwelling units.

Table 6. Trip distribution and network assignment.

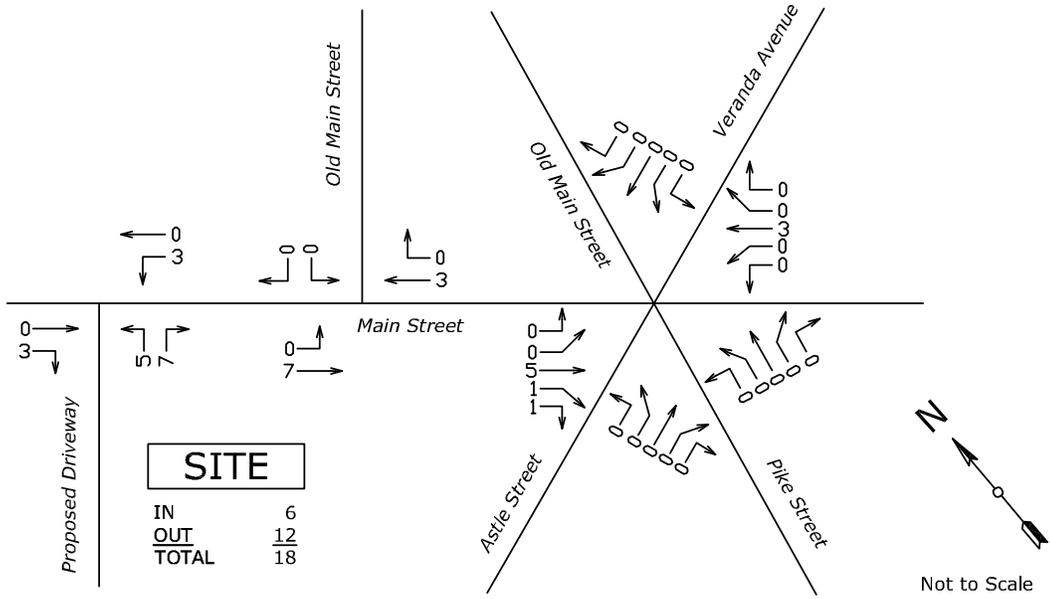
Road and Direction	Percent
Main Street to/from North	45
Main Street to/from South	45
Astle Street to/from West	5
<u>Pike Street to/from South</u>	<u>5</u>
Total	100

TRAFFIC-VOLUME CHANGES

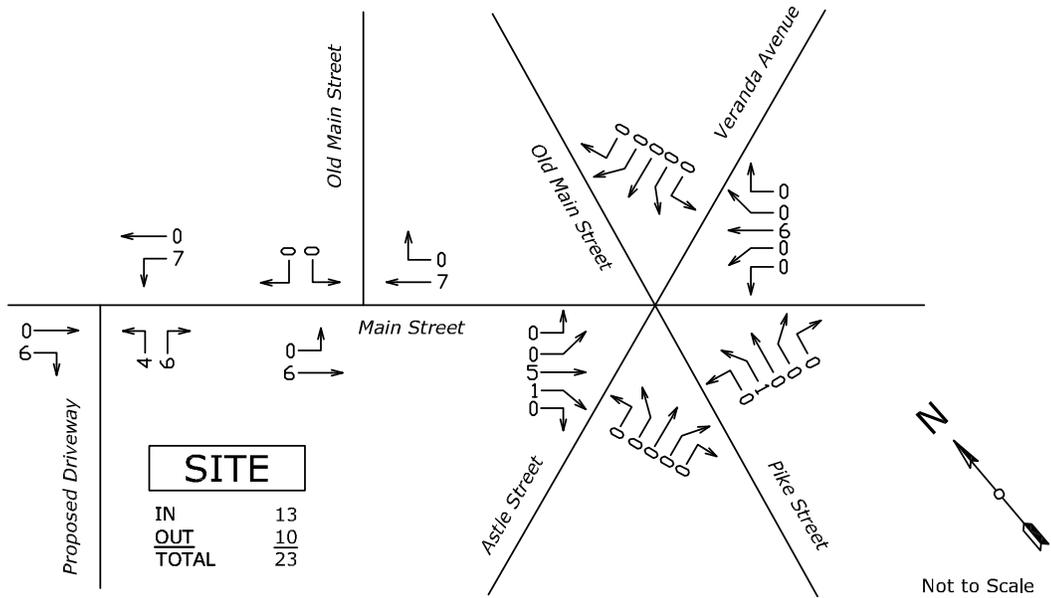
Table 7 presents calculated traffic-volume changes due to the proposed project for the:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

The tabulated increases on Main Street are 8 to 13 vph (0.5 to 0.7 percent).

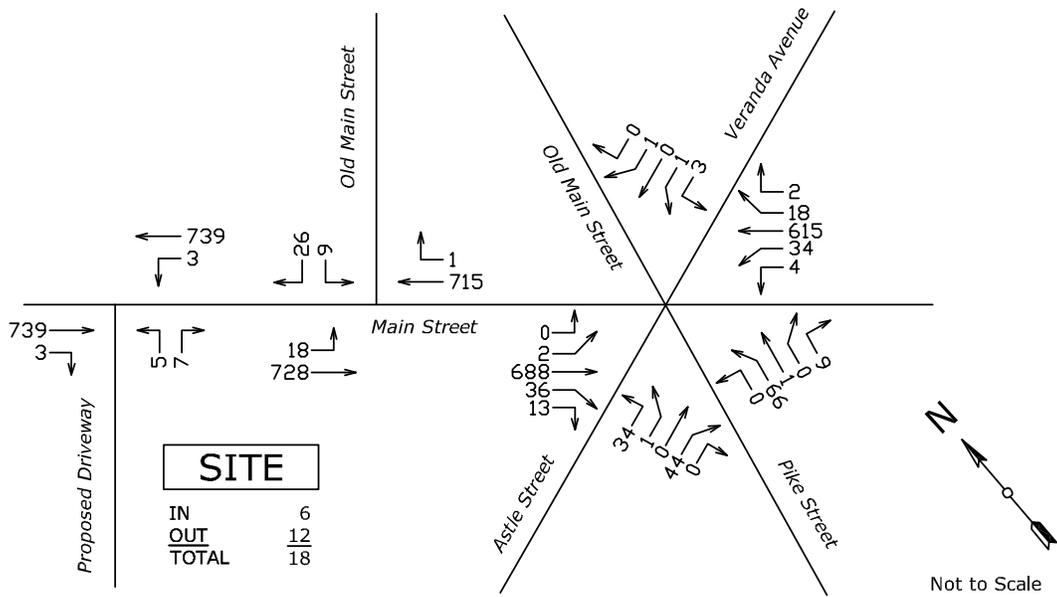


Weekday AM-Street-Peak-Hour

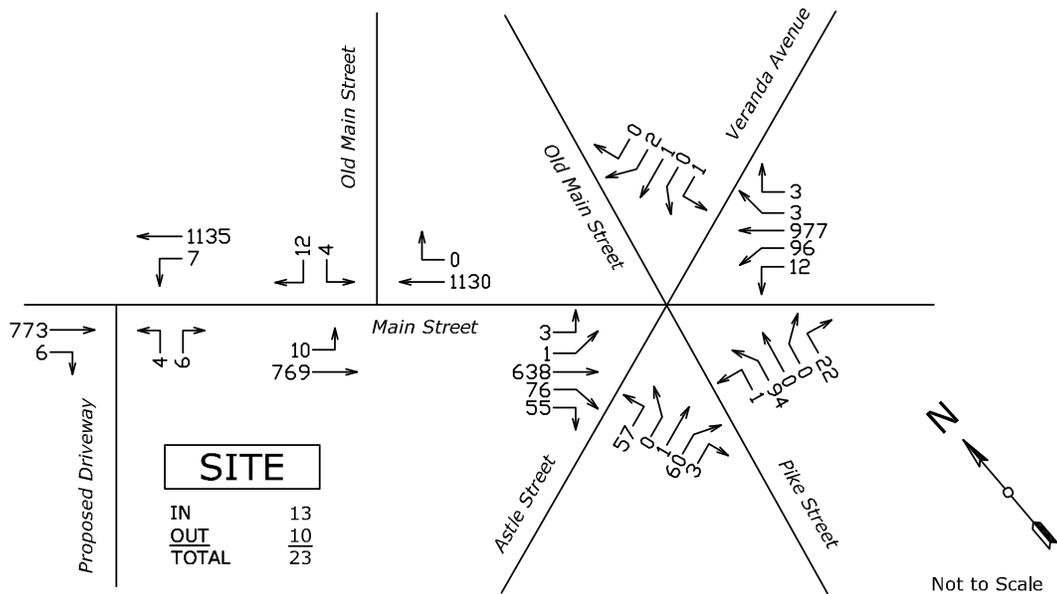


Weekday PM-Street-Peak Hour

Figure 5. Site trips.



Weekday AM-Street-Peak-Hour



Weekday PM-Street-Peak Hour

Figure 6. 2032 build traffic volumes.

Table 7. Traffic-volume changes.

Location and Time Period	Traffic Volumes ^a				Change	Percent Change
	2025 Existing	2032 No-Build	2032 Build			
Main Street South of Astle Street						
Weekday AM-Street-Peak Hour	1,282	1,409	1,417		8	0.6
Weekday PM-Street-Peak Hour	1,639	1,802	1,813		11	0.6
Main Street South of Proposed Driveway						
Weekday AM-Street-Peak Hour	1,344	1,477	1,497		8	0.5
Weekday PM-Street-Peak Hour	1,736	1,908	1,921		13	0.7
Main Street North of Proposed Driveway						
Weekday AM-Street-Peak Hour	1,344	1,477	1,485		8	0.5
Weekday PM-Street-Peak Hour	1,738	1,908	1,918		10	0.5

^a Two-way-total volumes in vph.

CAPACITY ANALYSIS

INTRODUCTION

This TIAS has quantified existing, future-no-build and future-build traffic volumes. Capacity analysis indicates quality of traffic operations. Comparing build conditions to no-build conditions indicates impacts of the proposed alterations on quality of traffic operations.

METHODS

Capacity analysis:

- indicates the quality of traffic operations for transportation facilities
- used methods of the Transportation Research Board (TRB)⁹
- used Synchro 11 software.

Method inputs include:

- intersection geometry
- traffic control, such as YIELD sign, two-way STOP sign, all-way STOP sign, roundabout, or signal (including phasing, timing, and progression)
- traffic volumes
- vehicle composition, such as passenger cars and trucks

Method outputs include:

- LOS based on delays in Table 8
- V/C ratios
- vehicle queues

The six LOS are designated A to F. LOS A represents the best or highest operating conditions. LOS F is the lowest but does not necessarily connote failure.

⁹ TRB, *Highway Capacity Manual 2000* (Washington DC 2000), *Highway Capacity Manual 2010* (Washington DC, 2010), and *Highway Capacity Manual*, 6th Edition (Washington DC, 2016).

Table 8. Level-of-service measures for intersections.

Level of Service	Control Delay (seconds/vehicle)	
	Unsignalized Intersections ^a	Signalized Intersections
A	≤10.0	≤10.0
B	>10.0 and ≤15.0	>10.0 and ≤20.0
C	>15.0 and ≤25.0	>20.0 and ≤35.0
D	>25.0 and ≤35.0	>35.0 and ≤55.0
E	>35.0 and ≤50.0	>55.0 and ≤80.0
F	>50	>80

From TRB, *Highway Capacity Manual 2010* (Washington DC, 2010).

^a For YIELD sign, two-way STOP sign, or all-way STOP sign, control delay defines LOS. For roundabout approaches and overall intersection, control delay defines LOS. For roundabout lanes with V/C ratio ≤1.0, control delay defines LOS. For roundabout lanes with V/C ratio > 1.0, LOS is F regardless of control delay.

LOS is a function of traffic volumes and traffic control. Because these volumes can vary, LOS of a transportation facility can differ by time of day, day of the week, or month. For example, a transportation facility with a low LOS during peak hours may have a high LOS during other hours.

The methods are all approximate. In particular, the method for two-way STOP-sign control can be conservative, with observed delays and queuing shorter than those calculated.

RESULTS

Table 9 shows computed LOS, delays, V/C ratios, and/or queues at study-area intersections under the following conditions:

- 2025 existing
- 2032 no build
- 2032 build

The analysis was for the following time periods:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

Reports that give detail and explanation are in Appendix I.

Table 9. Capacity-analysis summary.

Location, Time Period, and Lane Group ^a	2025 Existing				2032 No Build				2032 Build			
	LOS ^b	Delay ^c	V/C ^d	Queue ^e	LOS	Delay	V/C	Queue	LOS	Delay	V/C	Queue
Main Street/Astle Street Signalized Intersection—Weekday AM-Street-Peak Hour												
Pike Street Eastbound LTR	E	69.5	0.67	52/92	E	74.2	0.78	52/118	E	72.7	0.77	52/118
Veranda Avenue Westbound LTR	D	42.7	0.09	6/11	D	43.0	0.04	3/14	D	43.0	0.04	3/14
Main Street Northbound LTR	A	7.2	0.36	94/120	A	6.2	0.37	87/115	A	6.3	0.38	88/116
Main Street Southbound L	---	---	0.00	0/0	---	---	0.00	0/0	---	---	0.00	0/0
Main Street Southbound TR	B	18.6	0.68	309/449	B	19.0	0.74	356/523	B	19.3	0.75	362/532
Astle Street Southeastbound LTR	E	57.5	0.69	63/92	F	82.2	0.81	55/143	F	82.2	0.81	55/143
Overall	B	18.7	0.67	---	B	19.5	0.73	---	B	19.5	0.73	---
Main Street/Astle Street Signalized Intersection—Weekday PM-Street-Peak Hour												
Pike Street Eastbound LTR	E	57.9	0.75	81/129	E	63.1	0.77	79/169	E	60.2	0.76	79/166
Veranda Avenue Westbound LTR	D	38.6	0.04	5/10	D	39.4	0.02	2/13	D	39.1	0.02	2/13
Main Street North Bound LTR	B	13.9	0.74	168/214	B	17.2	0.83	184/232	B	18.2	0.85	189/238
Main Street South Bound L	B	10.3	0.01	1/6	A	9.8	0.02	1/6	A	10.0	0.02	1/6
Main Street South Bound TR	C	24.1	0.79	388/540	C	24.9	0.82	410/601	C	25.8	0.83	420/632
Astle Street Southeastbound LTR	D	47.1	0.34	17/34	D	44.7	0.08	0/50	D	44.7	0.08	0/50
Overall	C	22.9	0.76	---	C	24.2	0.80	---	C	24.9	0.81	---
Main Street/Old Main Street North Unsignalized Intersection—Weekday AM-Street-Peak Hour												
Main Street Southbound L	A	9.3	0.020	0.1	A	9.5	0.024	0.1	A	9.5	0.024	0.1
Old Main Street Westbound LR	B	0.4	0.106	0.4	C	16.1	0.105	0.3	C	16.2	0.106	0.4
Main Street/Old Main Street North Unsignalized Intersection—Weekday PM-Street-Peak Hour												
Main Street Southbound L	B	10.6	0.015	0.0	B	11.3	0.019	0.1	B	11.4	0.019	0.1
Old Main Street Westbound LR	C	19.3	0.060	0.2	C	22.9	0.079	0.3	C	23.0	0.080	0.3
Main Street/Proposed Driveway Intersection—Weekday AM-Street-Peak Hour												
Main Street Southbound L	---	---	---	---	---	---	---	---	A	9.5	0.004	0.0
Proposed Driveway Eastbound LR	---	---	---	---	---	---	---	---	C	17.8	0.044	0.1
Main Street/Proposed Driveway Intersection—Weekday AM-Street-Peak Hour												
Main Street Southbound L	---	---	---	---	---	---	---	---	A	9.6	0.010	0.0
Proposed Driveway Eastbound LR	---	---	---	---	---	---	---	---	C	22.3	0.050	0.2

^a L = left turn, T = through movement, R = right turn.

^b LOS = level of service.

^c Delay = average delay in seconds per vehicle.

^d V/C = volume/capacity ratio.

^e For signalized intersections, 50th-percentile queue in ft/95th-percentile queue in ft. For unsignalized intersections, 95th-percentile queue in vehicles.

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In summary, without or with the project, the:

- Main Street/Astle Street intersection shows overall low-to-moderate peak-hour delays, with higher delays on some approaches
- Main Street/Old Main Street north intersection shows low-to-moderate peak-hour delays
- Main Street/proposed driveway intersection shows low-to-moderate peak-hour delays

The project does not show a significant impact on overall area traffic operations.

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CONCLUSION

PROJECT DESCRIPTION

This TIAS regards the proposed redevelopment at 357 Main Street in the Town of Tewksbury, Massachusetts. The redevelopment:

- replaces previous land uses with senior-adult-multi-family housing, 90 dwelling units
- has one proposed unsignalized driveway along the west side of Main Street opposite and north of Old Main Street connector near Vic's Waffle House

TRIP GENERATION

Site trips due to the proposed redevelopment are:

- weekday daily, 292 (total of in and out)
- weekday AM-street-peak hour, 18 (6 in and 12 out)
- weekday PM-street-peak hour, 23 (13 in and 12 out)

CAPACITY ANALYSIS

Without or with the project, the:

- Main Street/Astle Street intersection shows overall low-to-moderate peak-hour delays, with higher delays on some approaches
- Main Street/Old Main Street north intersection shows low-to-moderate peak-hour delays
- Main Street/proposed driveway intersection shows low-to-moderate peak-hour delays

The project does not show a significant impact on overall area traffic operations.

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APPENDIX

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Appendix A: Project Plan

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ASSESSORS
 MAP 22, LOT 9 (#41 ASTLE STREET)
 MAP 22, LOT 11 (#15 ASTLE STREET)

PROPERTY OWNER
 BLIB HOLDINGS, LLC
 70 JOHN E. SMITH DRIVE
 TEWKSURY, MASSACHUSETTS

DEED REFERENCE
 MIDDLESEX NORTH REGISTRY OF DEEDS
 BOOK 32462, PAGE 83
 BOOK 32736, PAGE 167 (MA DOT "STREET ACCESS PERMIT")

PLAN REFERENCES
 MIDDLESEX NORTH REGISTRY OF DEEDS
 PLAN BOOK 245, PLAN 120

NOTES

- EXISTING CONDITIONS AND BOUNDARY LOCATION SHOWN HEREON FROM AN INSTRUMENT SURVEY IN JANUARY OF 2018. TOPOGRAPHY SHOWN HEREON REFERS TO APPROXIMATE NAVD83 DATUM, TRANSFERRED FROM GPS BENCHMARK UTILIZING MAINE TECHNICAL SOURCE BASE STATION.
- NO PORTION OF THE PREMISES SHOWN HEREON IS LOCATED WITHIN A FLOOD HAZARD AREA AS SHOWN ON DEPARTMENT H.U.D. FEDERAL INSURANCE ADMINISTRATION MAPS, PER COMMUNITY PANEL FM25017C0257F, EFFECT. DATE 7/7/14.
- NO UTILITIES ARE SHOWN. CALL DIG-SAFE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION OR CONSTRUCTION.

BUILDING HEIGHT CALCULATIONS
 PER TOWN OF TEWKSURY ZONING DEFINITIONS, BUILDING HEIGHT IS DEFINED AS THE VERTICAL DISTANCE FROM THE GRADE PLANE TO THE HIGHEST POINT OF THE ROOF, NOT INCLUDING SPIRES, CUPOLAS, ANTENNAE, OR SIMILAR PARTS OF STRUCTURES WHICH DO NOT ENCLOSE POTENTIALLY HABITABLE FLOOR SPACE.

FOR 'BUILDING 1':
 BASED ON THE PROPOSED GRADING, GRADE PLANE (GP)=168.1. SINCE THE ROOF ELEVATION=221.5 (NOT INCLUDING TOPMOST KNEE WALLS WHICH DO NOT ENCLOSE POTENTIALLY HABITABLE FLOOR SPACE),
 BUILDING HEIGHT = 221.5 - 168.1 = 53.4'

FOR 'BUILDING 2':
 BASED ON THE PROPOSED GRADING, GRADE PLANE (GP)=175.0. SINCE THE ROOF ELEVATION=227.5 (NOT INCLUDING TOPMOST KNEE WALLS WHICH DO NOT ENCLOSE POTENTIALLY HABITABLE FLOOR SPACE),
 BUILDING HEIGHT = 227.5 - 175.0 = 52.5'

FOR 'BUILDING 3':
 BASED ON THE PROPOSED GRADING, GRADE PLANE (GP)=176.2. SINCE THE ROOF ELEVATION=229.5 (NOT INCLUDING TOPMOST KNEE WALLS WHICH DO NOT ENCLOSE POTENTIALLY HABITABLE FLOOR SPACE),
 BUILDING HEIGHT = 229.5 - 176.2 = 53.3'

ZONING

DESCRIPTION	REQUIRED	PROPOSED
MIN. LOT AREA	43,560±SF	144,882±SF (3.326±ACRES)
MIN. FRONTAGE	150'	622.72'(MAIN)/413.21'(ASTLE)
MIN. FRONT SETBACK	25'	41.0'
MIN. SIDE SETBACK	15'	16.0'
MIN. REAR SETBACK	15'	5 **
MIN. OPEN SPACE	20%	53.4'(BDG1)/52.6'(BDG2)/53.3'(BDG3) **
MAX. BUILDING COVER.	30%	18%
MAX. STORIES	2.5	
MAX. HEIGHT	35'	

LANDSCAPING NOTE
 SEE LANDSCAPING PLAN BY OTHERS FOR PROPOSED LANDSCAPING IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO LOCATIONS AND DESCRIPTIONS OF SHADE TREES, EVERGREEN TREES, SHRUBS, & PERMANENT SEEDING FOR LOCATIONS DESCRIPTIONS OF LAWN SEED, CONSERVATION SEED WITH NATIVE WILDFLOWERS, AND CONSERVATION SEED FOR DRAINAGE BASIN.

PER ZONING IN EFFECT AT "ZONING FREEZE" ENDORSEMENT DATE OF 3/28/2022:
 COMMERCIAL DISTRICT

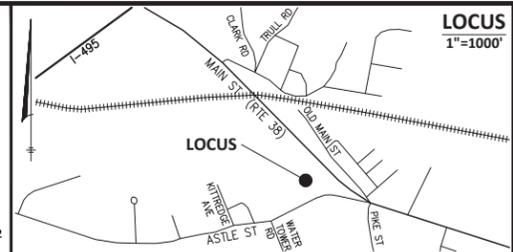
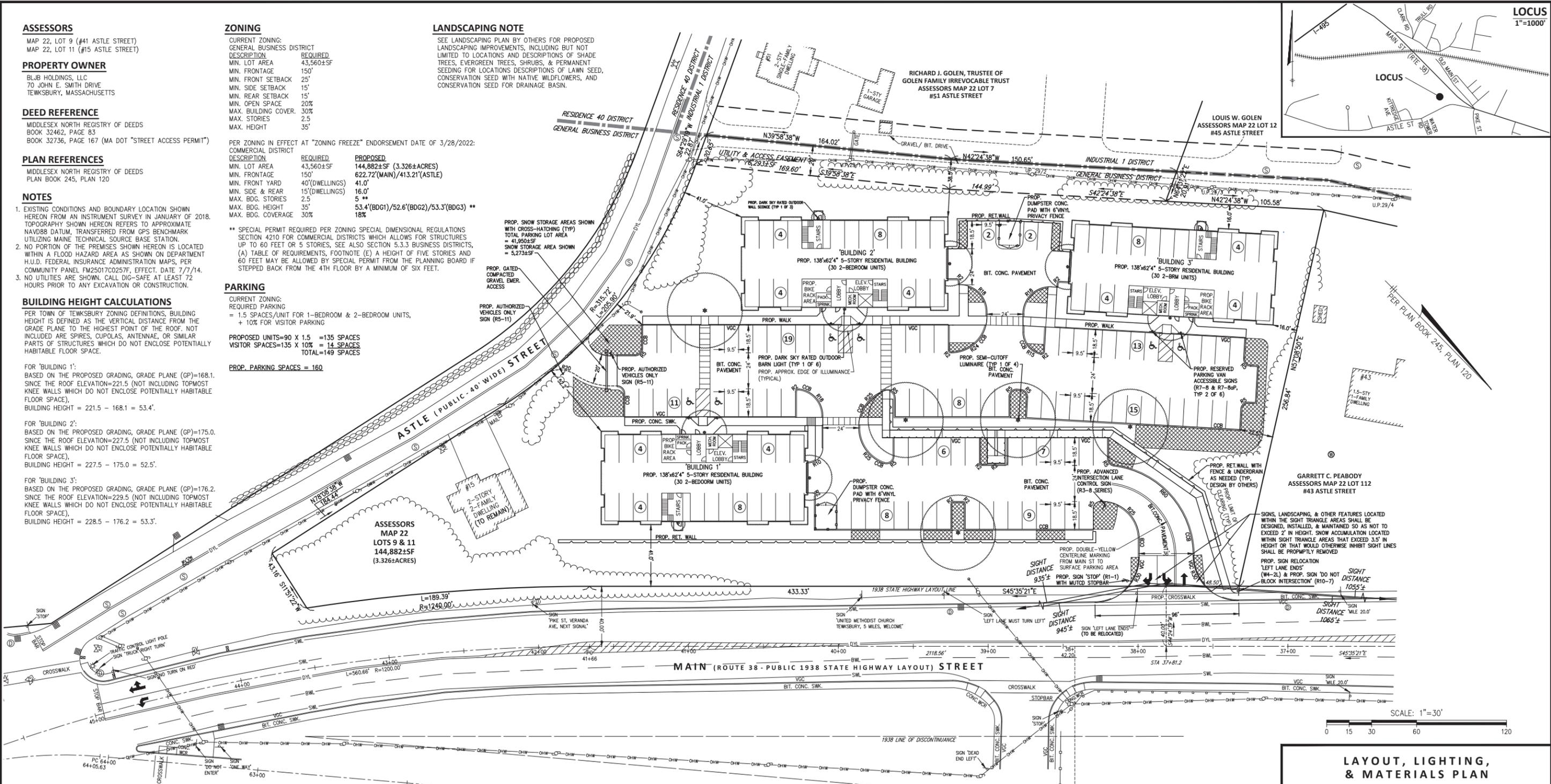
DESCRIPTION	REQUIRED	PROPOSED
MIN. LOT AREA	43,560±SF	144,882±SF (3.326±ACRES)
MIN. FRONTAGE	150'	622.72'(MAIN)/413.21'(ASTLE)
MIN. FRONT YARD	40'(DWELLINGS)	41.0'
MIN. SIDE & REAR	15'(DWELLINGS)	16.0'
MAX. BLDG. STORIES	2.5	5 **
MAX. BLDG. HEIGHT	35'	53.4'(BDG1)/52.6'(BDG2)/53.3'(BDG3) **
MAX. BLDG. COVERAGE	30%	18%

** SPECIAL PERMIT REQUIRED PER ZONING SPECIAL DIMENSIONAL REGULATIONS SECTION 4210 FOR COMMERCIAL DISTRICTS WHICH ALLOWS FOR STRUCTURES UP TO 60 FEET OR 5 STORIES, SEE ALSO SECTION 5.3.3 BUSINESS DISTRICTS, (A) TABLE OF REQUIREMENTS, FOOTNOTE (E) A HEIGHT OF FIVE STORIES AND 60 FEET MAY BE ALLOWED BY SPECIAL PERMIT FROM THE PLANNING BOARD IF STEPPED BACK FROM THE 4TH FLOOR BY A MINIMUM OF SIX FEET.

PARKING
 CURRENT ZONING: REQUIRED PARKING = 1.5 SPACES/UNIT FOR 1-BEDROOM & 2-BEDROOM UNITS, + 10% FOR VISITOR PARKING

PROPOSED UNITS=90 X 1.5 = 135 SPACES
 VISITOR SPACES=135 X 10% = 14 SPACES
 TOTAL=149 SPACES

PROP. PARKING SPACES = 160



LEGEND

	STONEWALL
	ZONING SETBACK LINE
	EASEMENT LINE
	TRAFFIC CONTROL LIGHT POLE
	SEWER MANHOLE
	DRAIN MANHOLE
	CATCH BASIN
	HYDRANT
	WATER GATE VALVE
	GAS GATE VALVE
	UTILITY POLE
	SIGN
	OVERHEAD WIRE LINE

ABBREVIATIONS

BTL	BITUMINOUS
BWL	BROKEN WHITE LINE
CB	CATCH BASIN
CCB	CAPE COD BERM
CONC.	CONCRETE
DMH	DRAIN MANHOLE
DYL	DOUBLE YELLOW LINE
ELEV	ELEVATION
ESHWT	ESTIMATED SEASONAL HIGH WATER TABLE
FES	FLARED END SECTION
INV	INVERT
R24	24' RADIUS (TYP)
RET.WALL	RETAINING WALL
SF	SQUARE FEET
SIS	SUBSURFACE INFIL. SYSTEM
SMH	SEWER MANHOLE
SOS	SEDIMENT & OIL SEPARATOR
SWK	SIDEWALK
SWL	SOLID WHITE LINE
UP	UTILITY POLE
WCR	WHEEL CHAIR RAMP

LIGHTING
 LIGHTING SYMBOL KEY:

	DARK SKY RATED OUTDOOR BARN LIGHT (HINKLEY 12070BK OR APPROVED EQUAL)
	DARK SKY RATED OUTDOOR WALL SCONCE (BALTHUS WS-W28516 OR APPROVED EQUAL)
	SEMI-CUTOFF LUMINAIRE (ANTIQUE STREET LAMPS DS7-W OR APPROVED EQUAL)

SIGNAGE SUMMARY TABLE
 ALL PROPOSED SIGNAGE SHOWN HEREON IS TO COMPLY WITH TOWN OF TEWKSURY, MASSDOT, AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) STANDARDS.

M.U.T.C.D. SIGN DESIGNATION:	R1-1	R3-8 SERIES	W4-2L	R10-7	R5-11	R7-8 WITH R7-8aP
M.U.T.C.D. SIGN NAME:	STOP	ADVANCE INTERSECTION CONTROL, LEFT LANE ONLY LEFT, RIGHT LANE ONLY RIGHT	LEFT LANE ENDS	DO NOT BLOCK INTERSECTION	AUTHORIZED VEHICLES ONLY	ACCESSIBLE RESERVED PARKING WITH VAN ACCESSIBLE
NUMBER OF PROP. SIGNS:	1	1	1	1	2	6 EACH
SIGN IMAGE:						

LAYOUT, LIGHTING, & MATERIALS PLAN

357 MAIN STREET
 TEWKSURY, MASSACHUSETTS

PLAN PREPARED FOR: BLIB HOLDINGS, LLC 70 JOHN E. SMITH DRIVE TEWKSURY, MASSACHUSETTS	PLAN PREPARED BY: LANDPLEX CIVIL ENGINEERING & SURVEYING 10 GEORGE STREET, UNIT 208 LOWELL, MASSACHUSETTS 01852 978-201-9390 - LANDPLEX.COM	
SHEET: 3 OF 8	SCALE: 1"=30'	FEBRUARY 5, 2025
NO.	REVISION DESCRIPTION	DATE
3	ACCESSIBLE WALK ADDED	1/23/2026
2	PER SUBCONSULTANT REVIEW	8/1/2025
1	PER SUBCONSULTANT REVIEW	4/25/2025

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Appendix B: Traffic Counts

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Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Veranda Ave / Pike St
 City/State : Tewksbury, MA
 Weather : Clear

File Name : 14050001
 Site Code : 14050001
 Start Date : 6/25/2025
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Int. Total
	Hard Left	Left	Thru	Right	Hard Right	Hard Left	Bear Left	Bear Right	Right	Hard Right	Left	Thru	Bear Right	Right	Hard Right	Left	Bear Left	Thru	Bear Right	Right	Hard Left	Left	Bear Left	Thru	Right	Hard Left	Left	Bear Left	Bear Right	Hard Right	
07:00 AM	0	2	160	14	8	0	0	0	0	0	0	1	0	0	0	2	8	120	2	0	0	13	0	0	6	2	1	0	7	1	347
07:15 AM	0	0	156	9	4	0	0	0	0	0	0	0	0	0	0	1	14	138	1	0	0	12	0	0	7	6	0	0	13	0	361
07:30 AM	0	0	143	7	2	0	0	0	0	0	2	0	0	0	0	0	13	127	3	0	0	10	4	0	0	1	0	0	13	0	325
07:45 AM	0	0	159	8	3	0	0	0	0	0	0	0	0	0	0	0	8	133	2	0	0	11	0	0	3	6	0	0	13	0	346
Total	0	2	618	38	17	0	0	0	0	0	2	1	0	0	0	3	43	518	8	0	0	46	4	0	16	15	1	0	46	1	1379
08:00 AM	0	0	161	7	4	0	0	0	0	0	0	0	0	0	0	1	13	149	4	1	0	16	0	0	1	9	1	0	5	0	372
08:15 AM	0	0	154	8	1	0	0	0	0	0	1	1	0	1	0	1	6	114	4	0	0	19	1	0	1	7	0	0	6	0	325
08:30 AM	0	0	143	9	3	0	0	0	0	0	2	0	0	0	0	2	4	161	6	1	0	14	0	0	3	9	0	0	16	0	373
08:45 AM	1	0	142	13	4	0	0	0	0	0	1	0	0	0	0	3	7	125	2	0	0	19	0	0	6	7	0	0	16	0	346
Total	1	0	600	37	12	0	0	0	0	0	4	1	0	1	0	7	30	549	16	2	0	68	1	0	11	32	1	0	43	0	1416
Grand Total	1	2	1218	75	29	0	0	0	0	0	6	2	0	1	0	10	73	1067	24	2	0	114	5	0	27	47	2	0	89	1	2795
Apprch %	0.1	0.2	91.9	5.7	2.2	0	0	0	0	0	66.7	22.2	0	11.1	0	0.9	6.2	90.7	2	0.2	0	78.1	3.4	0	18.5	33.8	1.4	0	64	0.7	
Total %	0	0.1	43.6	2.7	1	0	0	0	0	0	0.2	0.1	0	0	0	0.4	2.6	38.2	0.9	0.1	0	4.1	0.2	0	1	1.7	0.1	0	3.2	0	
Cars	1	2	1154	75	29	0	0	0	0	0	6	2	0	1	0	10	68	1007	21	2	0	114	5	0	27	47	2	0	88	1	2662
% Cars	100	100	94.7	100	100	0	0	0	0	0	100	100	0	100	0	100	93.2	94.4	87.5	100	0	100	100	0	100	100	100	0	98.9	100	95.2
Trucks	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	5	60	3	0	0	0	0	0	0	0	0	0	1	0	133
% Trucks	0	0	5.3	0	0	0	0	0	0	0	0	0	0	0	0	0	6.8	5.6	12.5	0	0	0	0	0	0	0	0	0	1.1	0	4.8

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Int. Total						
	Hard Left	Left	Thru	Right	Hard Right	Hard Left	Bear Left	Bear Right	Right	Hard Right	Left	Thru	Bear Right	Right	Hard Right	Left	Bear Left	Thru	Bear Right	Right	Hard Left	Left	Bear Left	Thru	Right	Hard Left	Left	Bear Left	Bear Right	Hard Right							
07:45 AM	0	0	159	8	3	170	0	0	0	0	0	0	0	0	0	0	0	0	0	8	133	2	0	143	0	11	0	0	3	14	6	0	0	13	0	19	346
08:00 AM	0	0	161	7	4	172	0	0	0	0	0	0	0	0	0	0	0	0	1	13	149	4	1	168	0	16	0	0	1	17	9	1	0	5	0	15	372
08:15 AM	0	0	154	8	1	163	0	0	0	0	0	0	1	1	0	1	0	3	1	6	114	4	0	125	0	19	1	0	1	21	7	0	0	6	0	13	325
08:30 AM	0	0	143	9	3	155	0	0	0	0	0	0	2	0	0	0	0	2	2	4	161	6	1	174	0	14	0	0	3	17	9	0	0	16	0	25	373
Total Volume	0	0	617	32	11	660	0	0	0	0	0	0	3	1	0	1	0	5	4	31	557	16	2	610	0	60	1	0	8	69	31	1	0	40	0	72	1416
% App. Total	0	0	93.5	4.8	1.7	0	0	0	0	0	60	20	0	20	0	0.7	5.1	91.3	2.6	0.3	0	87	1.4	0	11.6	43.1	1.4	0	55.6	0							
PHF	.000	.000	.958	.889	.698	.959	.000	.000	.000	.000	.000	.000	.375	.250	.000	.250	.000	.417	.500	.596	.865	.667	.500	.876	.000	.789	.250	.000	.667	.821	.861	.250	.000	.625	.000	.720	.949
Cars	0	0	583	32	11	626	0	0	0	0	0	0	3	1	0	1	0	5	4	30	521	15	2	572	0	60	1	0	8	69	31	1	0	40	0	72	1344
% Cars	0	0	94.5	100	100	94.8	0	0	0	0	0	0	100	100	0	100	0	100	100	96.8	93.5	93.8	100	93.8	0	100	100	0	100	100	100	100	0	100	0	100	94.9
Trucks	0	0	34	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	36	1	0	38	0	0	0	0	0	0	0	0	0	0	0	0	72
% Trucks	0	0	5.5	0	0	5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	6.5	6.3	0	6.2	0	0	0	0	0	0	0	0	0	0	0	0	5.1

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:45 AM

Accurate Counts

978-664-2565

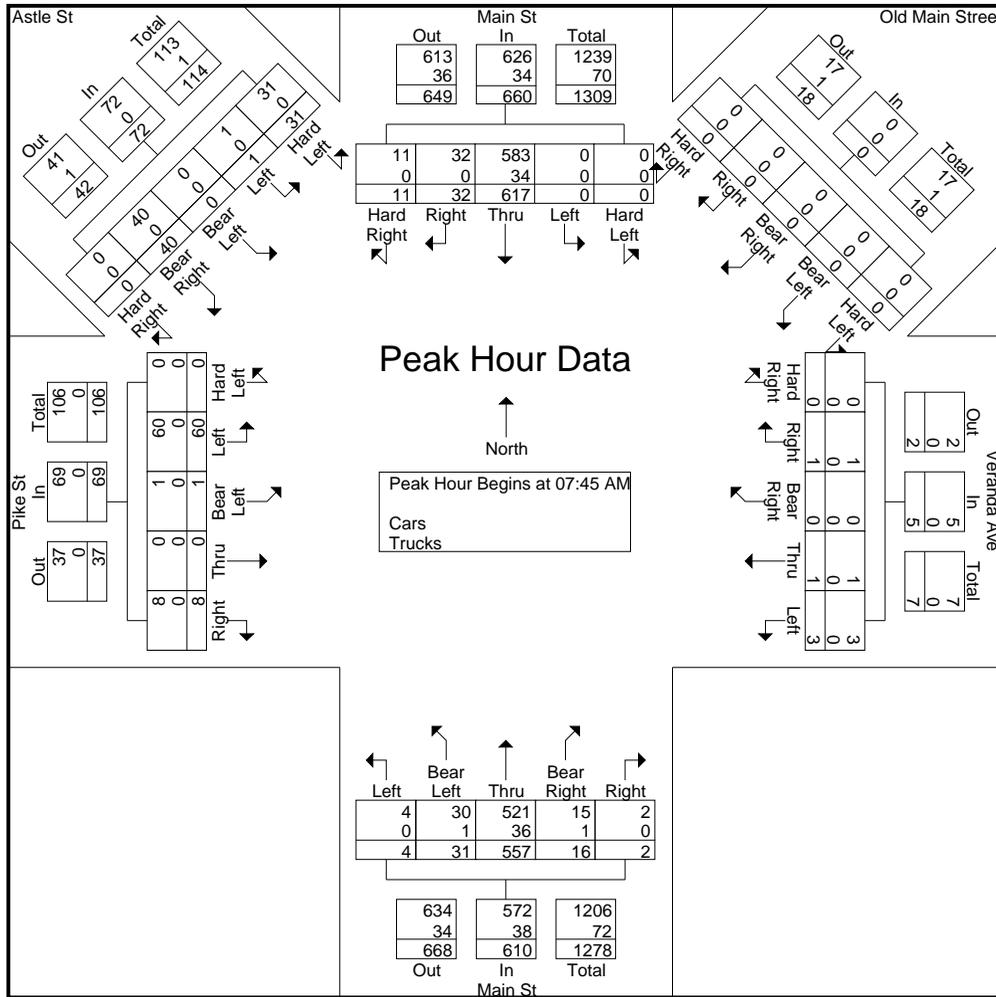
File Name : 14050001

Site Code : 14050001

Start Date : 6/25/2025

Page No : 2

N/S Street : Main Street
 E/W Street : Veranda Ave / Pike St
 City/State : Tewksbury, MA
 Weather : Clear



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

Peak Hour for Each Approach Begins at:

	07:00 AM					08:00 AM					07:45 AM					08:00 AM					08:00 AM															
+0 mins.	0	2	160	14	8	184	0	0	0	0	0	0	0	8	133	2	0	143	0	16	0	0	1	17	9	1	0	5	0	15						
+15 mins.	0	0	156	9	4	169	0	0	0	0	0	0	1	1	0	1	0	3	1	13	149	4	1	168	0	19	1	0	1	21	7	0	0	6	0	13
+30 mins.	0	0	143	7	2	152	0	0	0	0	0	0	2	0	0	0	0	2	1	6	114	4	0	125	0	14	0	0	3	17	9	0	0	16	0	25
+45 mins.	0	0	159	8	3	170	0	0	0	0	0	0	1	0	0	0	0	1	2	4	161	6	1	174	0	19	0	0	6	25	7	0	0	16	0	23
Total Volume	0	2	618	38	17	675	0	0	0	0	0	0	4	1	0	1	0	6	4	31	557	16	2	610	0	68	1	0	11	80	32	1	0	43	0	76
% App. Total	0	0.3	91.6	5.6	2.5		0	0	0	0	0	0	66.7	16.7	0	16.7	0	0.7	5.1	91.3	2.6	0.3		0	85	1.2	0	13.8		42.1	1.3	0	56.6	0		
PHF	.000	.250	.966	.879	.531	.917	.000	.000	.000	.000	.000	.000	.500	.250	.000	.250	.000	.500	.500	.596	.885	.667	.500	.876	.000	.895	.250	.000	.458	.800	.889	.250	.000	.672	.000	.760
Cars	0	2	58	3	1	642	0	0	0	0	0	0	4	1	0	1	0	6	4	3	52	1	2	572	0	6	1	0	1	80	3	1	0	4	0	75
% Cars	0	10	94.	10	10	95.1	0	0	0	0	0	0	10	10	0	10	0	100	10	96.	93.	93.	10	93.8	0	10	10	0	10	100	10	10	0	97.	0	98.7
Trucks	0	0	3	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	38	0	0	0	0	0	0	0	0	0	1	0	1
% Trucks	0	0	5.	0	0	4.9	0	0	0	0	0	0	0	0	0	0	0	0	0	3.	6.	6.	0	6.2	0	0	0	2.	0	1.3						

Accurate Counts
978-664-2565

File Name : 14050001
Site Code : 14050001
Start Date : 6/25/2025
Page No : 10

N/S Street : Main Street
E/W Street : Veranda Ave / Pike St
City/State : Tewksbury, MA
Weather : Clear

Groups Printed- Bikes Peds

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Exclu. Total	Inclu. Total	Int. Total								
	Har d Left	Thr u	Rig ht	Har d Right	Ped s	Har d Left	Bea r Left	Bea r Right	Rig ht	Har d Right	Ped s	Left	Thr u	Bea r Right	Rig ht	Har d Right	Ped s	Left	Bea r Left	Thr u	Bea r Right	Rig ht	Ped s	Har d Left	Left	Bea r Left	Bea r Right	Rig ht	Ped s												
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5			
07:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	1	3					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1					
Total	0	0	0	0	1	0	0	0	0	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	7	2	9					
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2					
08:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2					
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Total	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4					
Grand Total	0	0	0	0	1	0	0	0	0	3	0	0	0	0	4	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	10	3	13					
Approch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0	0	100	0											
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.3	0	0	0	33.3	0	0	0	0	0	0	33.3	0				.76	.23	.99					

Start Time	Main St From North						Old Main Street From Northeast						Veranda Ave From East						Main St From South						Pike St From West						Astle St From Northwest						Int. Total				
	Har d Left	Thr u	Rig ht	Har d Right	App. Total	Har d Left	Bea r Left	Bea r Right	Rig ht	Har d Right	App. Total	Left	Thr u	Bea r Right	Rig ht	Har d Right	App. Total	Left	Bea r Left	Thr u	Bea r Right	Rig ht	App. Total	Har d Left	Left	Bea r Left	Thr u	Rig ht	App. Total	Har d Left	Left	Bea r Left	Bea r Right	Rig ht	App. Total						
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	3
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	100	0	0	0	0	0	0	100	0						
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.000	.000	.000	.000	.250	.000	.000	.250	.000	.250	.750				

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

Peak Hour for Entire Intersection Begins at 07:15 AM

Accurate Counts

978-664-2565

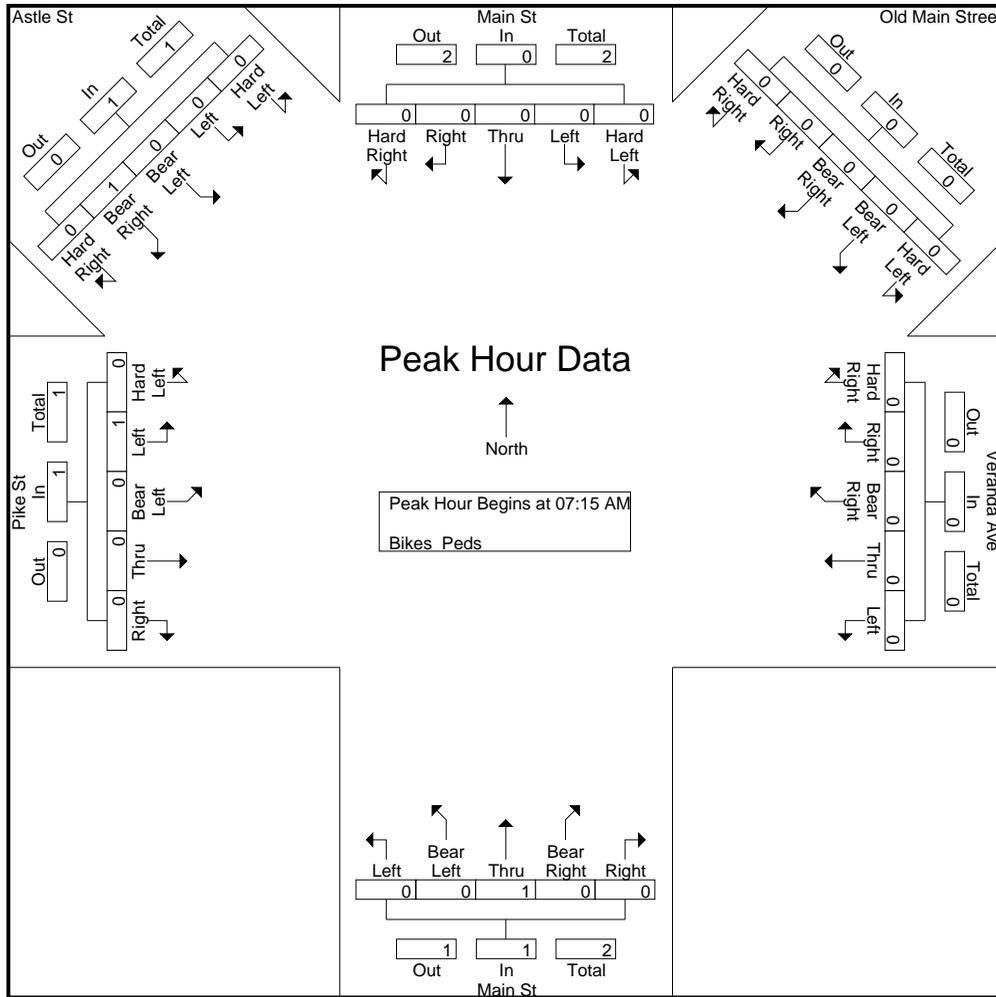
File Name : 14050001

Site Code : 14050001

Start Date : 6/25/2025

Page No : 11

N/S Street : Main Street
 E/W Street : Veranda Ave / Pike St
 City/State : Tewksbury, MA
 Weather : Clear



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

Peak Hour for Each Approach Begins at:

	07:00 AM						07:00 AM						07:00 AM						07:15 AM						07:00 AM						07:00 AM											
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	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	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	1	0	1						
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	100	0	0	0	0	0	0	100	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	.000	.250	.000	.000	.250	.000	.250	.000	.000	.000	.250	.000	.000	.000	.250	.000	.250								

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Veranda Ave / Pike St
City/State : Tewksbury, MA
Weather : Clear

File Name : 14050001
Site Code : 14050001
Start Date : 6/25/2025
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Int. Total
	Hard Left	Left	Thru	Right	Hard Right	Hard Left	Bear Left	Bear Right	Right	Hard Right	Left	Thru	Bear Right	Right	Hard Right	Left	Bear Left	Thru	Bear Right	Right	Hard Left	Left	Bear Left	Thru	Right	Hard Left	Left	Bear Left	Bear Right	Hard Right	
03:00 PM	0	0	138	14	10	0	0	0	0	0	0	0	0	0	0	1	14	208	3	2	0	17	0	1	8	6	0	0	9	1	432
03:15 PM	0	1	140	13	10	0	0	0	0	0	0	0	0	1	0	1	12	209	1	1	0	23	0	0	7	3	0	0	13	0	435
03:30 PM	2	1	119	14	10	0	0	0	0	0	0	0	0	0	0	3	25	226	1	1	0	26	0	0	7	12	0	1	9	2	459
03:45 PM	1	0	145	12	13	0	0	0	0	0	1	0	1	0	0	1	26	193	2	1	1	15	0	0	5	22	0	0	20	0	459
Total	3	2	542	53	43	0	0	0	0	0	1	0	1	1	0	6	77	836	7	5	1	81	0	1	27	43	0	1	51	3	1785
04:00 PM	0	0	112	15	16	0	0	0	0	0	0	0	0	1	0	5	20	214	0	1	0	22	0	0	4	15	0	0	11	0	436
04:15 PM	0	0	105	27	11	0	0	0	0	0	0	0	0	1	0	2	16	250	0	0	0	22	0	0	4	3	0	0	15	1	457
04:30 PM	1	0	98	12	15	0	0	0	0	0	0	0	0	0	0	0	15	215	1	0	0	14	0	0	1	10	0	0	17	1	400
04:45 PM	0	1	126	6	16	0	0	0	0	1	0	0	1	1	0	3	25	214	1	1	0	13	0	0	4	10	0	0	12	1	436
Total	1	1	441	60	58	0	0	0	0	1	0	0	1	3	0	10	76	893	2	2	0	71	0	0	13	38	0	0	55	3	1729
05:00 PM	0	0	164	15	11	0	0	0	0	0	0	0	0	1	0	4	17	222	1	1	1	6	2	0	2	10	0	0	24	0	481
05:15 PM	0	0	159	13	10	0	0	0	0	0	0	0	0	0	0	5	24	203	0	0	1	20	1	0	5	16	0	0	11	0	468
05:30 PM	0	0	163	10	5	0	0	0	0	0	0	0	0	0	0	1	23	184	2	0	0	13	0	0	4	4	1	0	12	0	422
05:45 PM	0	0	136	15	12	0	0	0	0	0	0	0	0	1	0	3	25	168	1	0	0	18	0	0	3	6	0	0	15	0	403
Total	0	0	622	53	38	0	0	0	0	0	0	0	0	2	0	13	89	777	4	1	2	57	3	0	14	36	1	0	62	0	1774
Grand Total	4	3	1605	166	139	0	0	0	0	1	1	0	2	6	0	29	242	2506	13	8	3	209	3	1	54	117	1	1	168	6	5288
Apprch %	0.2	0.2	83.7	8.7	7.3	0	0	0	0	100	11.1	0	22.2	66.7	0	1	8.6	89.6	0.5	0.3	1.1	77.4	1.1	0.4	20	39.9	0.3	0.3	57.3	2	
Total %	0.1	0.1	30.4	3.1	2.6	0	0	0	0	0	0	0	0	0.1	0	0.5	4.6	47.4	0.2	0.2	0.1	4	0.1	0	1	2.2	0	0	3.2	0.1	
Cars	4	3	1580	165	137	0	0	0	0	1	1	0	2	6	0	26	241	2462	12	8	3	206	3	1	52	117	1	1	163	6	5201
% Cars	100	100	98.4	99.4	98.6	0	0	0	0	100	100	0	100	100	0	89.7	99.6	98.2	92.3	100	100	98.6	100	100	96.3	100	100	100	97	100	98.4
Trucks	0	0	25	1	2	0	0	0	0	0	0	0	0	0	0	3	1	44	1	0	0	3	0	0	2	0	0	0	5	0	87
% Trucks	0	0	1.6	0.6	1.4	0	0	0	0	0	0	0	0	0	0	10.3	0.4	1.8	7.7	0	0	1.4	0	0	3.7	0	0	0	3	0	1.6

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Int. Total			
	Hard Left	Left	Thru	Right	Hard Right	Hard Left	Bear Left	Bear Right	Right	Hard Right	Left	Thru	Bear Right	Right	Hard Right	Left	Bear Left	Thru	Bear Right	Right	Hard Left	Left	Bear Left	Thru	Right	Hard Left	Left	Bear Left	Bear Right	Hard Right				
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																																		
Peak Hour for Entire Intersection Begins at 03:30 PM																																		
03:30 PM	2	1	119	14	10	0	0	0	0	0	0	0	0	0	0	3	25	226	1	1	0	26	0	0	7	33	12	0	1	9	2	24	459	
03:45 PM	1	0	145	12	13	0	0	0	0	0	1	0	1	0	0	1	26	193	2	1	1	15	0	0	5	21	22	0	0	20	0	42	459	
04:00 PM	0	0	112	15	16	0	0	0	0	0	0	0	0	1	0	1	5	20	0	1	0	22	0	0	4	26	15	0	0	11	0	26	436	
04:15 PM	0	0	105	27	11	0	0	0	0	0	0	0	0	1	0	1	2	16	250	0	0	22	0	0	4	26	3	0	0	15	1	19	457	
Total Volume	3	1	481	68	50	0	0	0	0	0	1	0	1	2	0	11	87	883	3	3	1	85	0	0	20	106	52	0	1	55	3	111	1811	
% App. Total	0.5	0.2	79.8	11.3	8.3	0	0	0	0	0	25	0	25	50	0	1.1	8.8	89.5	0.3	0.3	0.9	80.2	0	0	18.9	46.8	0	0.9	49.5	2.7				
PHF	.375	.250	.829	.630	.781	.000	.000	.000	.000	.000	.250	.000	.250	.500	.000	.550	.837	.883	.375	.750	.921	.250	.817	.000	.000	.714	.803	.591	.000	.250	.688	.375	.661	.986
Cars	3	1	474	67	49	0	0	0	0	0	1	0	1	2	0	8	87	868	3	3	1	85	0	0	20	106	52	0	1	53	3	109	1782	
% Cars	100	100	98.5	98.5	98.0	0	0	0	0	0	100	0	100	100	0	72.7	100	98.3	100	100	100	100	0	0	100	100	100	100	96.4	100	98.2	98.4		
Trucks	0	0	7	1	1	0	0	0	0	0	0	0	0	0	0	3	0	15	0	0	0	0	0	0	0	0	0	0	2	0	2	29		
% Trucks	0	0	1.5	1.5	2.0	0	0	0	0	0	0	0	0	0	0	27.3	0	1.7	0	0	0	0	0	0	0	0	0	0	3.6	0	1.8	1.6		

Accurate Counts

978-664-2565

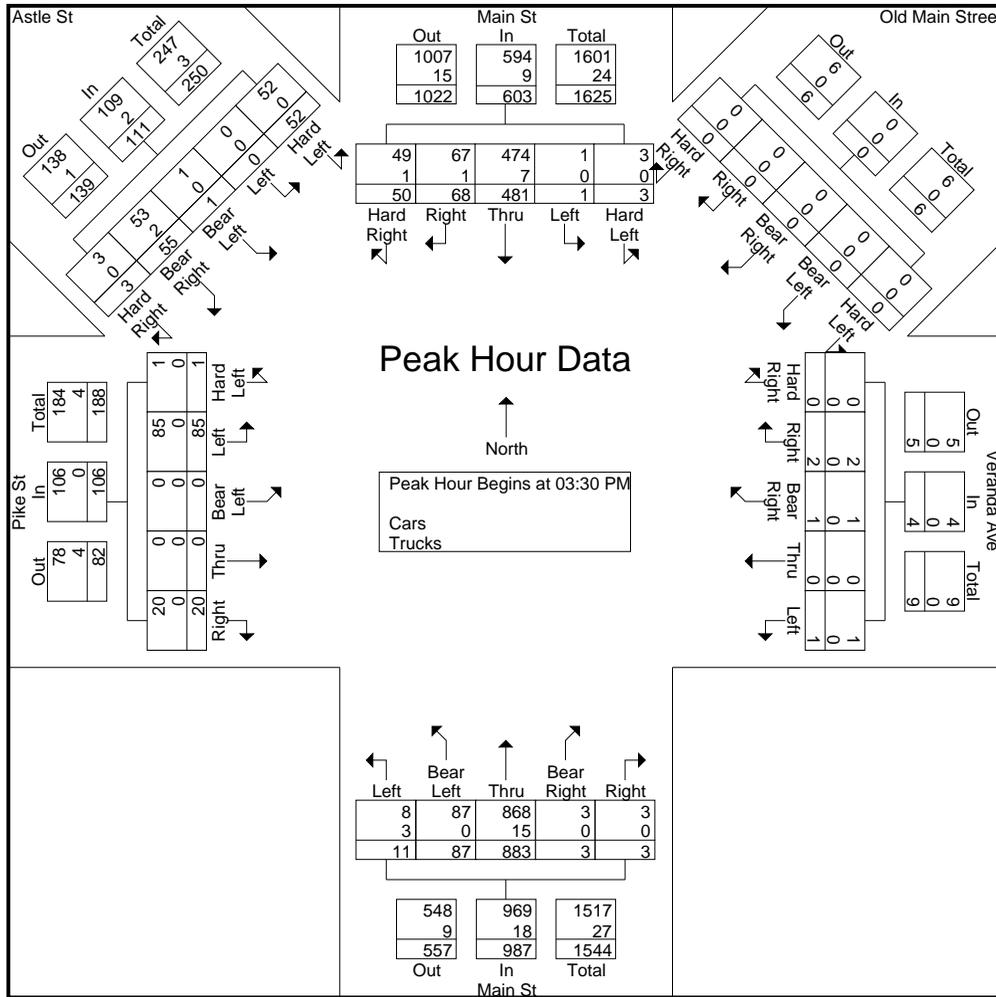
File Name : 14050001

Site Code : 14050001

Start Date : 6/25/2025

Page No : 2

N/S Street : Main Street
 E/W Street : Veranda Ave / Pike St
 City/State : Tewksbury, MA
 Weather : Clear



Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM					04:00 PM					03:15 PM					04:15 PM					03:00 PM					03:45 PM										
+0 mins.	0	0	164	15	11	190	0	0	0	0	0	0	0	0	0	1	0	1	2	16	250	0	0	268	0	17	0	1	8	26	22	0	0	20	0	42
+15 mins.	0	0	159	13	10	182	0	0	0	0	0	0	0	0	0	0	0	0	0	15	215	1	0	231	0	23	0	0	7	30	15	0	0	11	0	26
+30 mins.	0	0	163	10	5	178	0	0	0	0	0	0	1	0	1	0	0	2	3	25	214	1	1	244	0	26	0	0	7	33	3	0	0	15	1	19
+45 mins.	0	0	136	15	12	163	0	0	0	0	1	1	0	0	0	1	0	1	4	17	222	1	1	245	1	15	0	0	5	21	10	0	0	17	1	28
Total Volume	0	0	622	53	38	713	0	0	0	0	1	1	1	0	1	2	0	4	9	73	901	3	2	988	1	81	0	1	27	110	50	0	0	63	2	115
% App. Total	0	0	87.2	7.4	5.3	100	0	0	0	0	100	25	0	25	50	0	100	0.9	7.4	91.2	0.3	0.2	100	0.9	73.6	0	0.9	24.5	100	43.5	0	0	54.8	1.7	100	
PHF	.000	.000	.948	.883	.792	.938	.000	.000	.000	.000	.250	.250	.250	.000	.250	.500	.000	.500	.563	.730	.901	.750	.500	.922	.250	.779	.000	.250	.844	.833	.568	.000	.000	.788	.500	.685
Cars	0	0	61	5	3	706	0	0	0	0	1	1	1	0	1	2	0	4	9	7	89	3	2	979	1	8	0	1	2	110	5	0	0	6	0	112
% Cars	0	0	98.	10	10	99	0	0	0	0	10	100	10	0	10	10	0	100	10	10	9	10	10	99.1	10	10	0	10	10	100	10	0	0	95.	10	97.4
Trucks	0	0	7	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	0	3	0	3
% Trucks	0	0	1.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.9	0	0	0	0	0	0	0	0	0	4.	0	2.6

Accurate Counts
978-664-2565

File Name : 14050001
Site Code : 14050001
Start Date : 6/25/2025
Page No : 10

N/S Street : Main Street
E/W Street : Veranda Ave / Pike St
City/State : Tewksbury, MA
Weather : Clear

Groups Printed- Bikes Peds

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Exclu. Total	Inclu. Total	Int. Total					
	Har d Left	Thru	Rig ht	Har d Right	Ped s	Har d Left	Bea r Left	Bea r Right	Rig ht	Har d Right	Ped s	Left	Thru	Bea r Right	Rig ht	Har d Right	Ped s	Left	Bea r Left	Thru	Bea r Right	Rig ht	Ped s	Har d Left	Left	Bea r Left	Bea r Right	Har d Right	Ped s									
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	4
04:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	2	4
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	4	3	7
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6
Grand Total	0	0	1	0	1	0	0	0	0	3	0	0	0	0	3	0	0	2	1	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	11	6	17
Approch %	0	0	50	0	50	0	0	0	0	0	0	0	0	0	0	0	0	66.7	33.3	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0			
Total %	0	0	16.7	0	16.7	0	0	0	0	0	0	0	0	0	0	0	0	33.3	16.7	0	0	16.7	0	0	0	0	0	0	0	0						64	35	
																																				.7	.3	

Start Time	Main St From North					Old Main Street From Northeast					Veranda Ave From East					Main St From South					Pike St From West					Astle St From Northwest					Exclu. Total	Inclu. Total	Int. Total					
	Har d Left	Thru	Rig ht	Har d Right	App. Total	Har d Left	Bea r Left	Bea r Right	Rig ht	Har d Right	App. Total	Left	Thru	Bea r Right	Rig ht	Har d Right	App. Total	Left	Bea r Left	Thru	Bea r Right	Rig ht	App. Total	Har d Left	Left	Bea r Left	Bea r Right	Har d Right	App. Total									
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																																						
Peak Hour for Entire Intersection Begins at 03:15 PM																																						
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
% App. Total	0	0	50	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PHF	.000	.000	.250	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500

Accurate Counts

978-664-2565

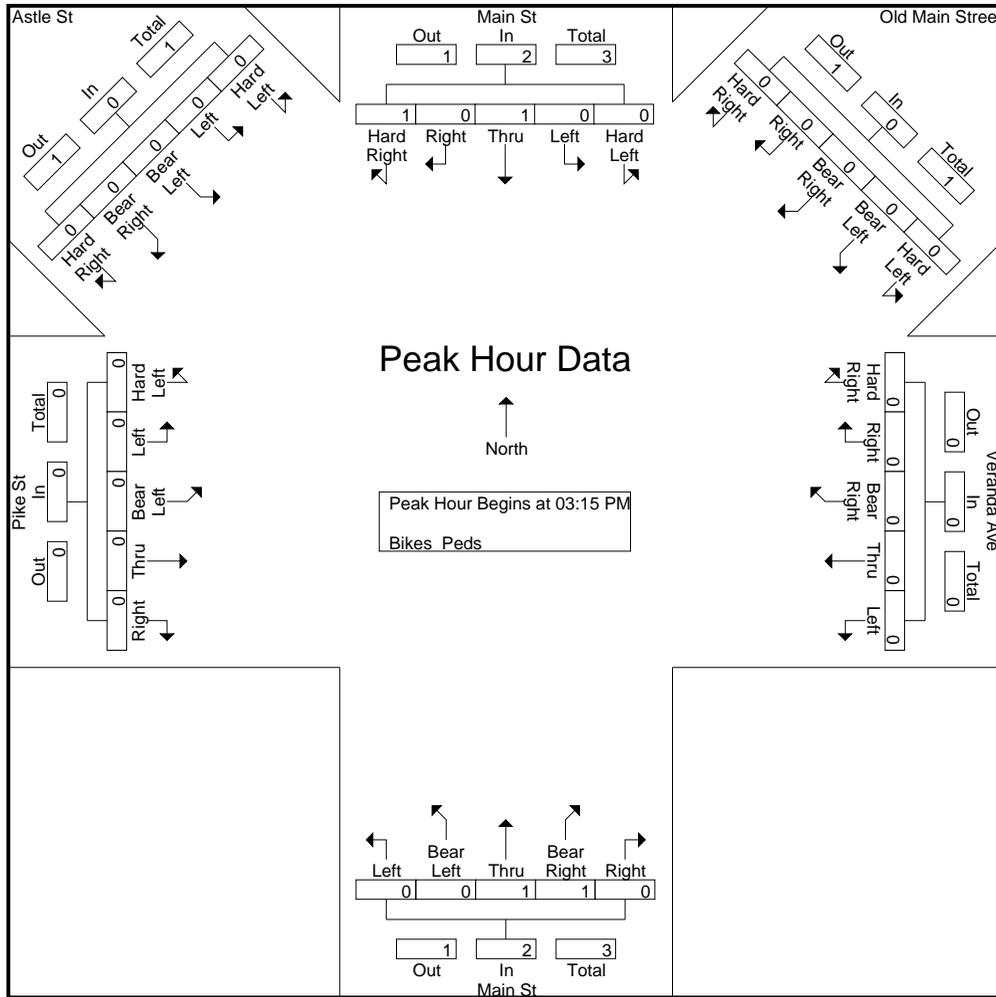
File Name : 14050001

Site Code : 14050001

Start Date : 6/25/2025

Page No : 11

N/S Street : Main Street
 E/W Street : Veranda Ave / Pike St
 City/State : Tewksbury, MA
 Weather : Clear



Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	03:15 PM						03:00 PM						03:00 PM						03:45 PM						03:00 PM						03:00 PM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
+15 mins.	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	1	0	0	0	1	0	0	0	0	0	0
% App. Total	0	0	50	0	50		0	0	0	0	0		0	0	0	0	0		0	0	66.7	33.3	0		0	100	0	0	0		0	0	0	0	0	
PHF	.000	.000	.250	.000	.250	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.250	.000	.750	.000	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000

Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear

File Name : 14050002
 Site Code : 14050002
 Start Date : 6/25/2025
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Main St From North		Old Main St From East		Main St From South		Int. Total
	Left	Thru	Left	Right	Thru	Right	
07:00 AM	4	183	0	2	137	0	326
07:15 AM	3	172	1	5	149	0	330
07:30 AM	2	135	2	6	141	0	286
07:45 AM	3	174	0	7	148	0	332
Total	12	664	3	20	575	0	1274
08:00 AM	0	164	1	3	171	0	339
08:15 AM	7	161	2	9	146	0	325
08:30 AM	6	157	5	5	175	1	349
08:45 AM	7	153	1	2	158	0	321
Total	20	635	9	19	650	1	1334
Grand Total	32	1299	12	39	1225	1	2608
Apprch %	2.4	97.6	23.5	76.5	99.9	0.1	
Total %	1.2	49.8	0.5	1.5	47	0	
Cars	31	1235	12	36	1166	1	2481
% Cars	96.9	95.1	100	92.3	95.2	100	95.1
Trucks	1	64	0	3	59	0	127
% Trucks	3.1	4.9	0	7.7	4.8	0	4.9

Start Time	Main St From North			Old Main St From East			Main St From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	3	174	177	0	7	7	148	0	148	332
08:00 AM	0	164	164	1	3	4	171	0	171	339
08:15 AM	7	161	168	2	9	11	146	0	146	325
08:30 AM	6	157	163	5	5	10	175	1	176	349
Total Volume	16	656	672	8	24	32	640	1	641	1345
% App. Total	2.4	97.6		25	75		99.8	0.2		
PHF	.571	.943	.949	.400	.667	.727	.914	.250	.911	.963
Cars	15	621	636	8	23	31	605	1	606	1273
% Cars	93.8	94.7	94.6	100	95.8	96.9	94.5	100	94.5	94.6
Trucks	1	35	36	0	1	1	35	0	35	72
% Trucks	6.3	5.3	5.4	0	4.2	3.1	5.5	0	5.5	5.4

Accurate Counts

978-664-2565

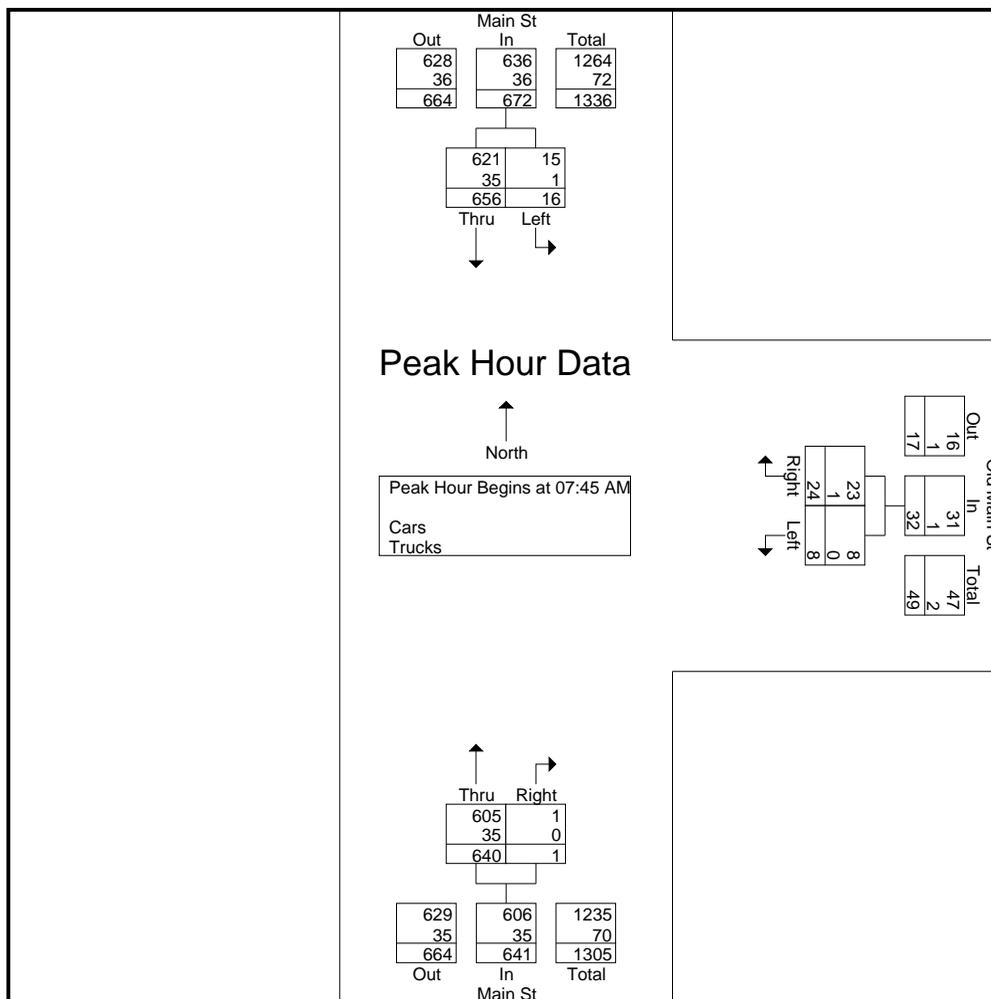
File Name : 14050002

Site Code : 14050002

Start Date : 6/25/2025

Page No : 2

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear



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

Peak Hour for Each Approach Begins at:

	07:00 AM			07:45 AM			08:00 AM		
+0 mins.	4	183	187	0	7	7	171	0	171
+15 mins.	3	172	175	1	3	4	146	0	146
+30 mins.	2	135	137	2	9	11	175	1	176
+45 mins.	3	174	177	5	5	10	158	0	158
Total Volume	12	664	676	8	24	32	650	1	651
% App. Total	1.8	98.2		25	75		99.8	0.2	
PHF	.750	.907	.904	.400	.667	.727	.929	.250	.925
Cars	12	631	643	8	23	31	616	1	617
% Cars	100	95	95.1	100	95.8	96.9	94.8	100	94.8
Trucks	0	33	33	0	1	1	34	0	34
% Trucks	0	5	4.9	0	4.2	3.1	5.2	0	5.2

Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear

File Name : 14050002
 Site Code : 14050002
 Start Date : 6/25/2025
 Page No : 10

Groups Printed- Bikes Peds

Start Time	Main St From North			Old Main St From East			Main St From South			Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
07:00 AM	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
07:30 AM	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
Total	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	1	1	0	0	1	1	2
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	1	0	0	0	1	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	1	0	0	2	1	3
Grand Total	0	0	0	0	0	2	1	0	0	2	1	3
Apprch %	0	0		0	0		100	0				
Total %	0	0		0	0		100	0		66.7	33.3	

Start Time	Main St From North			Old Main St From East			Main St From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	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
08:00 AM	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	1	0	1	1
% App. Total	0	0		0	0		100	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.250	.250

Accurate Counts

978-664-2565

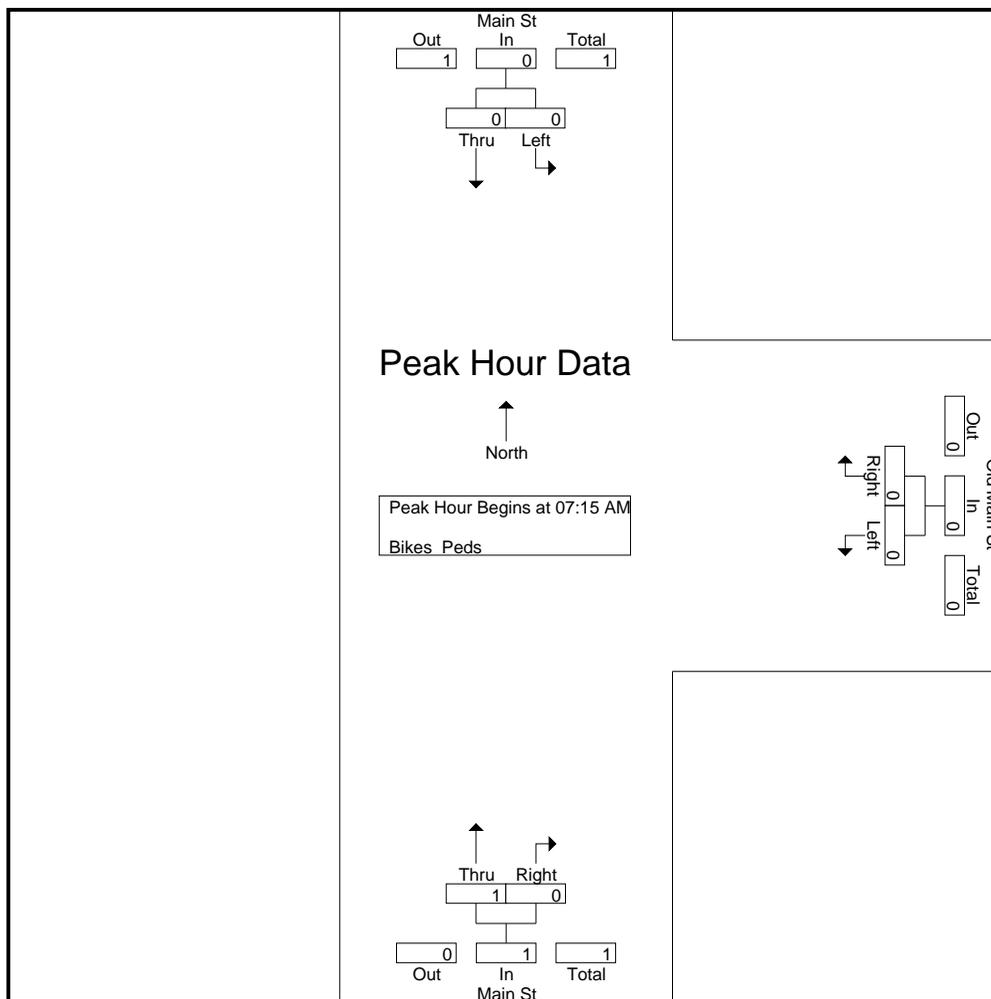
File Name : 14050002

Site Code : 14050002

Start Date : 6/25/2025

Page No : 11

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear



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

Peak Hour for Each Approach Begins at:

	07:00 AM			07:00 AM			07:15 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	1	0	1
Total Volume	0	0	0	0	0	0	1	0	1
% App. Total	0	0	0	0	0	0	100	0	
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.250

Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear

File Name : 14050002
 Site Code : 14050002
 Start Date : 6/25/2025
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Main St From North		Old Main St From East		Main St From South		Int. Total
	Left	Thru	Left	Right	Thru	Right	
03:00 PM	1	163	0	3	229	1	397
03:15 PM	2	163	1	6	235	0	407
03:30 PM	1	140	3	6	256	1	407
03:45 PM	4	171	2	4	223	0	404
Total	8	637	6	19	943	2	1615
04:00 PM	2	135	1	3	248	0	389
04:15 PM	2	140	0	2	269	0	413
04:30 PM	1	127	0	2	243	0	373
04:45 PM	3	151	0	4	242	0	400
Total	8	553	1	11	1002	0	1575
05:00 PM	3	178	2	2	234	0	419
05:15 PM	2	187	0	4	240	0	433
05:30 PM	1	178	2	1	201	0	383
05:45 PM	3	167	0	2	189	0	361
Total	9	710	4	9	864	0	1596
Grand Total	25	1900	11	39	2809	2	4786
Apprch %	1.3	98.7	22	78	99.9	0.1	
Total %	0.5	39.7	0.2	0.8	58.7	0	
Cars	25	1874	11	38	2763	2	4713
% Cars	100	98.6	100	97.4	98.4	100	98.5
Trucks	0	26	0	1	46	0	73
% Trucks	0	1.4	0	2.6	1.6	0	1.5

Start Time	Main St From North			Old Main St From East			Main St From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	3	151	154	0	4	4	242	0	242	400
05:00 PM	3	178	181	2	2	4	234	0	234	419
05:15 PM	2	187	189	0	4	4	240	0	240	433
05:30 PM	1	178	179	2	1	3	201	0	201	383
Total Volume	9	694	703	4	11	15	917	0	917	1635
% App. Total	1.3	98.7		26.7	73.3		100	0		
PHF	.750	.928	.930	.500	.688	.938	.947	.000	.947	.944
Cars	9	691	700	4	11	15	898	0	898	1613
% Cars	100	99.6	99.6	100	100	100	97.9	0	97.9	98.7
Trucks	0	3	3	0	0	0	19	0	19	22
% Trucks	0	0.4	0.4	0	0	0	2.1	0	2.1	1.3

Accurate Counts

978-664-2565

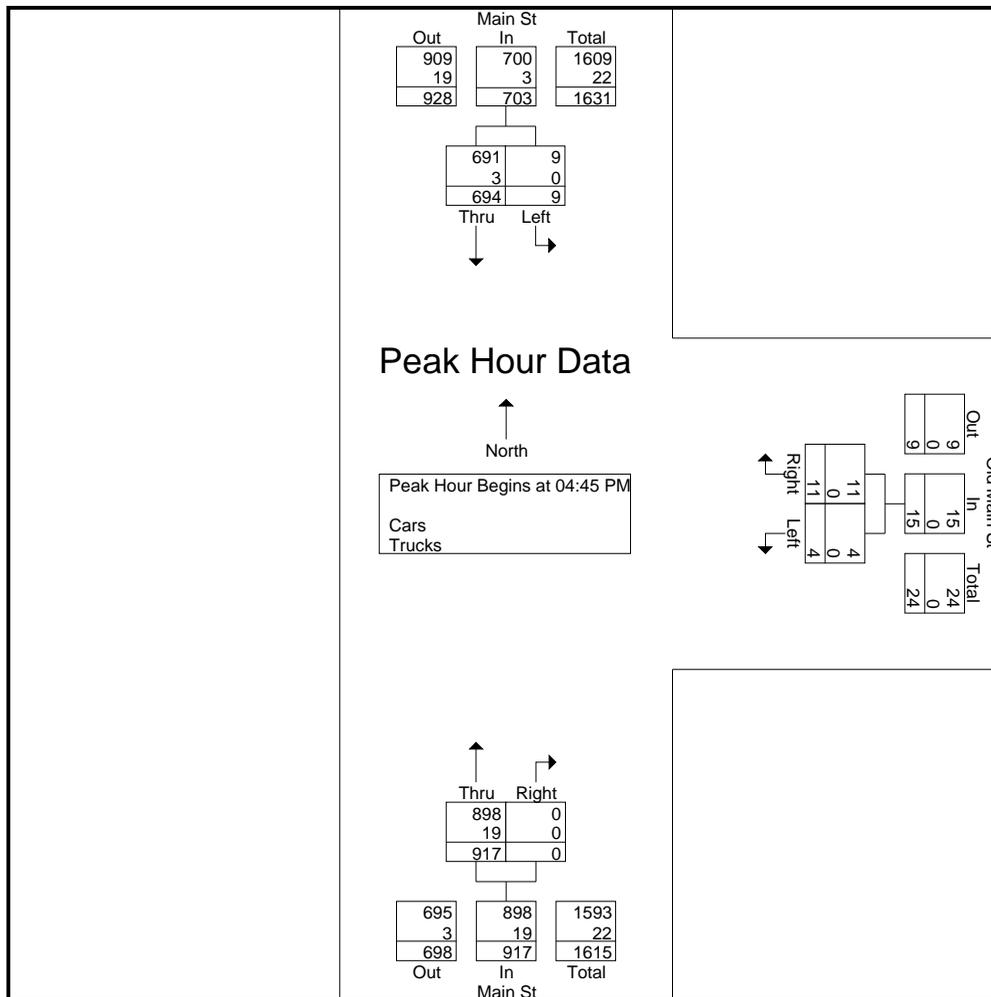
File Name : 14050002

Site Code : 14050002

Start Date : 6/25/2025

Page No : 2

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear



Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

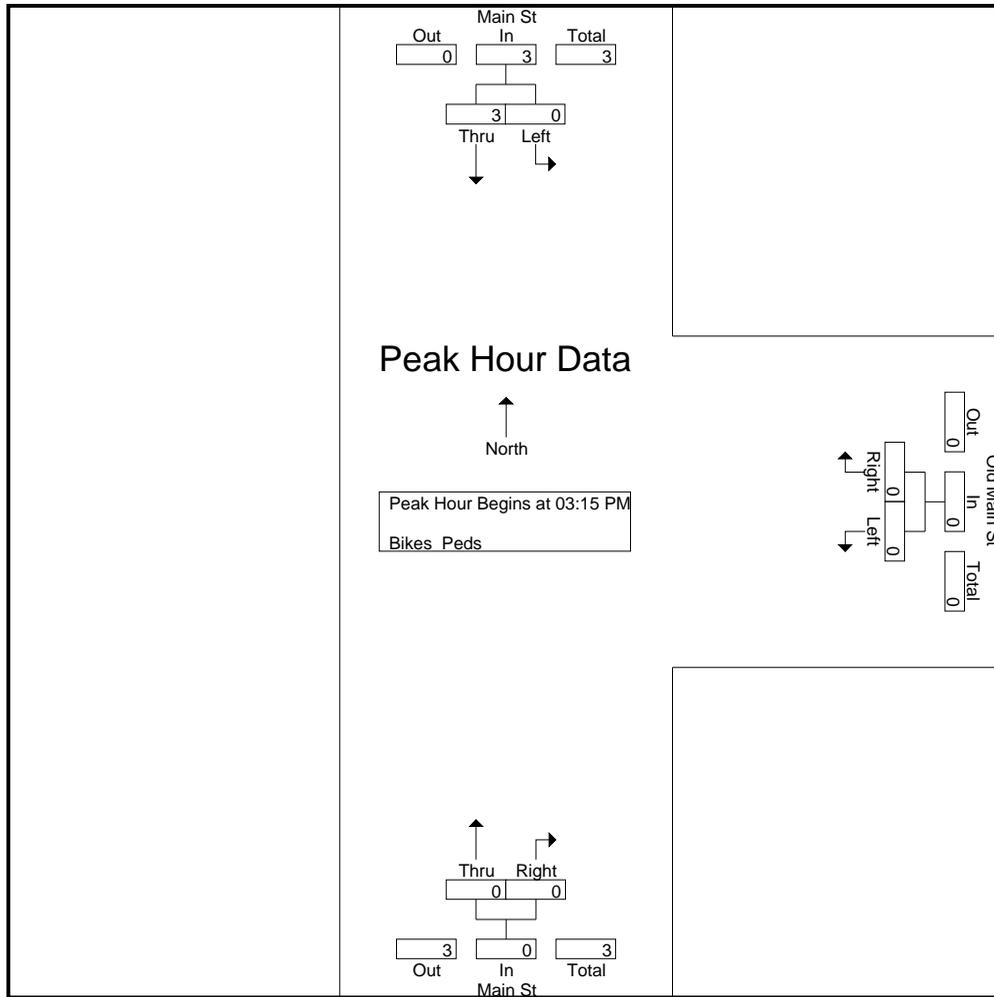
	05:00 PM			03:15 PM			04:00 PM		
+0 mins.	3	178	181	1	6	7	248	0	248
+15 mins.	2	187	189	3	6	9	269	0	269
+30 mins.	1	178	179	2	4	6	243	0	243
+45 mins.	3	167	170	1	3	4	242	0	242
Total Volume	9	710	719	7	19	26	1002	0	1002
% App. Total	1.3	98.7		26.9	73.1		100	0	
PHF	.750	.949	.951	.583	.792	.722	.931	.000	.931
Cars	9	705	714	7	19	26	992	0	992
% Cars	100	99.3	99.3	100	100	100	99	0	99
Trucks	0	5	5	0	0	0	10	0	10
% Trucks	0	0.7	0.7	0	0	0	1	0	1

Accurate Counts

978-664-2565

N/S Street : Main Street
 E/W Street : Old Main Street
 City/State : Tewksbury, MA
 Weather : Clear

File Name : 14050002
 Site Code : 14050002
 Start Date : 6/25/2025
 Page No : 11



Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	03:15 PM			03:00 PM			03:00 PM		
+0 mins.	0	0	0	0	0	0	1	0	1
+15 mins.	0	1	1	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	2	2	0	0	0	0	0	0
Total Volume	0	3	3	0	0	0	1	0	1
% App. Total	0	100		0	0		100	0	
PHF	.000	.375	.375	.000	.000	.000	.250	.000	.250

Appendix C: Monthly Traffic-Volume Factors

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Massachusetts Highway Department
Statewide Traffic Data Collection
2024 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.17	1.12	1.11	1.06	1.00	0.96	0.94	0.92	1.00	0.98	1.06	1.07	0.78
R3	1.10	1.04	1.04	1.02	0.91	0.88	0.88	0.87	0.92	0.92	0.99	1.01	0.98
R4-R7	1.16	1.12	1.08	1.03	0.92	0.89	0.88	0.89	0.92	0.94	1.04	1.10	0.98
U1-Boston	1.07	1.03	0.98	0.97	0.94	0.91	0.94	0.91	0.94	0.94	0.98	1.02	0.94
U1-Essex	1.13	1.09	1.06	1.04	0.95	0.89	0.88	0.87	0.95	0.95	1.03	1.05	0.96
U1-Southeast	1.14	1.10	1.04	0.99	0.93	0.86	0.87	0.85	0.91	0.93	0.99	1.02	0.96
U1-West	1.10	1.02	0.98	0.96	0.95	0.92	0.94	0.91	0.91	0.91	0.96	1.00	0.83
U1-Worcester	1.08	1.03	0.99	0.98	0.94	0.91	0.93	0.91	0.92	0.91	0.95	1.00	0.93
U3	1.06	1.02	0.98	0.96	0.93	0.91	0.95	0.94	0.93	0.93	0.96	1.00	0.98
U4-U7	1.04	1.02	0.96	0.95	0.91	0.90	0.94	0.94	0.93	0.94	0.98	1.02	0.99
UR2	1.08	1.02	0.98	0.97	0.93	0.90	0.93	0.90	0.92	0.92	0.97	1.01	0.98
Rec - East	1.21	1.20	1.09	1.01	0.91	0.81	0.77	0.79	0.91	0.95	1.05	1.13	0.99
Rec - West	1.46	1.38	1.32	1.06	0.94	0.79	0.59	0.69	0.97	0.99	1.18	1.28	0.99

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

UR2 Group - Combination of Urban Freeways and Expressways and Rural Freeways and Expressways.

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

Recreational - West Group - Continuous Stations 2 and 189 including stations

1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

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Appendix D: Vehicle Speeds

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Accurate Counts
978-664-2565

Site Code: 14050001

Location : Main Street NB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: NB,

7/10/2025 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	2	2	9	13	19	9	4	1	0	0	0	0	0	59
1:00	1	9	5	5	8	4	3	0	0	0	0	0	0	35
2:00	1	0	5	6	2	2	0	0	0	0	0	0	0	16
3:00	0	2	5	3	4	2	0	0	1	0	0	0	0	17
4:00	1	1	2	9	2	2	3	2	0	0	0	0	0	22
5:00	0	0	9	23	27	23	15	5	1	1	0	0	0	104
6:00	0	7	25	46	66	41	20	5	2	0	0	0	0	212
7:00	0	6	37	123	108	81	49	10	1	0	0	0	0	415
8:00	2	13	58	123	142	118	29	6	1	0	0	0	0	492
9:00	1	15	58	93	139	95	28	8	2	1	0	0	0	440
10:00	2	18	54	168	120	58	29	10	1	0	0	0	0	460
11:00	1	23	95	125	180	77	25	14	3	0	0	0	0	543
12:00 PM	2	36	100	199	176	93	30	9	2	0	0	0	0	647
1:00	3	37	95	204	194	107	36	11	2	0	0	0	0	689
2:00	0	28	118	205	175	94	37	8	2	0	0	0	0	667
3:00	5	46	122	232	239	137	37	5	1	0	0	0	0	824
4:00	5	28	102	235	217	116	42	6	3	0	0	0	0	754
5:00	8	34	100	177	191	105	31	7	6	0	0	0	0	659
6:00	1	22	82	192	212	95	40	5	1	0	0	0	0	650
7:00	0	18	75	164	168	123	48	12	0	0	0	0	0	608
8:00	1	20	48	144	139	67	27	6	0	1	0	0	0	453
9:00	2	9	64	102	103	39	12	1	1	0	0	0	0	333
10:00	3	8	32	43	43	29	11	3	0	0	0	0	0	172
11:00	2	5	20	45	41	24	6	1	1	0	0	0	0	145
Total	43	387	1320	2679	2715	1541	562	135	31	3	0	0	0	9416
Percentile				15th	50th	85th	95th							
Speed				21	27	33	36							
Mean Speed (Average)				31.2										
10 MPH Pace Speed				26-35										
Number in Pace				5394										
Percent in Pace				57.0%										
Number > 30 MPH				4987										
Percent > 30 MPH				53.0%										

Accurate Counts
978-664-2565

Site Code: 14050001

Location : Main Street NB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: NB,

7/11/2025 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	2	6	10	11	23	10	7	2	0	0	0	0	0	71
1:00	0	0	5	5	5	3	0	1	0	0	0	0	0	19
2:00	0	1	0	6	6	4	0	0	0	0	0	0	0	17
3:00	0	1	3	5	3	6	1	1	0	0	0	0	0	20
4:00	0	2	4	8	8	2	6	1	0	0	0	0	0	31
5:00	0	3	17	36	38	27	17	2	1	0	0	0	0	141
6:00	0	6	33	77	68	56	17	7	4	0	0	0	0	268
7:00	4	10	67	133	137	91	36	10	2	0	0	0	0	490
8:00	0	11	58	161	166	97	36	13	1	1	0	0	0	544
9:00	0	22	93	197	196	89	34	6	2	0	0	0	0	639
10:00	0	24	71	181	154	89	31	3	0	0	0	0	0	553
11:00	4	27	69	144	167	82	32	5	0	0	0	0	0	530
12:00 PM	7	31	83	178	139	82	23	6	0	0	0	0	0	549
1:00	1	27	106	179	145	86	25	0	0	0	0	0	0	569
2:00	9	27	93	189	181	103	13	1	3	0	0	0	0	619
3:00	4	37	122	206	194	121	28	4	0	0	0	0	0	716
4:00	2	27	101	187	182	82	22	5	0	0	0	0	0	608
5:00	2	12	63	183	155	87	35	4	2	0	0	0	0	543
6:00	2	12	74	158	165	79	23	6	3	0	0	0	0	522
7:00	0	10	43	118	126	77	33	4	1	0	0	0	0	412
8:00	0	3	40	128	118	64	27	5	0	0	0	0	0	385
9:00	0	14	62	106	95	38	15	5	2	0	1	0	0	338
10:00	1	13	40	85	55	32	8	5	0	0	0	0	0	239
11:00	0	12	42	83	51	34	12	4	1	1	0	1	0	241
Total	38	338	1299	2764	2577	1441	481	100	22	2	1	1	0	9064

Percentile	15th	50th	85th	95th
Speed	22	27	33	36
Mean Speed (Average)	30.9			
10 MPH Pace Speed	26-35			
Number in Pace	5341			
Percent in Pace	59.0%			
Number > 30 MPH	4625			
Percent > 30 MPH	51.0%			

Accurate Counts
978-664-2565

Location : Main Street NB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: NB,

Site Code: 14050001

7/12/2025 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	2	10	17	21	23	14	2	1	1	0	0	0	0	91
1:00	0	8	6	5	8	2	3	1	0	0	0	0	0	33
2:00	1	0	5	3	3	3	3	0	0	0	0	0	0	18
3:00	0	0	3	5	6	4	0	1	0	0	0	0	0	19
4:00	1	0	4	12	7	3	1	0	0	0	0	0	0	28
5:00	0	1	5	17	7	9	5	1	0	0	0	0	0	45
6:00	0	2	24	55	42	34	8	2	0	1	0	0	0	168
7:00	1	10	34	72	90	75	18	9	2	2	1	0	0	314
8:00	1	14	42	95	102	68	11	2	0	0	0	0	0	335
9:00	1	19	46	154	155	71	28	3	3	0	0	0	0	480
10:00	4	25	95	152	188	85	31	3	0	0	0	0	0	583
11:00	4	23	64	200	195	105	34	5	1	0	1	0	0	632
12:00 PM	1	24	86	182	159	106	25	4	0	0	0	0	0	587
1:00	3	15	85	169	177	90	19	3	0	0	0	0	0	561
2:00	0	9	57	162	160	94	33	5	1	0	0	0	0	521
3:00	1	11	71	175	169	93	41	3	0	0	0	0	0	564
4:00	2	11	56	168	155	82	31	10	3	0	0	0	0	518
5:00	0	10	60	183	130	95	34	5	0	0	0	0	0	517
6:00	0	4	43	119	141	83	31	8	3	0	0	0	0	432
7:00	0	9	26	122	113	62	27	9	0	0	0	0	0	368
8:00	0	11	48	87	81	55	16	6	0	0	0	0	0	304
9:00	2	10	57	81	72	41	16	3	2	0	0	0	0	284
10:00	0	17	42	66	52	18	5	2	0	0	0	0	0	202
11:00	1	4	28	46	45	33	11	2	1	0	0	0	0	171
Total	25	247	1004	2351	2280	1325	433	88	17	3	2	0	0	7775
			Percentile	15th	50th	85th	95th							
			Speed	23	27	33	37							
			Mean Speed (Average)	31.3										
			10 MPH Pace Speed	26-35										
			Number in Pace	4422										
			Percent in Pace	60.0%										
			Number > 30 MPH	4148										
			Percent > 30 MPH	53.4%										
Grand Total	106	972	3623	7794	7572	4307	1476	323	70	8	3	1	0	26255
Stats			Percentile	15th	50th	85th	95th							
			Speed	22	27	33	36							
			Mean Speed (Average)	31.1										
			10 MPH Pace Speed	26-35										
			Number in Pace	15275										
			Percent in Pace	59.0%										
			Number > 30 MPH	13760										
			Percent > 30 MPH	52.4%										

Accurate Counts
978-664-2565

Location : Main Street SB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: SB,

Site Code: 1405002A

7/24/2025 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	0	6	13	19	5	1	0	0	0	0	44
1:00	0	0	0	0	2	23	6	4	0	0	0	0	0	35
2:00	0	0	0	0	3	6	4	5	0	1	0	0	0	19
3:00	0	0	0	2	4	9	12	3	2	0	0	0	0	32
4:00	0	1	0	0	8	23	23	9	2	2	0	0	0	68
5:00	0	0	0	2	17	104	110	45	16	0	0	0	1	295
6:00	1	0	18	19	92	219	214	78	15	2	0	0	0	658
7:00	0	1	1	43	131	232	189	55	7	0	0	0	0	659
8:00	2	4	13	64	154	209	191	55	11	0	1	0	0	704
9:00	0	0	13	41	197	246	174	16	1	0	0	0	0	688
10:00	9	8	15	59	203	239	170	30	15	0	8	0	0	756
11:00	3	11	31	112	206	257	161	26	3	1	0	0	0	811
12:00 PM	2	3	35	84	316	275	95	23	2	1	0	0	0	836
1:00	11	5	29	122	194	234	136	27	0	0	0	0	0	758
2:00	0	7	20	76	190	313	130	38	3	3	0	0	0	780
3:00	5	2	9	58	180	297	100	23	1	0	0	0	0	675
4:00	0	0	5	45	157	245	182	15	9	1	0	1	0	660
5:00	0	0	9	41	194	278	163	29	6	0	0	0	0	720
6:00	0	0	14	51	132	265	231	30	1	0	0	0	0	724
7:00	0	3	14	42	130	257	149	18	4	0	0	0	0	617
8:00	0	0	4	27	126	176	125	12	1	0	0	0	0	471
9:00	0	4	4	13	68	113	80	13	10	3	0	1	0	309
10:00	0	0	2	18	40	81	65	32	4	3	0	0	0	245
11:00	1	0	0	7	11	45	40	16	4	0	0	0	0	124
Total	34	49	236	926	2761	4159	2769	607	118	17	9	2	1	11688

Percentile	15th	50th	85th	95th
Speed	29	35	41	44
Mean Speed (Average)	37.5			
10 MPH Pace Speed	34-43			
Number in Pace	6948			
Percent in Pace	59.0%			
Number > 35 MPH	7682			
Percent > 35 MPH	65.7%			

Accurate Counts
978-664-2565

Site Code: 1405002A

Location : Main Street SB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: SB,

7/25/2025 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	2	7	19	19	4	1	0	0	0	0	52
1:00	0	0	1	0	4	9	16	6	0	0	0	0	0	36
2:00	0	0	0	1	3	6	5	1	3	0	0	0	0	19
3:00	0	0	0	1	7	14	11	3	3	1	0	0	0	40
4:00	0	0	1	5	16	23	19	5	2	2	0	0	0	73
5:00	0	1	0	1	19	69	92	55	5	4	1	0	0	247
6:00	0	0	19	19	69	199	192	58	11	2	2	0	0	571
7:00	0	0	13	47	103	225	155	67	6	0	0	0	0	616
8:00	0	2	8	62	125	303	185	55	3	5	0	0	0	748
9:00	0	1	7	34	148	255	164	45	8	1	1	0	0	664
10:00	0	1	5	71	181	293	150	26	2	0	0	0	0	729
11:00	1	2	16	49	150	233	176	33	1	0	1	0	0	662
12:00 PM	0	0	15	97	283	276	116	48	4	0	0	0	0	839
1:00	6	28	26	92	228	271	151	28	2	0	0	0	0	832
2:00	1	2	9	51	158	308	164	20	3	2	0	0	0	718
3:00	1	1	12	37	177	253	169	36	4	3	0	0	0	693
4:00	0	0	1	44	201	261	169	46	2	1	0	0	0	725
5:00	0	1	4	20	157	272	172	54	8	0	0	0	0	688
6:00	0	0	0	23	154	240	207	20	10	2	0	0	0	656
7:00	0	1	0	16	113	197	138	38	5	0	0	0	0	508
8:00	0	0	1	15	99	164	85	13	2	0	0	0	0	379
9:00	0	2	6	16	74	142	63	20	5	1	0	0	0	329
10:00	0	1	2	10	51	114	72	32	3	2	2	0	0	289
11:00	0	1	1	0	20	53	49	23	5	1	0	0	0	153
Total	9	44	147	713	2547	4199	2739	736	98	27	7	0	0	11266

Percentile	15th
Speed	31
Mean Speed (Average)	38.0
10 MPH Pace Speed	36-45
Number in Pace	6938
Percent in Pace	62.0%
Number > 35 MPH	7806
Percent > 35 MPH	69.3%

Accurate Counts
978-664-2565

Site Code: 1405002A

Location : Main Street SB
Location : North of Old Main Street
City/State: Tewksbury, MA
Direction: SB,

7/26/2025	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	1	5	13	20	29	9	0	0	0	0	0	77
1:00	0	0	0	3	8	10	12	7	3	0	0	0	0	43
2:00	0	0	1	0	4	16	15	4	2	0	0	0	0	42
3:00	0	0	0	0	8	9	6	3	2	0	0	0	0	28
4:00	0	0	0	0	3	10	8	5	1	0	0	0	0	27
5:00	0	1	0	1	6	31	45	21	2	0	0	0	0	107
6:00	0	0	0	6	24	85	117	48	7	2	1	0	0	290
7:00	1	0	4	14	53	121	100	44	4	0	0	0	0	341
8:00	0	0	6	50	116	243	126	30	3	0	0	0	0	574
9:00	0	2	8	51	194	270	140	24	3	0	0	0	0	692
10:00	1	4	28	71	189	336	126	19	11	1	0	0	0	786
11:00	2	4	14	86	233	272	110	19	8	1	0	0	0	749
12:00 PM	8	5	39	76	228	344	93	25	10	0	0	0	0	828
1:00	0	0	19	48	214	259	175	18	2	2	1	0	0	738
2:00	0	0	2	32	188	267	192	48	10	0	0	0	0	739
3:00	3	1	5	38	205	273	145	29	4	0	1	0	0	704
4:00	3	1	9	55	133	286	106	54	2	0	1	0	0	650
5:00	0	1	6	27	116	212	165	36	7	0	0	0	0	570
6:00	0	0	1	30	104	223	145	30	2	0	0	0	0	535
7:00	0	1	1	14	112	198	132	25	3	2	0	0	2	490
8:00	0	0	4	13	103	151	75	16	2	1	2	0	0	367
9:00	0	0	2	14	88	144	93	17	1	0	0	0	0	359
10:00	0	0	0	16	60	75	79	17	3	0	0	0	0	250
11:00	0	1	1	4	26	49	51	19	2	1	0	0	0	154
Total	18	21	151	654	2428	3904	2285	567	94	10	6	0	2	10140
			Percentile	15th	50th	85th	95th							
			Speed	31	35	41	44							
			Mean Speed (Average)	37.7										
			10 MPH Pace Speed	31-40										
			Number in Pace	6122										
			Percent in Pace	63.0%										
			Number > 35 MPH	6868										
			Percent > 35 MPH	67.7%										
Grand Total	61	114	534	2293	7736	12262	7793	1910	310	54	22	2	3	33094
Stats			Percentile	15th	50th	85th	95th							
			Speed	30	35	41	44							
			Mean Speed (Average)	37.7										
			10 MPH Pace Speed	34-43										
			Number in Pace	20015										
			Percent in Pace	61.0%										
			Number > 35 MPH	22356										
			Percent > 35 MPH	67.6%										

Appendix E: Crash-Rate Worksheets

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Appendix F: Transit

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RIDER POLICY FOR FARE FREE PROGRAM

- 1 You must have a destination when boarding the bus. Riding the bus without a destination will create bus overcrowding.
- 2 You may be asked to disembark at the end of the line.
- 3 You are only allowed to bring on the bus what you can carry in one trip.



LRTA ROAD RUNNER OFFICE

(978-459-0152)
113 THORNDIKE STREET, LOWELL, MA 01852
(LOCATED NEXT TO THE KENNEDY CENTER)
Monday - Friday: 9 AM to Noon
Issues CharlieCards for Persons with Disabilities/TAP.

THREE WAYS TO GET YOUR CHARLIECARD FOR PERSONS WITH DISABILITIES/TAP

1) IN PERSON AT LRTA ROAD RUNNER OFFICE

- First time applicants for the IAP ID, or applicants with expired TAP ID Cards need to fill out an application.

Applications are available at the LRTA Road Runner Office or online at LRTA.com

- The LRTA will process your application within 14 days of receipt.
- Once approved, you will need to bring a photo ID.

2) APPLY ONLINE AT MBTA.COM

3) MAIL YOUR APPLICATION TO THE LRTA ROAD RUNNER OFFICE

113 THORNDIKE STREET
LOWELL, MA 01852

For More Detailed Info visit LRTA.com

BLIND ACCESS CHARLIECARD

These cards are issued by the MBTA.

For more information visit

www.mbta.com/fares/reduced/blind-access-charliecard

THE LOWELL REGIONAL TRANSIT AUTHORITY

Announces

A Temporary Fare Free Pilot Program Commencing

December 1, 2024

And Continues Through September 30, 2025

(Fares may resume 10/1/2025
Subject to State Funding)

The LRTA wants to Thank
Governor Maura Healey and
Lieutenant Governor Kim Driscoll,
as well as the Massachusetts State Legislature
for funding this
Fare Free Transportation Pilot Program
that will greatly benefit our communities.

TO CATCH A BUS...

1

USE A DESIGNATED LRTA BUS STOP

The bus will pick you up and take you to your destination. Please raise your hand to alert driver.

Outbound
Inbound

2

WAVE YOUR HAND ALONG ANY LRTA BUS ROUTE

Simply wave your hand in order to alert the driver to stop. You need to be at a safe location on the same side of the street as the bus. We encourage you to be at a bus stop.



BUS SCHEDULES

EFFECTIVE DECEMBER 1, 2024



BUS INFORMATION
978-452-6161
WWW.LRTA.COM

Service updates and changes will be posted on LRTA.com

DOWNTOWN SHUTTLE



The LRTA offers a Shuttle between

**DOWNTOWN LOWELL
(JOHN & MERRIMACK STREETS)**

&

**ROBERT B. KENNEDY
BUS TRANSFER CENTER**

Monday - Friday:

5:45 am - 7:00 pm Every 30 minutes

First Shuttle departs Downtown Lowell at 6:00 AM
Last Shuttle departs Downtown Lowell at 7:00 PM

Saturday

7:15 am - 7:00 pm Every 30 minutes

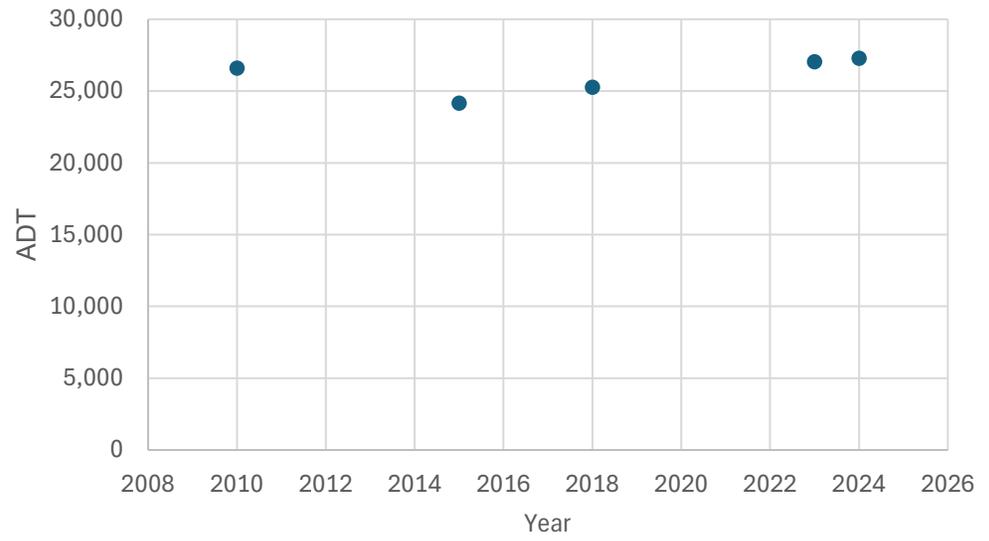
First Shuttle departs Downtown Lowell at 7:30 AM
Last Shuttle departs Downtown Lowell at 7:00 PM

Appendix G: Traffic Growth

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MassDOT Count Station 4111, Tewksbury, Main Street South of Interstate Route 495

Year	AADT (veh)	CAGR to 2024
2010	26,593	0.18%
2011		
2012		
2013		
2014		
2015	24,170	1.36%
2016		
2017		
2018	25,271	1.29%
2019		
2020		
2021		
2022		
2023	27,032	0.94%
2024	27,287	



ADT = annual average daily traffic.

CAGR = compound annual growth rate.

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Appendix H: Trip Distribution

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Trip-Distribution Analysis

Location	2025 Existing Weekday Street-Peak-Hour Volumes					Trip Distribution (%)
	Vehicles		Percent			
	AM	PM	AM	PM	Average	
Main Street S of Astle Street	1,282	1,639	44	43	43	45
Main Street N of Site	1,313	1,736	45	45	45	45
Astle Street NW of Main Street	114	250	4	6	5	5
Pike Street SW of Main Street	106	188	4	5	4	5
Veranda Avenue SE of Main Street	7	9	0	0	0	0
Old Main Street S NE of Main Street	18	6	1	0	0	0
Old Main Street E of Main Street	49	24	2	1	1	0
Total	2,889	3,852	100	100	100	1

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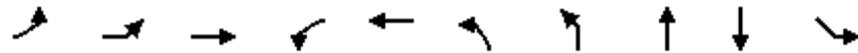
Appendix I: Synchro Reports

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Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

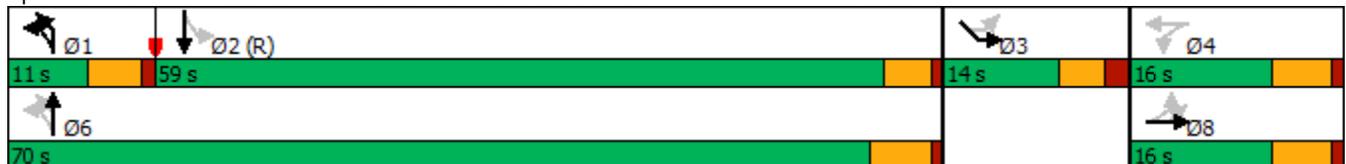


Lane Group	EBL2	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBT	SEL
Lane Configurations			↔		↔			↔	↑	↔
Traffic Volume (vph)	60	1	0	3	1	4	31	557	621	1
Future Volume (vph)	60	1	0	3	1	4	31	557	621	1
Turn Type	Perm	Perm	NA	custom	NA	pm+pt	pm+pt	NA	NA	Prot
Protected Phases			8			1	1	6	2	3
Permitted Phases	8	8		4	4	6	6			
Detector Phase	8	8	8	4	4	1	1	6	2	3
Switch Phase										
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	11.5
Total Split (s)	16.0	16.0	16.0	16.0	16.0	11.0	11.0	70.0	59.0	14.0
Total Split (%)	16.0%	16.0%	16.0%	16.0%	16.0%	11.0%	11.0%	70.0%	59.0%	14.0%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)			0.0		0.0			0.0	0.0	0.0
Total Lost Time (s)			5.5		5.5			5.5	4.5	5.5
Lead/Lag						Lead	Lead		Lag	
Lead-Lag Optimize?						Yes	Yes		Yes	
Recall Mode	None	None	None	None	None	Min	Min	Min	C-Min	None
Act Effct Green (s)			9.5		9.4			68.2	58.2	8.2
Actuated g/C Ratio			0.10		0.09			0.68	0.58	0.08
v/c Ratio			0.63		0.08			0.35	0.66	0.69
Control Delay			64.4		41.8			7.7	19.5	69.3
Queue Delay			0.0		0.0			0.0	0.0	0.0
Total Delay			64.4		41.8			7.7	19.5	69.3
LOS			E		D			A	B	E
Approach Delay			64.4		41.8			7.7	19.5	69.3
Approach LOS			E		D			A	B	E

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 20.0
 Intersection LOS: C
 Intersection Capacity Utilization 66.5%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Lane Group	EBT	WBT	NBT	SBT	SEL
Lane Group Flow (vph)	84	11	693	691	100
v/c Ratio	0.63	0.08	0.35	0.66	0.69
Control Delay	64.4	41.8	7.7	19.5	69.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	64.4	41.8	7.7	19.5	69.3
Queue Length 50th (ft)	52	6	94	309	63
Queue Length 95th (ft)	92	11	120	449	92
Internal Link Dist (ft)	269	168	98	438	447
Turn Bay Length (ft)					
Base Capacity (vph)	148	160	1973	1042	150
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.57	0.07	0.35	0.66	0.67

Intersection Summary

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

												
Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR2	NBL2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	60	1	0	8	3	1	1	4	31	557	16	2
Future Volume (vph)	60	1	0	8	3	1	1	4	31	557	16	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-3%			3%				0%		
Total Lost time (s)			5.5			5.5				5.5		
Lane Util. Factor			1.00			1.00				0.95		
Frt			0.98			0.98				1.00		
Flt Protected			0.96			0.97				1.00		
Satd. Flow (prot)			1817			1769				3381		
Flt Permitted			0.74			0.84				0.84		
Satd. Flow (perm)			1411			1528				2848		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.42	0.42	0.42	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	73	1	0	10	7	2	2	5	35	633	18	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	84	0	0	11	0	0	0	693	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	6%	6%	6%	6%	6%
Turn Type	Perm	Perm	NA		custom	NA		pm+pt	pm+pt	NA		
Protected Phases			8					1	1	6		
Permitted Phases	8	8			4	4		6	6			
Actuated Green, G (s)			8.2			8.2				67.1		
Effective Green, g (s)			8.2			8.2				67.1		
Actuated g/C Ratio			0.08			0.08				0.67		
Clearance Time (s)			5.5			5.5				5.5		
Vehicle Extension (s)			3.0			3.0				3.0		
Lane Grp Cap (vph)			115			125				1942		
v/s Ratio Prot										c0.02		
v/s Ratio Perm			c0.06			0.01				0.22		
v/c Ratio			0.73			0.09				0.36		
Uniform Delay, d1			44.8			42.4				7.1		
Progression Factor			1.00			1.00				1.00		
Incremental Delay, d2			21.0			0.3				0.1		
Delay (s)			65.9			42.7				7.2		
Level of Service			E			D				A		
Approach Delay (s)			65.9			42.7				7.2		
Approach LOS			E			D				A		
Intersection Summary												
HCM 2000 Control Delay			18.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				20.5		
Intersection Capacity Utilization			66.5%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SER
Lane Configurations	↘	↗				↘	
Traffic Volume (vph)	0	621	32	11	31	1	40
Future Volume (vph)	0	621	32	11	31	1	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-6%	
Total Lost time (s)		4.5				5.5	
Lane Util. Factor		1.00				1.00	
Frt		0.99				0.92	
Flt Protected		1.00				0.98	
Satd. Flow (prot)		1792				1770	
Flt Permitted		1.00				0.98	
Satd. Flow (perm)		1792				1770	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.72	0.72	0.72
Adj. Flow (vph)	0	647	33	11	43	1	56
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	691	0	0	0	100	0
Heavy Vehicles (%)	5%	5%	5%	5%	0%	0%	0%
Turn Type	Perm	NA			Perm	Prot	
Protected Phases		2				3	
Permitted Phases	2				3		
Actuated Green, G (s)		57.1				8.2	
Effective Green, g (s)		57.1				8.2	
Actuated g/C Ratio		0.57				0.08	
Clearance Time (s)		4.5				5.5	
Vehicle Extension (s)		3.0				3.0	
Lane Grp Cap (vph)		1023				145	
v/s Ratio Prot		0.39					
v/s Ratio Perm						0.06	
v/c Ratio		0.68				0.69	
Uniform Delay, d1		15.0				44.7	
Progression Factor		1.00				1.00	
Incremental Delay, d2		3.6				12.8	
Delay (s)		18.6				57.5	
Level of Service		B				E	
Approach Delay (s)		18.6				57.5	
Approach LOS		B				E	
Intersection Summary							

HCM 6th TWSC
2: Main Street & Old Main Street

02/12/2026

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T		T	
Traffic Vol, veh/h	8	24	648	1	16	656
Future Vol, veh/h	8	24	648	1	16	656
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	73	73	91	91	95	95
Heavy Vehicles, %	3	2	6	6	5	5
Mvmt Flow	11	33	712	1	17	691

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1093	357	0	0	713
Stage 1	713	-	-	-	-
Stage 2	380	-	-	-	-
Critical Hdwy	6.86	6.94	-	-	4.2
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-
Follow-up Hdwy	3.53	3.32	-	-	2.25
Pot Cap-1 Maneuver	207	639	-	-	863
Stage 1	444	-	-	-	-
Stage 2	658	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	200	639	-	-	863
Mov Cap-2 Maneuver	200	-	-	-	-
Stage 1	444	-	-	-	-
Stage 2	637	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	413	863
HCM Lane V/C Ratio	-	-	0.106	0.02
HCM Control Delay (s)	-	-	14.7	9.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

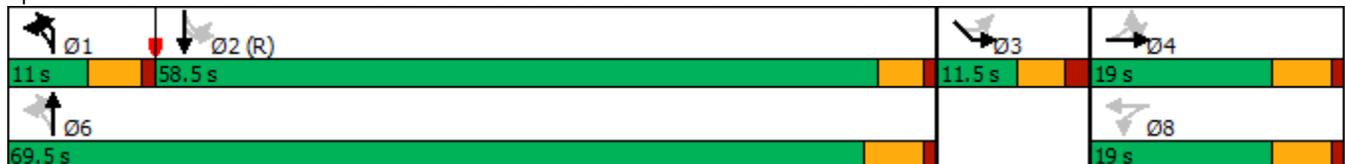


Lane Group	EBL2	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBL2	SBL	SBT	SEL
Lane Configurations			↔		↔			↕		↕	↕	↕
Traffic Volume (vph)	1	85	0	1	0	11	87	883	3	1	576	1
Future Volume (vph)	1	85	0	1	0	11	87	883	3	1	576	1
Turn Type	Perm	Perm	NA	custom	NA	pm+pt	pm+pt	NA	Perm	Perm	NA	Prot
Protected Phases			4			1	1	6			2	3
Permitted Phases	4	4		8	8	6	6		2	2		
Detector Phase	4	4	4	8	8	1	1	6	2	2	2	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	5.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	15.5	15.5	11.5
Total Split (s)	19.0	19.0	19.0	19.0	19.0	11.0	11.0	69.5	58.5	58.5	58.5	11.5
Total Split (%)	19.0%	19.0%	19.0%	19.0%	19.0%	11.0%	11.0%	69.5%	58.5%	58.5%	58.5%	11.5%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)			0.0		0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)			5.5		5.5			5.5		4.5	4.5	5.5
Lead/Lag						Lead	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?						Yes	Yes		Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	Min	C-Min	C-Min	C-Min	None
Act Effct Green (s)			12.4		12.4			65.1		55.1	55.1	6.0
Actuated g/C Ratio			0.12		0.12			0.65		0.55	0.55	0.06
v/c Ratio			0.75		0.04			0.75		0.01	0.79	0.71
Control Delay			68.0		38.2			14.8		11.0	25.4	29.1
Queue Delay			0.0		0.0			0.0		0.0	0.0	0.0
Total Delay			68.0		38.2			14.8		11.0	25.4	29.1
LOS			E		D			B		B	C	C
Approach Delay			68.0		38.3			14.8			25.3	29.1
Approach LOS			E		D			B			C	C

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 101.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Lane Group	EBT	WBT	NBT	SBL	SBT	SEL
Lane Group Flow (vph)	132	8	1073	4	789	169
v/c Ratio	0.75	0.04	0.75	0.01	0.79	0.71
Control Delay	68.0	38.2	14.8	11.0	25.4	29.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	38.2	14.8	11.0	25.4	29.1
Queue Length 50th (ft)	81	5	168	1	388	17
Queue Length 95th (ft)	#129	10	214	6	540	34
Internal Link Dist (ft)	269	168	98		438	447
Turn Bay Length (ft)				150		
Base Capacity (vph)	192	213	1437	274	1000	238
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.04	0.75	0.01	0.79	0.71

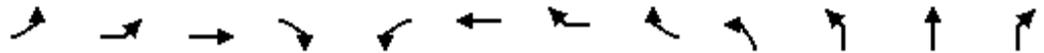
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Lane Configurations			↕			↕					↕	
Traffic Volume (vph)	1	85	0	20	1	0	1	2	11	87	883	3
Future Volume (vph)	1	85	0	20	1	0	1	2	11	87	883	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-3%			3%					0%	
Total Lost time (s)			5.5			5.5					5.5	
Lane Util. Factor			1.00			1.00					0.95	
Frt			0.97			0.90					1.00	
Flt Protected			0.96			0.99					1.00	
Satd. Flow (prot)			1806			1661					3519	
Flt Permitted			0.76			0.94					0.59	
Satd. Flow (perm)			1431			1585					2088	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	106	0	25	2	0	2	4	12	95	960	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	132	0	0	8	0	0	0	0	1073	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%
Parking (#/hr)												
Turn Type	Perm	Perm	NA		custom	NA			pm+pt	pm+pt	NA	
Protected Phases			4						1	1	6	
Permitted Phases	4	4			8	8			6	6		
Actuated Green, G (s)			12.4			12.4					65.1	
Effective Green, g (s)			12.4			12.4					65.1	
Actuated g/C Ratio			0.12			0.12					0.65	
Clearance Time (s)			5.5			5.5					5.5	
Vehicle Extension (s)			3.0			3.0					3.0	
Lane Grp Cap (vph)			177			196					1445	
v/s Ratio Prot											c0.04	
v/s Ratio Perm			c0.09			0.01					0.44	
v/c Ratio			0.75			0.04					0.74	
Uniform Delay, d1			42.3			38.6					11.8	
Progression Factor			1.00			1.00					1.00	
Incremental Delay, d2			15.6			0.1					2.1	
Delay (s)			57.9			38.6					13.9	
Level of Service			E			D					B	
Approach Delay (s)			57.9			38.6					13.9	
Approach LOS			E			D					B	
Intersection Summary												
HCM 2000 Control Delay			22.9			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			20.5			
Intersection Capacity Utilization			101.6%			ICU Level of Service					G	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	NBR2	SBL2	SBL	SBT	SBR	SBR2	SEL2	SEL	SER	SER2
Lane Configurations										
Traffic Volume (vph)	3	3	1	576	68	50	52	1	55	3
Future Volume (vph)	3	3	1	576	68	50	52	1	55	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)				0%				-6%		
Total Lost time (s)			4.5	4.5				5.5		
Lane Util. Factor			1.00	1.00				1.00		
Frt			1.00	0.97				0.93		
Flt Protected			0.95	1.00				0.98		
Satd. Flow (prot)			1770	1815				1742		
Flt Permitted			0.27	1.00				0.98		
Satd. Flow (perm)			496	1815				1742		
Peak-hour factor, PHF	0.92	0.88	0.88	0.88	0.88	0.88	0.66	0.66	0.66	0.66
Adj. Flow (vph)	3	3	1	655	77	57	79	2	83	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	133	0	0
Lane Group Flow (vph)	0	0	4	789	0	0	0	36	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)	0									
Turn Type		Perm	Perm	NA			Perm	Prot		
Protected Phases				2				3		
Permitted Phases		2	2				3			
Actuated Green, G (s)			55.1	55.1				6.0		
Effective Green, g (s)			55.1	55.1				6.0		
Actuated g/C Ratio			0.55	0.55				0.06		
Clearance Time (s)			4.5	4.5				5.5		
Vehicle Extension (s)			3.0	3.0				3.0		
Lane Grp Cap (vph)			273	1000				104		
v/s Ratio Prot				c0.43						
v/s Ratio Perm			0.01					0.02		
v/c Ratio			0.01	0.79				0.34		
Uniform Delay, d1			10.2	17.8				45.1		
Progression Factor			1.00	1.00				1.00		
Incremental Delay, d2			0.1	6.3				2.0		
Delay (s)			10.3	24.1				47.1		
Level of Service			B	C				D		
Approach Delay (s)				24.1				47.1		
Approach LOS				C				D		
Intersection Summary										

HCM 6th TWSC
2: Main Street & Old Main Street

02/12/2026

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑			↑↑
Traffic Vol, veh/h	4	11	1022	0	9	694
Future Vol, veh/h	4	11	1022	0	9	694
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	95	95	93	93
Heavy Vehicles, %	0	0	2	2	0	0
Mvmt Flow	4	12	1076	0	10	746

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1469	538	0	0	1076	0
Stage 1	1076	-	-	-	-	-
Stage 2	393	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	121	493	-	-	656	-
Stage 1	293	-	-	-	-	-
Stage 2	657	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	118	493	-	-	656	-
Mov Cap-2 Maneuver	118	-	-	-	-	-
Stage 1	293	-	-	-	-	-
Stage 2	640	-	-	-	-	-

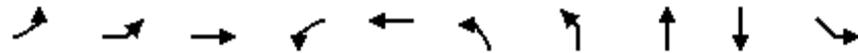
Approach	WB	NB	SB
HCM Control Delay, s	19.3	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	267	656
HCM Lane V/C Ratio	-	-	0.06	0.015
HCM Control Delay (s)	-	-	19.3	10.6
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.2	0

Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

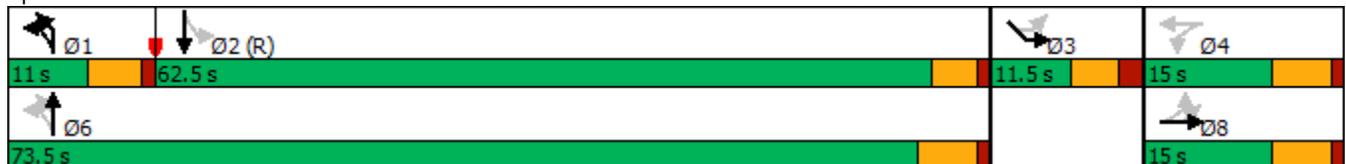


Lane Group	EBL2	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBT	SEL
Lane Configurations			↔		↔			↔↔	↑	↔↔
Traffic Volume (vph)	66	1	0	3	1	4	34	612	683	1
Future Volume (vph)	66	1	0	3	1	4	34	612	683	1
Turn Type	Perm	Perm	NA	custom	NA	pm+pt	pm+pt	NA	NA	Prot
Protected Phases			8			1	1	6	2	3
Permitted Phases	8	8		4	4	6	6			
Detector Phase	8	8	8	4	4	1	1	6	2	3
Switch Phase										
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	11.5
Total Split (s)	15.0	15.0	15.0	15.0	15.0	11.0	11.0	73.5	62.5	11.5
Total Split (%)	15.0%	15.0%	15.0%	15.0%	15.0%	11.0%	11.0%	73.5%	62.5%	11.5%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)			0.0		0.0			0.0	0.0	0.0
Total Lost Time (s)			5.5		5.5			5.5	4.5	5.5
Lead/Lag						Lead	Lead		Lag	
Lead-Lag Optimize?						Yes	Yes		Yes	
Recall Mode	None	None	None	None	None	Min	Min	Min	C-Min	None
Act Effct Green (s)			8.9		8.8			71.0	61.0	6.0
Actuated g/C Ratio			0.09		0.09			0.71	0.61	0.06
v/c Ratio			0.66		0.04			0.37	0.73	0.81
Control Delay			68.7		41.8			6.6	19.8	95.4
Queue Delay			0.0		0.0			0.0	0.0	0.0
Total Delay			68.7		41.8			6.6	19.8	95.4
LOS			E		D			A	B	F
Approach Delay			68.7		41.8			6.6	19.8	95.4
Approach LOS			E		D			A	B	F

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 20.4
 Intersection LOS: C
 Intersection Capacity Utilization 70.9%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Lane Group	EBT	WBT	NBT	SBT	SEL
Lane Group Flow (vph)	83	5	728	793	86
v/c Ratio	0.66	0.04	0.37	0.73	0.81
Control Delay	68.7	41.8	6.6	19.8	95.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	68.7	41.8	6.6	19.8	95.4
Queue Length 50th (ft)	52	3	87	356	55
Queue Length 95th (ft)	#118	14	115	523	#143
Internal Link Dist (ft)	269	168	98	438	447
Turn Bay Length (ft)					
Base Capacity (vph)	134	148	1979	1092	106
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.62	0.03	0.37	0.73	0.81

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR2	NBL2	NBL	NBT	NBR	NBR2
Lane Configurations			↔			↔				↕		
Traffic Volume (vph)	66	1	0	9	3	1	1	4	34	612	18	2
Future Volume (vph)	66	1	0	9	3	1	1	4	34	612	18	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-3%			3%				0%		
Total Lost time (s)			5.5			5.5				5.5		
Lane Util. Factor			1.00			1.00				0.95		
Frt			0.98			0.97				1.00		
Flt Protected			0.96			0.97				1.00		
Satd. Flow (prot)			1817			1768				3381		
Flt Permitted			0.75			0.86				0.81		
Satd. Flow (perm)			1420			1561				2739		
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)	72	1	0	10	3	1	1	4	37	665	20	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	83	0	0	5	0	0	0	728	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	6%	6%	6%	6%	6%
Turn Type	Perm	Perm	NA		custom	NA		pm+pt	pm+pt	NA		
Protected Phases			8					1	1	6		
Permitted Phases	8	8			4	4		6	6			
Actuated Green, G (s)			7.6			7.6				69.9		
Effective Green, g (s)			7.6			7.6				69.9		
Actuated g/C Ratio			0.08			0.08				0.70		
Clearance Time (s)			5.5			5.5				5.5		
Vehicle Extension (s)			3.0			3.0				3.0		
Lane Grp Cap (vph)			107			118				1953		
v/s Ratio Prot										c0.02		
v/s Ratio Perm			c0.06			0.00				0.24		
v/c Ratio			0.78			0.04				0.37		
Uniform Delay, d1			45.4			42.8				6.1		
Progression Factor			1.00			1.00				1.00		
Incremental Delay, d2			28.9			0.1				0.1		
Delay (s)			74.2			43.0				6.2		
Level of Service			E			D				A		
Approach Delay (s)			74.2			43.0				6.2		
Approach LOS			E			D				A		

Intersection Summary

HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SER
Lane Configurations	↶	↷				↶	
Traffic Volume (vph)	0	683	35	12	34	1	44
Future Volume (vph)	0	683	35	12	34	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-6%	
Total Lost time (s)		4.5				5.5	
Lane Util. Factor		1.00				1.00	
Frt		0.99				0.92	
Flt Protected		1.00				0.98	
Satd. Flow (prot)		1792				1770	
Flt Permitted		1.00				0.98	
Satd. Flow (perm)		1792				1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	742	38	13	37	1	48
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	793	0	0	0	86	0
Heavy Vehicles (%)	5%	5%	5%	5%	0%	0%	0%
Turn Type	Perm	NA			Perm	Prot	
Protected Phases		2				3	
Permitted Phases	2				3		
Actuated Green, G (s)		59.9				6.0	
Effective Green, g (s)		59.9				6.0	
Actuated g/C Ratio		0.60				0.06	
Clearance Time (s)		4.5				5.5	
Vehicle Extension (s)		3.0				3.0	
Lane Grp Cap (vph)		1073				106	
v/s Ratio Prot		0.44					
v/s Ratio Perm						0.05	
v/c Ratio		0.74				0.81	
Uniform Delay, d1		14.4				46.4	
Progression Factor		1.00				1.00	
Incremental Delay, d2		4.6				35.8	
Delay (s)		19.0				82.2	
Level of Service		B				F	
Approach Delay (s)		19.0				82.2	
Approach LOS		B				F	
Intersection Summary							

HCM 6th TWSC
2: Main Street & Old Main Street

02/12/2026

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	26	712	1	18	721
Future Vol, veh/h	9	26	712	1	18	721
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	6	6	5	5
Mvmt Flow	10	28	774	1	20	784

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1207	388	0	0	775
Stage 1	775	-	-	-	-
Stage 2	432	-	-	-	-
Critical Hdwy	6.86	6.94	-	-	4.2
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-
Follow-up Hdwy	3.53	3.32	-	-	2.25
Pot Cap-1 Maneuver	174	611	-	-	817
Stage 1	412	-	-	-	-
Stage 2	619	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	167	611	-	-	817
Mov Cap-2 Maneuver	167	-	-	-	-
Stage 1	412	-	-	-	-
Stage 2	592	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.1	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	363	817
HCM Lane V/C Ratio	-	-	0.105	0.024
HCM Control Delay (s)	-	-	16.1	9.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/13/2026

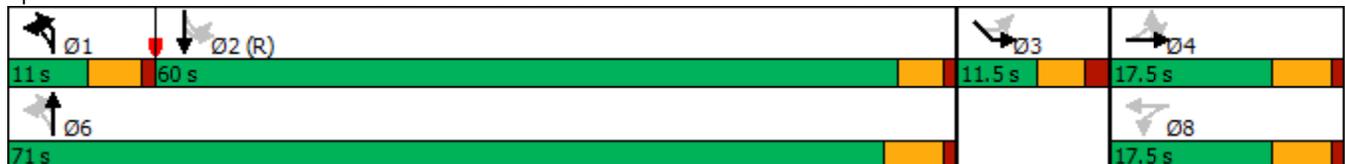


Lane Group	EBL2	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBL2	SBL	SBT	SEL
Lane Configurations			↔		↔			↕		↕	↕	↕
Traffic Volume (vph)	1	93	0	1	0	12	96	971	3	1	633	1
Future Volume (vph)	1	93	0	1	0	12	96	971	3	1	633	1
Turn Type	Perm	Perm	NA	custom	NA	pm+pt	pm+pt	NA	Perm	Perm	NA	Prot
Protected Phases			4			1	1	6			2	3
Permitted Phases	4	4		8	8	6	6		2	2		
Detector Phase	4	4	4	8	8	1	1	6	2	2	2	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	5.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	15.5	15.5	11.5
Total Split (s)	17.5	17.5	17.5	17.5	17.5	11.0	11.0	71.0	60.0	60.0	60.0	11.5
Total Split (%)	17.5%	17.5%	17.5%	17.5%	17.5%	11.0%	11.0%	71.0%	60.0%	60.0%	60.0%	11.5%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)			0.0		0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)			5.5		5.5			5.5		4.5	4.5	5.5
Lead/Lag						Lead	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?						Yes	Yes		Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	Min	C-Min	C-Min	C-Min	None
Act Effct Green (s)			11.4		11.4			66.1		56.1	56.1	6.0
Actuated g/C Ratio			0.11		0.11			0.66		0.56	0.56	0.06
v/c Ratio			0.77		0.02			0.84		0.02	0.82	0.55
Control Delay			73.4		39.2			18.4		10.2	26.2	16.0
Queue Delay			0.0		0.0			0.0		0.0	0.0	0.0
Total Delay			73.4		39.2			18.4		10.2	26.2	16.0
LOS			E		D			B		B	C	B
Approach Delay			73.4		39.3			18.4			26.2	16.0
Approach LOS			E		D			B			C	B

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 24.2	Intersection LOS: C
Intersection Capacity Utilization 109.2%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/13/2026



Lane Group	EBT	WBT	NBT	SBL	SBT	SEL
Lane Group Flow (vph)	126	4	1178	4	830	131
v/c Ratio	0.77	0.02	0.84	0.02	0.82	0.55
Control Delay	73.4	39.2	18.4	10.2	26.2	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.4	39.2	18.4	10.2	26.2	16.0
Queue Length 50th (ft)	79	2	184	1	410	0
Queue Length 95th (ft)	#169	13	232	6	601	50
Internal Link Dist (ft)	269	168	98		438	447
Turn Bay Length (ft)				150		
Base Capacity (vph)	172	191	1406	244	1017	238
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.02	0.84	0.02	0.82	0.55

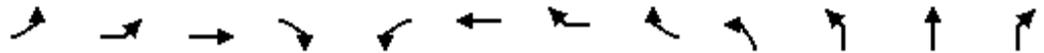
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/13/2026



Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Lane Configurations			↔			↔					↔	
Traffic Volume (vph)	1	93	0	22	1	0	1	2	12	96	971	3
Future Volume (vph)	1	93	0	22	1	0	1	2	12	96	971	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-3%			3%					0%	
Total Lost time (s)			5.5			5.5					5.5	
Lane Util. Factor			1.00			1.00					0.95	
Frt			0.97			0.90					1.00	
Flt Protected			0.96			0.99					1.00	
Satd. Flow (prot)			1806			1661					3519	
Flt Permitted			0.76			0.95					0.57	
Satd. Flow (perm)			1436			1591					2001	
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)	1	101	0	24	1	0	1	2	13	104	1055	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	126	0	0	4	0	0	0	0	1178	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%
Turn Type	Perm	Perm	NA		custom	NA			pm+pt	pm+pt	NA	
Protected Phases			4						1	1	6	
Permitted Phases	4	4			8	8			6	6		
Actuated Green, G (s)			11.4			11.4					66.1	
Effective Green, g (s)			11.4			11.4					66.1	
Actuated g/C Ratio			0.11			0.11					0.66	
Clearance Time (s)			5.5			5.5					5.5	
Vehicle Extension (s)			3.0			3.0					3.0	
Lane Grp Cap (vph)			163			181					1413	
v/s Ratio Prot											c0.05	
v/s Ratio Perm			c0.09			0.00					c0.50	
v/c Ratio			0.77			0.02					0.83	
Uniform Delay, d1			43.0			39.3					12.8	
Progression Factor			1.00			1.00					1.00	
Incremental Delay, d2			20.1			0.0					4.4	
Delay (s)			63.1			39.4					17.2	
Level of Service			E			D					B	
Approach Delay (s)			63.1			39.4					17.2	
Approach LOS			E			D					B	

Intersection Summary

HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/13/2026



Movement	NBR2	SBL2	SBL	SBT	SBR	SBR2	SEL2	SEL	SER	SER2
Lane Configurations										
Traffic Volume (vph)	3	3	1	633	75	55	57	1	60	3
Future Volume (vph)	3	3	1	633	75	55	57	1	60	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)				0%				-6%		
Total Lost time (s)			4.5	4.5				5.5		
Lane Util. Factor			1.00	1.00				1.00		
Frt			1.00	0.97				0.93		
Flt Protected			0.95	1.00				0.98		
Satd. Flow (prot)			1770	1815				1742		
Flt Permitted			0.23	1.00				0.98		
Satd. Flow (perm)			436	1815				1742		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	3	1	688	82	60	62	1	65	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	123	0	0
Lane Group Flow (vph)	0	0	4	830	0	0	0	8	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		Perm	Perm	NA			Perm	Prot		
Protected Phases				2				3		
Permitted Phases		2	2				3			
Actuated Green, G (s)			56.1	56.1				6.0		
Effective Green, g (s)			56.1	56.1				6.0		
Actuated g/C Ratio			0.56	0.56				0.06		
Clearance Time (s)			4.5	4.5				5.5		
Vehicle Extension (s)			3.0	3.0				3.0		
Lane Grp Cap (vph)			244	1018				104		
v/s Ratio Prot				0.46						
v/s Ratio Perm			0.01					0.00		
v/c Ratio			0.02	0.82				0.08		
Uniform Delay, d1			9.7	17.8				44.4		
Progression Factor			1.00	1.00				1.00		
Incremental Delay, d2			0.1	7.2				0.3		
Delay (s)			9.8	24.9				44.7		
Level of Service			A	C				D		
Approach Delay (s)				24.9				44.7		
Approach LOS				C				D		
Intersection Summary										

HCM 6th TWSC
2: Main Street & Old Main Street

02/13/2026

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	12	1123	0	10	763
Future Vol, veh/h	4	12	1123	0	10	763
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	0	0
Mvmt Flow	4	13	1221	0	11	829

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1658	611	0	0	1221
Stage 1	1221	-	-	-	-
Stage 2	437	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1
Critical Hdwy Stg 1	5.8	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	90	442	-	-	578
Stage 1	246	-	-	-	-
Stage 2	624	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	87	442	-	-	578
Mov Cap-2 Maneuver	87	-	-	-	-
Stage 1	246	-	-	-	-
Stage 2	602	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	219	578
HCM Lane V/C Ratio	-	-	0.079	0.019
HCM Control Delay (s)	-	-	22.9	11.3
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.3	0.1

Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

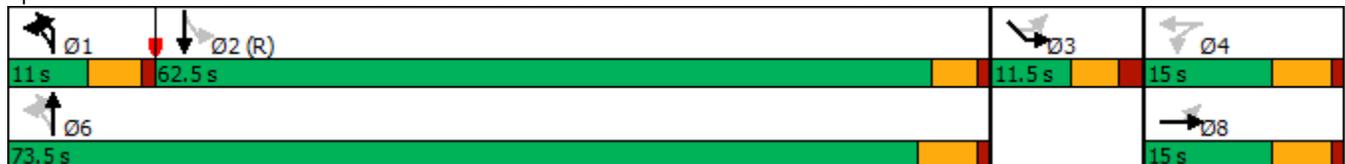


Lane Group	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBT	SEL
Lane Configurations		↔		↔			↔	↔	↔
Traffic Volume (vph)	66	1	3	1	4	34	615	688	1
Future Volume (vph)	66	1	3	1	4	34	615	688	1
Turn Type	Perm	NA	custom	NA	pm+pt	pm+pt	NA	NA	Prot
Protected Phases		8			1	1	6	2	3
Permitted Phases	8		4	4	6	6			
Detector Phase	8	8	4	4	1	1	6	2	3
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	11.5
Total Split (s)	15.0	15.0	15.0	15.0	11.0	11.0	73.5	62.5	11.5
Total Split (%)	15.0%	15.0%	15.0%	15.0%	11.0%	11.0%	73.5%	62.5%	11.5%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0			0.0	0.0	0.0
Total Lost Time (s)		5.5		5.5			5.5	4.5	5.5
Lead/Lag					Lead	Lead		Lag	
Lead-Lag Optimize?					Yes	Yes		Yes	
Recall Mode	None	None	None	None	Min	Min	Min	C-Min	None
Act Effct Green (s)		8.9		8.8			71.0	61.0	6.0
Actuated g/C Ratio		0.09		0.09			0.71	0.61	0.06
v/c Ratio		0.65		0.04			0.37	0.73	0.81
Control Delay		68.4		41.8			6.6	20.0	95.4
Queue Delay		0.0		0.0			0.0	0.0	0.0
Total Delay		68.4		41.8			6.6	20.0	95.4
LOS		E		D			A	C	F
Approach Delay		68.4		41.8			6.6	20.0	95.4
Approach LOS		E		D			A	C	F

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 70.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Lane Group	EBT	WBT	NBT	SBT	SEL
Lane Group Flow (vph)	83	5	731	801	86
v/c Ratio	0.65	0.04	0.37	0.73	0.81
Control Delay	68.4	41.8	6.6	20.0	95.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	68.4	41.8	6.6	20.0	95.4
Queue Length 50th (ft)	52	3	88	362	55
Queue Length 95th (ft)	#118	14	116	532	#143
Internal Link Dist (ft)	269	168	98	438	447
Turn Bay Length (ft)					
Base Capacity (vph)	135	148	1970	1092	106
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.61	0.03	0.37	0.73	0.81

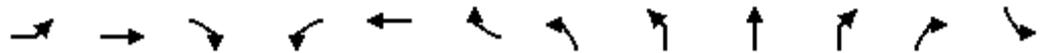
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL2	NBL	NBT	NBR	NBR2	SBL
Lane Configurations		↕			↕				↕			↕
Traffic Volume (vph)	66	1	9	3	1	1	4	34	615	18	2	0
Future Volume (vph)	66	1	9	3	1	1	4	34	615	18	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-3%			3%				0%			
Total Lost time (s)		5.5			5.5				5.5			
Lane Util. Factor		1.00			1.00				0.95			
Frt		0.98			0.97				1.00			
Flt Protected		0.96			0.97				1.00			
Satd. Flow (prot)		1818			1768				3381			
Flt Permitted		0.75			0.86				0.80			
Satd. Flow (perm)		1425			1560				2725			
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)	72	1	10	3	1	1	4	37	668	20	2	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	83	0	0	5	0	0	0	731	0	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	6%	6%	6%	6%	6%	5%
Turn Type	Perm	NA	custom	NA		pm+pt	pm+pt	NA				Perm
Protected Phases		8					1	1	6			
Permitted Phases	8		4	4		6	6					2
Actuated Green, G (s)		7.6			7.6				69.9			
Effective Green, g (s)		7.6			7.6				69.9			
Actuated g/C Ratio		0.08			0.08				0.70			
Clearance Time (s)		5.5			5.5				5.5			
Vehicle Extension (s)		3.0			3.0				3.0			
Lane Grp Cap (vph)		108			118				1944			
v/s Ratio Prot									c0.02			
v/s Ratio Perm		c0.06			0.00				0.24			
v/c Ratio		0.77			0.04				0.38			
Uniform Delay, d1		45.3			42.8				6.1			
Progression Factor		1.00			1.00				1.00			
Incremental Delay, d2		27.3			0.1				0.1			
Delay (s)		72.7			43.0				6.3			
Level of Service		E			D				A			
Approach Delay (s)		72.7			43.0				6.3			
Approach LOS		E			D				A			

Intersection Summary

HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	SBT	SBR	SBR2	SEL2	SEL	SER
Lane Configurations	↑				↓	↘
Traffic Volume (vph)	688	36	13	34	1	44
Future Volume (vph)	688	36	13	34	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%				-6%	
Total Lost time (s)	4.5				5.5	
Lane Util. Factor	1.00				1.00	
Frt	0.99				0.92	
Flt Protected	1.00				0.98	
Satd. Flow (prot)	1792				1770	
Flt Permitted	1.00				0.98	
Satd. Flow (perm)	1792				1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	748	39	14	37	1	48
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	801	0	0	0	86	0
Heavy Vehicles (%)	5%	5%	5%	0%	0%	0%
Turn Type	NA			Perm	Prot	
Protected Phases	2				3	
Permitted Phases				3		
Actuated Green, G (s)	59.9				6.0	
Effective Green, g (s)	59.9				6.0	
Actuated g/C Ratio	0.60				0.06	
Clearance Time (s)	4.5				5.5	
Vehicle Extension (s)	3.0				3.0	
Lane Grp Cap (vph)	1073				106	
v/s Ratio Prot	c0.45					
v/s Ratio Perm					0.05	
v/c Ratio	0.75				0.81	
Uniform Delay, d1	14.5				46.4	
Progression Factor	1.00				1.00	
Incremental Delay, d2	4.7				35.8	
Delay (s)	19.3				82.2	
Level of Service	B				F	
Approach Delay (s)	19.3				82.2	
Approach LOS	B				F	
Intersection Summary						

HCM 6th TWSC
2: Main Street & Old Main Street

02/12/2026

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	26	715	1	18	728
Future Vol, veh/h	9	26	715	1	18	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	2	6	6	5	5
Mvmt Flow	10	28	777	1	20	791

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1214	389	0	0	778
Stage 1	778	-	-	-	-
Stage 2	436	-	-	-	-
Critical Hdwy	6.86	6.94	-	-	4.2
Critical Hdwy Stg 1	5.86	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-
Follow-up Hdwy	3.53	3.32	-	-	2.25
Pot Cap-1 Maneuver	173	610	-	-	815
Stage 1	411	-	-	-	-
Stage 2	616	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	165	610	-	-	815
Mov Cap-2 Maneuver	165	-	-	-	-
Stage 1	411	-	-	-	-
Stage 2	589	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.2	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	360	815
HCM Lane V/C Ratio	-	-	0.106	0.024
HCM Control Delay (s)	-	-	16.2	9.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

HCM 6th TWSC
 3: Main Street & Proposed Driveway

02/12/2026

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	5	7	3	739	739	3
Future Vol, veh/h	5	7	3	739	739	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	5	5	6	6
Mvmt Flow	5	8	3	803	803	3

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1213	403	806	0	-	0
Stage 1	805	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.2	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.25	-	-	-
Pot Cap-1 Maneuver	174	597	795	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	640	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	173	597	795	-	-	-
Mov Cap-2 Maneuver	173	-	-	-	-	-
Stage 1	397	-	-	-	-	-
Stage 2	640	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	795	-	295	-	-
HCM Lane V/C Ratio	0.004	-	0.044	-	-
HCM Control Delay (s)	9.5	0	17.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Timings

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026

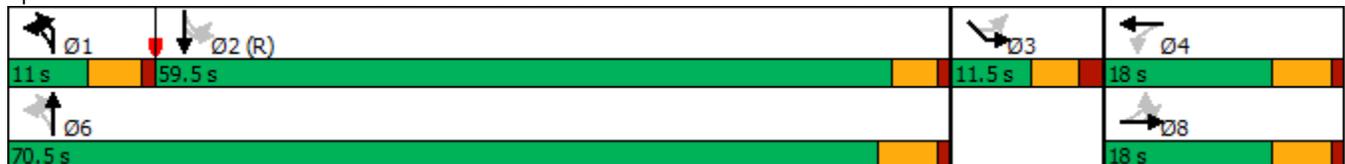


Lane Group	EBL2	EBL	EBT	WBL	WBT	NBL2	NBL	NBT	SBL2	SBL	SBT	SEL
Lane Configurations			↔		↔			↕		↕	↕	↕
Traffic Volume (vph)	1	94	0	1	0	12	96	977	3	1	638	1
Future Volume (vph)	1	94	0	1	0	12	96	977	3	1	638	1
Turn Type	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Perm	Perm	NA	Prot
Protected Phases			8		4	1	1	6			2	3
Permitted Phases	8	8		4		6	6		2	2		
Detector Phase	8	8	8	4	4	1	1	6	2	2	2	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	10.0	5.0	5.0	5.0	6.0
Minimum Split (s)	11.5	11.5	11.5	11.5	11.5	11.0	11.0	15.5	15.5	15.5	15.5	11.5
Total Split (s)	18.0	18.0	18.0	18.0	18.0	11.0	11.0	70.5	59.5	59.5	59.5	11.5
Total Split (%)	18.0%	18.0%	18.0%	18.0%	18.0%	11.0%	11.0%	70.5%	59.5%	59.5%	59.5%	11.5%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Lost Time Adjust (s)			0.0		0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)			5.5		5.5			5.5		4.5	4.5	5.5
Lead/Lag						Lead	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?						Yes	Yes		Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	Min	Min	Min	C-Min	C-Min	C-Min	None
Act Effct Green (s)			11.7		11.7			65.8		55.8	55.8	6.0
Actuated g/C Ratio			0.12		0.12			0.66		0.56	0.56	0.06
v/c Ratio			0.76		0.02			0.85		0.02	0.83	0.55
Control Delay			70.5		38.8			19.7		10.5	27.2	16.0
Queue Delay			0.0		0.0			0.0		0.0	0.0	0.0
Total Delay			70.5		38.8			19.7		10.5	27.2	16.0
LOS			E		D			B		B	C	B
Approach Delay			70.5		38.8			19.7			27.2	16.0
Approach LOS			E		D			B			C	B

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 25.1	Intersection LOS: C
Intersection Capacity Utilization 109.7%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street



Queues

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Lane Group	EBT	WBT	NBT	SBL	SBT	SEL
Lane Group Flow (vph)	127	4	1185	4	836	131
v/c Ratio	0.76	0.02	0.85	0.02	0.83	0.55
Control Delay	70.5	38.8	19.7	10.5	27.2	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.5	38.8	19.7	10.5	27.2	16.0
Queue Length 50th (ft)	79	2	189	1	420	0
Queue Length 95th (ft)	#166	13	238	6	#632	50
Internal Link Dist (ft)	269	168	98		438	447
Turn Bay Length (ft)				150		
Base Capacity (vph)	179	198	1389	239	1011	238
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.02	0.85	0.02	0.83	0.55

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Lane Configurations			↔			↔					↔	
Traffic Volume (vph)	1	94	0	22	1	0	1	2	12	96	977	3
Future Volume (vph)	1	94	0	22	1	0	1	2	12	96	977	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-3%			3%					0%	
Total Lost time (s)			5.5			5.5					5.5	
Lane Util. Factor			1.00			1.00					0.95	
Frt			0.97			0.90					1.00	
Flt Protected			0.96			0.99					1.00	
Satd. Flow (prot)			1806			1661					3519	
Flt Permitted			0.76			0.94					0.56	
Satd. Flow (perm)			1436			1589					1984	
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)	1	102	0	24	1	0	1	2	13	104	1062	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	127	0	0	4	0	0	0	0	1185	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%
Turn Type	Perm	Perm	NA		Perm	NA			pm+pt	pm+pt	NA	
Protected Phases			8			4			1	1	6	
Permitted Phases	8	8			4				6	6		
Actuated Green, G (s)			11.7			11.7					65.8	
Effective Green, g (s)			11.7			11.7					65.8	
Actuated g/C Ratio			0.12			0.12					0.66	
Clearance Time (s)			5.5			5.5					5.5	
Vehicle Extension (s)			3.0			3.0					3.0	
Lane Grp Cap (vph)			168			185					1397	
v/s Ratio Prot											c0.05	
v/s Ratio Perm			c0.09			0.00					c0.51	
v/c Ratio			0.76			0.02					0.85	
Uniform Delay, d1			42.8			39.1					13.2	
Progression Factor			1.00			1.00					1.00	
Incremental Delay, d2			17.5			0.0					5.0	
Delay (s)			60.2			39.1					18.2	
Level of Service			E			D					B	
Approach Delay (s)			60.2			39.1					18.2	
Approach LOS			E			D					B	

Intersection Summary

HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	109.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Main Street & Pike Street/Veranda Avenue & Astle Street & Old Main Street

02/12/2026



Movement	NBR2	SBL2	SBL	SBT	SBR	SBR2	SEL2	SEL	SER	SER2
Lane Configurations										
Traffic Volume (vph)	3	3	1	638	76	55	57	1	60	3
Future Volume (vph)	3	3	1	638	76	55	57	1	60	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)				0%				-6%		
Total Lost time (s)			4.5	4.5				5.5		
Lane Util. Factor			1.00	1.00				1.00		
Frt			1.00	0.97				0.93		
Flt Protected			0.95	1.00				0.98		
Satd. Flow (prot)			1770	1815				1742		
Flt Permitted			0.23	1.00				0.98		
Satd. Flow (perm)			431	1815				1742		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	3	1	693	83	60	62	1	65	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	123	0	0
Lane Group Flow (vph)	0	0	4	836	0	0	0	8	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		Perm	Perm	NA			Perm	Prot		
Protected Phases				2				3		
Permitted Phases		2	2				3			
Actuated Green, G (s)			55.8	55.8				6.0		
Effective Green, g (s)			55.8	55.8				6.0		
Actuated g/C Ratio			0.56	0.56				0.06		
Clearance Time (s)			4.5	4.5				5.5		
Vehicle Extension (s)			3.0	3.0				3.0		
Lane Grp Cap (vph)			240	1012				104		
v/s Ratio Prot				0.46						
v/s Ratio Perm			0.01					0.00		
v/c Ratio			0.02	0.83				0.08		
Uniform Delay, d1			9.9	18.1				44.4		
Progression Factor			1.00	1.00				1.00		
Incremental Delay, d2			0.1	7.7				0.3		
Delay (s)			10.0	25.8				44.7		
Level of Service			A	C				D		
Approach Delay (s)				25.7				44.7		
Approach LOS				C				D		
Intersection Summary										

HCM 6th TWSC
2: Main Street & Old Main Street

02/12/2026

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↑↓		↔	
Traffic Vol, veh/h	4	12	1130	0	10	769
Future Vol, veh/h	4	12	1130	0	10	769
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	0	0
Mvmt Flow	4	13	1228	0	11	836

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1668	614	0	0	1228
Stage 1	1228	-	-	-	-
Stage 2	440	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1
Critical Hdwy Stg 1	5.8	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	89	440	-	-	575
Stage 1	244	-	-	-	-
Stage 2	622	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	86	440	-	-	575
Mov Cap-2 Maneuver	86	-	-	-	-
Stage 1	244	-	-	-	-
Stage 2	600	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	217	575
HCM Lane V/C Ratio	-	-	0.08	0.019
HCM Control Delay (s)	-	-	23	11.4
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.3	0.1

HCM 6th TWSC
 3: Main Street & Proposed Driveway

02/12/2026

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	4	6	7	1135	773	6
Future Vol, veh/h	4	6	7	1135	773	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	4	7	8	1234	840	7

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1477	424	847	0	-	0
Stage 1	844	-	-	-	-	-
Stage 2	633	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	117	579	786	-	-	-
Stage 1	382	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	113	579	786	-	-	-
Mov Cap-2 Maneuver	113	-	-	-	-	-
Stage 1	370	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.3	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	786	-	219	-	-
HCM Lane V/C Ratio	0.01	-	0.05	-	-
HCM Control Delay (s)	9.6	0.2	22.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Appendix J: Traffic Peer Review

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Ref: 10484

December 1, 2025

Ms. Alexandra Lowder
Community/Economic Development Planner
Town of Tewksbury
1009 Main Street
Tewksbury, MA 01876

Re: Traffic Engineering Peer Review
Proposed Senior Housing Development – 15 & 41 Astle Street and 375 Main Street (Route 38)
Tewksbury, Massachusetts

Dear Alex:

Vanasse & Associates, Inc. (VAI) has completed a review of the materials that have been submitted on behalf of the BLJB Holdings, LLC (the “Applicant”) in support of the Planning Board’s review of the proposed senior housing development to be located at 15 & 41 Astle Street and 375 Main Street (Route 38) in Tewksbury, Massachusetts (hereafter referred to as the “Project”). The Applicant is requesting a Special Permit, Site Plan Review and Land Disturbance Permit to allow for the construction of the Project. Our review focused on the following specific areas as they relate to the Project: i) vehicle and pedestrian access and circulation; ii) Massachusetts Department of Transportation (MassDOT) design standards; iii) Town Zoning requirements as they relate to access, parking and circulation; and iv) accepted Traffic Engineering and Transportation Planning practices.

The Applicant has submitted the following materials which are the subject of this review:

1. Planning Board Applications for Special Permits, Site Plan Review and Land Disturbance Permit with supporting narratives prepared by Plunkett & Plunkett, Attorneys at Law, on behalf of the Applicant and dated February 5, 2025;
2. *Residential Site Development Permit Plan Set*, 375 Main Street, Tewksbury, Massachusetts; LandPlex, LLC; February 5, 2025, last revised August 1, 2025 (the “Site Plan”); and
3. *Traffic Impact and Access Study*, 375 Main Street, Tewksbury, Massachusetts; Transportation Engineering, Planning, and Policy (TEPP, LLC); September 5, 2025 (the “September 2025 TIAS”).

In addition, VAI reviewed the site locus in order to validate the existing conditions context of the Project and to observe factors related to the design and location of the access to the Project site, internal circulation and potential off-site improvements.

Based on our review of the aforementioned materials that have been submitted in support of the Project, we have determined that the materials were prepared in a professional manner and following the applicable standards of care. That being said, the Applicant should address the following comments that were identified as a part of our review, a detailed summary of which is attached:

September 2025 TIAS

- Comment T1: The Applicant should provide an update on discussions with Massachusetts Department of Transportation (MassDOT) concerning the Project and the status of the State Highway Access Permit. The Driveway Permit that was included as an attachment to the Application has expired and it is not clear if the Driveway Permit applies to the current development (90-unit, age qualified (age 55+), multifamily residential development) or if a new Driveway Permit is required.
- Comment T2: The Study area should be expanded to include the intersection of Main Street at the Walmart and Cumberland Farms driveways given the operating relationship between this intersection and the Main Street/Astle Street intersection.
- Comment T3: The right-turn volume from Pike Street to Main Street southbound during the weekday evening peak-hour should be reviewed and corrected on Figure 3 (2025 Existing Traffic Volumes).
- Comment T4: Public schools were not in session on June 25, 2025, the date that the TMCs were conducted, or in July 2025 when the vehicle travel speed measurements were performed. A review of historic traffic count data available on MassDOT's Traffic Count Data System (TCDS) for Main Street indicates that traffic volumes are generally higher when schools are in session. It is recommended that an updated data collection program be undertaken on Main Street as a part of a post-occupancy traffic monitoring program (discussion follows).
- Comment T5: The Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection is included in the Top 100 High Crash Locations list (No. 40 out of 100) published by the Northern Middlesex Council of Governments in *Envision 2050, A Long-Range Transportation Plan For Northern Middlesex County, Massachusetts*.¹ A Road Safety Audit (RSA) was performed for the intersection in 2019.² A review of the suggested safety enhancements that were recommended as a part of the RSA should be completed and a summary of the current status of the suggestions should be provided.
- Comment T6: The Town of Tewksbury Community/Economic Development Planner should be contacted to determine if there are potential future development projects by others that may result in an increase in traffic volumes that would exceed the general background traffic growth rate or that would result in a change in traffic patterns. To the extent that any projects are identified, the No-Build condition traffic volumes should be revised accordingly.
- Comment T7: There are several traffic volume discrepancies during both peak-hours for the Astle Street and Pike Street approaches that should be reviewed and corrected on Figure 4 (2032 No-Build Traffic Volumes).

¹*Envision 2050, A Long-Range Transportation Plan For Northern Middlesex County, Massachusetts*; Northern Middlesex Council of Governments; August 2023, Adopted on August 23, 2023 and Amended September 25, 2024.

²*Road Safety Audit*, Route 38 (Main Street) at Pike Street/ Old Main Street/Veranda Avenue/ Astle Street, Town of Tewksbury; Greenman-Pedersen, Inc.; October 15, 2019.



Comment T8: The traffic volumes shown on Figure 6 (2032 Build Traffic Volumes) should be reviewed and corrected as necessary to address Comments T3 and T7.

Comment T9: The traffic operations analysis should be expanded to include the intersection of Main Street at the Walmart and Cumberland Farms driveways and to address Comments T3, T7 and T8.

Comment T10: While we agree that the predicted impact of the Project on traffic operations will be relatively minor, we suggest that the following recommendations be considered for the Project and focus on safety, access and Transportation Demand Management (TDM) measures:

- Safety – As discussed previously, a review of the suggested safety enhancements that were recommended as a part of the RSA that was completed at the Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection should be completed and a summary of the current status of the suggestions should be provided. To the extent that there are short-term, low-cost improvements that have not been completed, the Applicant should commit to implementing the outstanding improvements.
- Access – The Project site driveway is located along a section of Main Street where southbound traffic is merging into a single travel lane between the Walmart driveway and Astle Street. Adding conflicting left-turn movements entering and exiting a driveway within the merge area creates additional complexities for motorists that are not desirable, particularly when left-turn movements can be accommodated at a signalized intersection to the extent that the Astle Street access were formalized as a right-in/left-out driveway only to limit impacts to Astle Street. The Applicant has provided evidence that a Driveway Permit was issued by MassDOT to allow for the construction of the driveway to serve the Project site; however, the Driveway Permit has expired and it is not clear if the approval applies to the Project. It is suggested that the Applicant reassess the limited use of the Astle Street driveway as described and limit the Main Street driveway to right-in/right-out operation. In addition, it is suggested that the Main Street driveway be reduced in width to 24-feet, accommodating one (1) entering and one (1) exiting travel lane, in order to reduce the conflict area along Main Street, particularly for pedestrians and bicyclists.
- Transportation Demand Management – A Transportation Coordinator, who may have other responsibilities and duties as a part of the Project, should be assigned to manage the TDM program. The elements of the TDM program should be expanded to include the following measures:
 - A “welcome packet” should be provided to residents that should include the contact information for the TC and details regarding available public transportation services, bicycle and walking alternatives, and other commuter options;
 - Secure bicycle parking should be provided to include weather protected bicycle parking and exterior bicycle racks located proximate to building entrances or in an accessible location that is centrally located; and
 - Coordinate with Town, MassDOT and the LRTA to locate a bus shelter at the Project site. To the extent a shelter is approved for this location, a concrete bus shelter pad and shelter should be installed as a part of the Project.



- Post-Occupancy Monitoring – A post-occupancy traffic monitoring program should be implemented to include the following information:
 - a. A 7-day, week-long automatic traffic recorder count on the Project site driveway to identify weekday and weekend traffic volumes associated with the Project;
 - b. Weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak period turning movement counts at the Project site driveway intersection with Main Street while public schools are in regular session; and
 - c. A review of motor vehicle crash data at the Project site driveway intersection with Main Street for the most recent one-year period available from the Tewksbury Police Department.

The Post Occupancy Traffic Monitoring Program should commence upon achieving 80 Percent Occupancy of the Project (72 units) and repeated within 12-months of achieving full occupancy. The monitoring program shall document the volume of traffic generated by the Project on a typical weekday, on a Saturday and during the weekday morning, weekday evening and Saturday midday peak hours, and shall compare the measured traffic volumes to those predicted in the September 2025 TIAS. In addition, motor vehicle crash patterns (if any) shall be documented at the Project site driveway intersection. To the extent that the measured traffic volumes exceed the predicted traffic volumes for the Project as assessed in the September 2025 TIAS by more than 10 percent and/or there is evidence of a motor vehicle crash history at the Project site driveway that is attributable to vehicles entering or exiting the Project site, the Applicant shall provide recommendations to address these conditions. To the extent that the improvements include signs and pavement markings and/or on-site management strategies, the improvements shall be completed by the Applicant subject to receipt of all necessary rights, permits and approvals. The results of the Post Occupancy Traffic Monitoring Program shall be summarized in a report provided to the Community/Economic Development Planner within two (2) months of the date of the data collection effort that forms the basis of the report.

Site Plan

- Comment S1: A vehicle turning analysis (swept path) should be provided for the following design vehicles: fire truck, single-unit truck (SU-30) and a trash/recycling vehicle (SU-40). The fire truck design vehicle shall be defined by the Tewksbury Fire Department. The turning analysis should depict all maneuvers required to enter and exit the Project site from both directions and to access the required areas within the Project site.
- Comment S2: Double-yellow centerline pavement markings should be provided along the Project site driveway extending between Main Street and the surface parking area.
- Comment S3: The sight triangle areas for the Project site driveway intersection with Main Street should be shown on the Site Plan and should include the following note: “Signs, landscaping and other features located within sight triangle areas shall be designed, installed, and maintained so as not to exceed 2.0-feet in height. Snow accumulation (windrows) located within sight triangle areas that exceed 3.5-feet in height or that would otherwise inhibit sight lines shall be promptly removed.”



Ms. Alexandra Lowder
December 1, 2025
Page 5 of 5

Comment S4: The maneuvering area for the parking spaces at the end of the parking areas should be reviewed and the turning area at the end of the parking aisles expanded. The maneuvering area should have a depth that is equal to the width of a parking space. This may require that the emergency vehicle gate be relocated.

Parking

Comment P1: The parking calculations shown on Sheet 1 and Sheet 3 of the *Residential Site Development Permit Plan Set* should be reviewed and corrected, as necessary.

This concludes our review of the materials that have been submitted to date in support of the Project. Written responses to our comments should be provided so that we may continue our review on behalf of the Town. If you should have any questions regarding our review, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.



Jeffrey S. Dirk, P.E., PTOE, FITE
Managing Partner

Professional Engineer in CT, MA, ME, NH, RI and VA

JSD/jsd

Attachment



**TRAFFIC ENGINEERING PEER REVIEW
PROPOSED SENIOR HOUSING DEVELOPMENT
15 & 41 ASTLE STREET AND 375 MAIN STREET (ROUTE 38)
TEWKSBURY, MASSACHUSETTS
DECEMBER 1, 2025**

The following details Vanasse & Associates, Inc.'s (VAI's) review of the September 5, 2025 *Traffic Impact and Access Study* (the "September 2025 TIAS") prepared by Transportation Engineering, Planning, and Policy (TEPP, LLC) and the *Residential Site Development Permit Plan Set* as revised through August 1, 2025 (the "Site Plan") prepared by LandPlex, LLC, that were submitted in support of the proposed senior housing development to be located at 15 & 41 Astle Street and 375 Main Street (Route 38) in Tewksbury, Massachusetts (hereafter referred to as the "Project"). Our comments are indicated in *italicized* text, with those requiring responses or additional information **bolded**.

PROJECT DESCRIPTION

The Project will entail the construction of a 90-unit, age qualified (age 55+), multifamily residential development to be located at 15 & 41 Astle Street and 375 Main Street (Route 38) in Tewksbury, Massachusetts. The residential units will be dispersed between three (3) five-story buildings that will contain 30 two-bedroom units each. The Project site contains 3.326± acres of land that is situated between Main Street and Astle Street and is bounded by Main Street to the north; Astle Street and residential and commercial properties to the south and west; and Astle Street to the east. The Project site is improved by a single-family home (15 Astle Street), garages and other structures and appurtenances, as well as areas of open and wooded space. The single-family home will be retained as a part of the Project and the other structures and appurtenances will be removed.

Access to the Project will be provided by way of a new driveway that will intersect the south side of Main Street approximately 60 feet north of Old Main Street North (opposite Vic's Waffle House). Secondary access for emergency vehicles will be provided by way of a 20-foot wide gravel driveway that will intersect the north side of Astle Street, approximately 60 feet west of the driveway to 15 Astle Street, and will be secured by means of a gate.

On-site parking will be provided for 162 vehicles, including 11 visitor parking spaces, in surface parking areas and covered parking beneath the residential buildings.

SEPTEMBER 2025 TIAS

General

Comment: *The September 2025 TIAS was prepared in a professional manner and following the applicable standards of care, and was prepared under the responsible charge of Kim Eric Hazarvartian, P.E. (MA P.E. No. 32570, Civil).*

Comment T1: **The Applicant should provide an update on discussions with Massachusetts Department of Transportation (MassDOT) concerning the Project and the status of the State Highway Access Permit. The Driveway Permit that was included as an attachment to the Application has expired and it is not clear if the Driveway Permit applies to the current development (90-unit, age qualified (age 55+), multifamily residential development) or if a new Driveway Permit is required.**



**TRAFFIC ENGINEERING PEER REVIEW
PROPOSED SENIOR HOUSING DEVELOPMENT
15 & 41 ASTLE STREET AND 375 MAIN STREET (ROUTE 38)
TEWKSBURY, MASSACHUSETTS
DECEMBER 1, 2025**

Existing Conditions

Study Area

The study area that was assessed in the September 2025 TIAS consisted of Main Street (Route 38) and the following specific intersections:

- Main Street at Astle Street, Pike Street/Veranda Avenue and Old Main Street;
- Main Street at Old Main Street North; and
- Main Street at the Project site driveway (future intersection).

Comment: This study area includes all intersections where the Project is predicted to result in an increase in peak hour traffic volumes by: a) five (5) percent or more, or b) by more than 100 vehicles per hour.

Comment T2: The Study area should be expanded to include the intersection of Main Street at the Walmart and Cumberland Farms driveways given the operating relationship between this intersection and the Main Street/Astle Street intersection.

Comment T3: The right-turn volume from Pike Street to Main Street southbound during the weekday evening peak-hour should be reviewed and corrected on Figure 3.

Traffic Volumes and Data Collection

Traffic volume data was collected by means of turning movement counts (TMCs) that were conducted at the study area intersections on Thursday, June 25, 2025, during the weekday morning (7:00 to 9:00 AM) and evening (3:00 to 6:00 PM) peak periods. The data collection time periods were selected for analysis as they were determined to be representative of the peak traffic volume periods for both the Project and the adjacent roadway network.

A review of seasonal adjustment data available from MassDOT indicated that traffic volumes within the study area during the month of June are representative of traffic volumes that are higher than those that occur under “average-month” conditions. In order to provide an “above average” analysis condition, the June traffic volumes were not adjusted downward to average-month conditions.

In addition to the TMCs, vehicle travel speed measurements were performed on Main Street in the vicinity of the Project site on Thursday, July 10, 2025 through Saturday, July 12, 2025 in the northbound direction and on Thursday, July 24, 2025 through Saturday, July 26, 2025 in the southbound direction.

Comment: The data collection effort and seasonal adjustment (none required) was completed following accepted standards.

We note that MassDOT no longer requires pandemic-related adjustment of traffic counts performed after March 2022 except in locations where the predominant land use consists



**TRAFFIC ENGINEERING PEER REVIEW
PROPOSED SENIOR HOUSING DEVELOPMENT
15 & 41 ASTLE STREET AND 375 MAIN STREET (ROUTE 38)
TEWKSBURY, MASSACHUSETTS
DECEMBER 1, 2025**

of offices or similar uses.³ Given that the predominant land use within the study area consists primarily of residential, commercial and institutional properties, a pandemic-related adjustment is not required to the existing condition traffic volumes.

Comment T4: Public schools were not in session on June 25, 2025, the date that the TMCs were conducted, or in July 2025 when the vehicle travel speed measurements were performed. A review of historic traffic count data available on MassDOT’s Traffic Count Data System (TCDS) for Main Street indicates that traffic volumes are generally higher when schools are in session. It is recommended that an updated data collection program be undertaken on Main Street as a part of a post-occupancy traffic monitoring program (discussion follows).

Pedestrian and Bicycle Facilities

A description of pedestrian facilities within the study area was included as a part of the roadway and intersection descriptions in the September 2025 TIAS. A sidewalk is provided along both sides of Main Street in the vicinity of the Project site; sidewalks are not provided along Astle Street. Crosswalks are provided across the Astle Street and Old Main Street legs of the Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection that are included as a part of the traffic signal system (i.e., pedestrian pushbuttons, signal indications and phasing are provided). A crosswalk is provided for crossing Main Street at the Main Street/Walmart/Cumberland Farms driveway intersection to the north of the Project site that is included as a part of the traffic signal system at that intersection. Formal bicycle facilities are not provided in the vicinity of the Project site; however, Main Street generally provides sufficient width (combined travel lane and shoulder) to accommodate bicycle travel in a shared traveled-way condition.⁴

Public Transportation

A description of public transportation services that are available within the study area was provided as a part of the September 2025 TIAS. As described therein, the Lowell Regional Transit Authority (LRTA) provides fixed-route bus services along Main Street by way of Route 12, *Tewksbury via Rte. 38/Wilmington Train Station*, with stops located proximate to the Project site opposite Vic’s Waffle House and at Veranda Avenue. The Route 12 bus provides continued service to Tewksbury Town Hall, Tewksbury State Hospital, the Market Basket plaza (Oakdale) and Wilmington Station on the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system (Lowell Line).

Comment: In addition to fixed-route bus services, the LRTA also operates the Road Runner paratransit service for persons with disabilities who are unable to ride LRTA fixed route bus services in accordance with the Americans with Disabilities Act (ADA).

³25% *Design Submission Guidelines*; MassDOT Highway Division, Traffic and Safety Engineering; Revised May 31, 2022.

⁴A minimum combined travel lane and paved shoulder width of 14-feet is required to support bicycle travel in a shared traveled-way condition.



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Motor Vehicle Crash Summary

Motor vehicle crash information for the study area intersections was obtained from MassDOT for the five-year period 2017 through 2021, inclusive, in order to examine motor vehicle crash trends occurring within the study area and a summary table was provided in the September 2025 TIAS.

Based on a review of the MassDOT crash data, 47 crashes were reported at the Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection over the 5-year review period, or an average of 9.6 crashes per year, the majority of which occurred during daylight, on a dry pavement surface and involved angle or rear-end type crashes that resulted in property damage only. The calculated motor vehicle crash rate (i.e., number of motor vehicle crashes occurring per million entering vehicles (MEV)) was found to be above the MassDOT statewide and District average crash rates for a signalized intersection.

The Main Street/Old Main Street intersection was identified to have experienced two (2) crashes over the 5-year review period, or an average of 0.4 crashes per year. The calculated motor vehicle crash rate (i.e., number of motor vehicle crashes occurring per million entering vehicles (MEV)) was found to be below the MassDOT statewide and District average crash rates for an unsignalized intersection.

No (0) fatal motor vehicle crashes were identified within the study area over the five-year review period.

Comment: The motor vehicle crash analysis was completed following accepted standards and we agree with the results. A review of the MassDOT High Crash Location (HSIP) database indicates that there are no (0) designated high crash locations within the study area.

Comment T5: The Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection is included in the Top 100 High Crash Locations list (No. 40 out of 100) published by the Northern Middlesex Council of Governments in *Envision 2050, A Long-Range Transportation Plan For Northern Middlesex County, Massachusetts*.⁵ A Road Safety Audit (RSA) was performed for the intersection in 2019.⁶ A review of the suggested safety enhancements that were recommended as a part of the RSA should be completed and a summary of the current status of the suggestions should be provided.

Future Conditions

No-Build Conditions

Traffic volumes within the study area were projected to 2032, which represents a 7-year planning horizon from the date of the filing of the September 2025 TIAS consistent with MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. The future condition traffic volume projections were developed by: i) applying a background traffic growth rate to the 2025 Existing traffic volumes; and ii) adding traffic

⁵*Envision 2050, A Long-Range Transportation Plan For Northern Middlesex County, Massachusetts*; Northern Middlesex Council of Governments; August 2023, Adopted on August 23, 2023 and Amended September 25, 2024.

⁶*Road Safety Audit*, Route 38 (Main Street) at Pike Street/ Old Main Street/Veranda Avenue/ Astle Street, Town of Tewksbury; Greenman-Pedersen, Inc.; October 15, 2019.



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associated with specific development projects by others that may increase traffic volumes within the study area beyond that accounted for by the background traffic growth rate.

Based on a review of historic traffic volume data obtained from MassDOT permanent count stations, a 1.36% per year compounded annual background traffic growth rate was identified as being consistent with the historic background traffic growth rate that has been experienced within the study area.

The MassDOT Main Street Adaptive Traffic Control (ATC) system improvement project was identified that includes traffic signal upgrades and equipment replacement along the Main Street corridor between and including Clark Road and Astle Street/Pike Street/Veranda Avenue/Old Main Street. This project is substantially complete and the ATC system is operational.

Comment: We agree with the methodology that was used to develop the future No-Build condition traffic volume projections, including the background traffic growth rate (1.36%).

Comment T6: The Town of Tewksbury Community/Economic Development Planner should be contacted to determine if there are potential future development projects by others that may result in an increase in traffic volumes that would exceed the general background traffic growth rate or that would result in a change in traffic patterns. To the extent that any projects are identified, the No-Build condition traffic volumes should be revised accordingly.

Comment T7: There are several traffic volume discrepancies during both peak-hours for the Astle Street and Pike Street approaches that should be reviewed and corrected on Figure 4 (2032 No-Build Traffic Volumes).

Build Conditions

The traffic characteristics of the Project were developed by the Applicant's engineer using trip-generation statistics published by the Institute of Transportation Engineers (ITE)⁷ for a similar land use as that proposed. ITE Land Use Codes (LUC) 252, *Senior Adult Multifamily*, was used to develop the trip characteristics for the Project. The table below summarizes the trip characteristics of the Project as presented in September 2025 TIAS.

⁷*Trip Generation*, 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.



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TRIP GENERATION SUMMARY

Time Period	Vehicle Trips ^a		
	Entering	Exiting	Total
<i>Average Weekday:</i>	146	146	292
<i>Weekday Morning Peak-Hour:</i>	6	12	18
<i>Weekday Evening Peak-Hour:</i>	13	10	23

^aITE LUC 252, *Senior Adult Multifamily*.

Project-related traffic was assigned to the roadway network based on a review of the transportation system serving the project site, population centers and destinations, and existing traffic patterns within the study area. Using this methodology, Project-related traffic was assigned as follows:

TRIP DISTRIBUTION

Roadway	Trip Assignment To/From (%)
<i>Main Street to/from North</i>	45
<i>Main Street to/from South</i>	45
<i>Astle Street to/from West</i>	5
<i>Pike Street to/from South</i>	5
TOTAL:	100

Comment: We agree with the methodology that was used to develop the traffic characteristics of the Project and the resulting values, as well as the trip distribution pattern that was used to assign Project-related traffic to the study area roadways and intersections. We note that use of the current edition of Trip Generation (12th Edition) to establish the trip characteristics of the Project would not materially change the reported trips.

Comment T8: The traffic volumes shown on Figure 6 (2032 Build Traffic Volumes) should be reviewed and corrected as necessary to address Comments T3 and T7.

Traffic Operations Analysis

In order to assess the potential impact of the Project on the transportation infrastructure, a detailed traffic operations analysis was performed for the study intersections under 2025 Existing, 2032 No-Build (without the Project) and 2032 Build conditions (with the Project). In brief, traffic operations are described by six



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“levels of service” which are defined by letter grades from “A” through “F”, with a level-of-service (LOS) “A” representing the best operating conditions (average motorist delay of less than 10 seconds and little or no apparent vehicle queuing) and a LOS “F” representing constrained operating conditions (average motorist delay of 50 to 80 seconds or more and often with apparent vehicle queuing). A LOS of “E” is representative of an intersection or traffic movement that is operating at its design capacity, with a LOS of “D” typically representing the limit of acceptable traffic operations.

The addition of Project-related traffic was identified to result in the following impacts:

- **Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street:** This signalized intersection was identified to continue to operate at LOS C or better during the peak hours with the addition of Project-related traffic, with impacts associated with the Project defined as a predicted increase in average motorist delay of up to 1.0 seconds and in vehicle queuing of up to one (1) vehicle. Independent of the Project, all movements from Pike Street were identified to operate at capacity (LOS “E”) during both peak hours.
- **Main Street/Old Main Street North:** All movements from Old Main Street North to Main Street were identified to continue to operate at LOS C with the addition of Project-related traffic, with impacts associated with the Project defined as a predicted increase in average motorist delay of less than 1.0 seconds with no material increase in vehicle queuing.
- **Main Street/Project Site Driveway:** All movements exiting the Project site driveway to Main Street were identified to operate with delays of up to 23.3 seconds with vehicle queuing of generally less and one (1) vehicle. All movements along Main Street approaching the driveway were identified to operate with minimal delay (less than 10 seconds) and vehicle queuing (also less than one (1) vehicle).

Comment: We agree with the methodology that was used to complete the traffic operations analysis and the general findings with respect to the identified impact of the Project.

Comment T9: The traffic operations analysis should be expanded to include the intersection of Main Street at the Walmart and Cumberland Farms driveways and to address Comments T3, T7 and T8.

Sight Distance

An evaluation of sight lines at the Project site driveway intersection with Main Street was performed following American Association of State Highway and Transportation Officials (AASHTO)⁸ standards. Based on this evaluation, it was determined that the available sight lines at the Project site driveway intersection exceed the recommended minimum sight distance for safe operation of the driveway based on the measured 85th percentile vehicle travel speeds as documented in the September 2025 TIAS (33/41 mph) and the posted speed limits (35/40 mph) (a minimum sight distance of 360 feet is required for an approach speed of 45 mph along Main Street; the available sight lines exceed 900 feet).

⁸A Policy on Geometric Design of Highway and Streets, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.



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Comment: We are in agreement with the sight distance evaluation and the conclusion that the available lines of sight will meet or exceed the required minimum sight lines for safe operation of the driveway.

Recommendations

Given the limited impact of the Project as identified in the September 2025 TIAS, no recommendations were provided.

Comment T10: While we agree that the predicted impact of the Project on traffic operations will be relatively minor, we suggest that the following recommendations be considered for the Project and focus on safety, access and transportation demand management:

- **Safety** – As discussed previously, a review of the suggested safety enhancements that were recommended as a part of the RSA that was completed at the Main Street/Astle Street/Pike Street/Veranda Avenue/Old Main Street intersection should be completed and a summary of the current status of the suggestions should be provided. To the extent that there are short-term, low-cost improvements that have not been completed, the Applicant should commit to implementing the outstanding improvements.
- **Access** – The Project site driveway is located along a section of Main Street where southbound traffic is merging into a single travel lane between the Walmart driveway and Astle Street. Adding conflicting left-turn movements entering and exiting a driveway within the merge area creates additional complexities for motorists that are not desirable, particularly when left-turn movements can be accommodated at a signalized intersection to the extent that the Astle Street access were formalized as a right-in/left-out driveway only to limit impacts to Astle Street. The Applicant has provided evidence that a Driveway Permit was issued by MassDOT to allow for the construction of the driveway to serve the Project site; however, the Driveway Permit has expired and it is not clear if the approval applies to the Project. It is suggested that the Applicant reassess the limited use of the Astle Street driveway as described and limit the Main Street driveway to right-in/right-out operation. In addition, it is suggested that the Main Street driveway be reduced in width to 24-feet, accommodating one (1) entering and one (1) exiting travel lane, in order to reduce the conflict area along Main Street, particularly for pedestrians and bicyclists.
- **Transportation Demand Management** – A Transportation Coordinator, who may have other responsibilities and duties as a part of the Project, should be assigned to manage the TDM program. The elements of the TDM program should be expanded to include the following measures:
 - A “welcome packet” should be provided to residents that should include the contact information for the TC and details regarding available public



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transportation services, bicycle and walking alternatives, and other commuter options;

- Secure bicycle parking should be provided to include weather protected bicycle parking and exterior bicycle racks located proximate to building entrances or in an accessible location that is centrally located; and
 - Coordinate with Town, MassDOT and the LRTA to locate a bus shelter at the Project site. To the extent a shelter is approved for this location, a concrete bus shelter pad and shelter should be installed as a part of the Project.
- **Post-Occupancy Monitoring** – A post-occupancy traffic monitoring program should be implemented to include the following information:
- a. A 7-day, week-long automatic traffic recorder count on the Project site driveway to identify weekday and weekend traffic volumes associated with the Project;
 - b. Weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak period turning movement counts at the Project site driveway intersection with Main Street while public schools are in regular session; and
 - c. A review of motor vehicle crash data at the Project site driveway intersection with Main Street for the most recent one-year period available from the Tewksbury Police Department.

The Post Occupancy Traffic Monitoring Program should commence upon achieving 80 Percent Occupancy of the Project (72 units) and repeated within 12-months of achieving full occupancy. The monitoring program shall document the volume of traffic generated by the Project on a typical weekday, on a Saturday and during the weekday morning, weekday evening and Saturday midday peak hours, and shall compare the measured traffic volumes to those predicted in the September 2025 TIAS. In addition, motor vehicle crash patterns (if any) shall be documented at the Project site driveway intersection. To the extent that the measured traffic volumes exceed the predicted traffic volumes for the Project as assessed in the September 2025 TIAS by more than 10 percent and/or there is evidence of a motor vehicle crash history at the Project site driveway that is attributable to vehicles entering or exiting the Project site, the Applicant shall provide recommendations to address these conditions. To the extent that the improvements include signs and pavement markings and/or on-site management strategies, the improvements shall be completed by the Applicant subject to receipt of all necessary rights, permits and approvals. The results of the Post Occupancy Traffic Monitoring Program shall be summarized in a report provided to the Community/Economic Development Planner within two (2) months of the date of the data collection effort that forms the basis of the report.



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SITE PLAN

The following comments are offered with regard to our review of the *Residential Site Development Permit Plan Set* as revised through August 1, 2025 LandPlex, LLC:

- Comment S1:** A vehicle turning analysis (swept path) should be provided for the following design vehicles: fire truck, single-unit truck (SU-30) and a trash/recycling vehicle (SU-40). The fire truck design vehicle shall be defined by the Tewksbury Fire Department. The turning analysis should depict all maneuvers required to enter and exit the Project site from both directions and to access the required areas within the Project site.
- Comment S2:** Double-yellow centerline pavement markings should be provided along the Project site driveway extending between Main Street and the surface parking area.
- Comment S3:** The sight triangle areas for the Project site driveway intersection with Main Street should be shown on the Site Plan and should include the following note: “Signs, landscaping and other features located within sight triangle areas shall be designed, installed, and maintained so as not to exceed 2.0-feet in height. Snow accumulation (windrows) located within sight triangle areas that exceed 3.5-feet in height or that would otherwise inhibit sight lines shall be promptly removed.”
- Comment S4:** The maneuvering area for the parking spaces at the end of the parking areas should be reviewed and the turning area at the end of the parking aisles expanded. The maneuvering area should have a depth that is equal to the width of a parking space. This may require that the emergency vehicle gate be relocated.

PARKING

On-site parking will be provided for 162 vehicles, including 11 visitor parking spaces, in surface parking areas and covered parking beneath the residential buildings. The Project includes 90 two-bedroom units. Section 6.1.3, *Off-Street Parking Requirements*, of the Town of Tewksbury Zoning Bylaw requires that 1.5 parking spaces per unit be provided for one and two-bedroom units in a multifamily residential building, plus 10 percent for visitor parking. Applying the parking requirements of the Zoning Bylaw to the Project results in 135 parking spaces for residents plus 14 parking spaces for visitors, or a total of 149 parking spaces. Given that 162 parking spaces will be provided, the proposed parking supply exceeds the requirements of the Zoning Bylaw for the use and the number of bedrooms that are proposed.

- Comment P1:** The parking calculations shown on Sheet 1 and Sheet 3 of the Residential Site Development Permit Plan Set should be reviewed and corrected, as necessary.



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Appendix K: Responses to Traffic Peer Review

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RESPONSES TO TRAFFIC COMMENTS

COMMENT T1

MassDOT review of the new driveway permit for the current development is well underway.

COMMENT T2

The existing adaptive traffic-signal-control system is designed to respond to changes in travel demand. The vehicle-trips due to the proposed redevelopment are minor and will not have a material effect on the operating relationships, such as offsets, between the Main Street/Walmart driveway/Cumberland Farms driveway intersection and the Main Street/Astle Street intersection.

COMMENT T3

The revised TIAS reflects the correction.

COMMENT T4

The applicant is willing to provide an updated data-collection program post-occupancy.

COMMENT T5

The adaptive traffic-signal-control project has substantially addressed the short-term suggestions of the RSA. The applicant is willing to work with the Town and MassDOT on suggestions such as speed-feedback signage for the Main Street southbound approach to the Astle Street intersection.

COMMENT T6

TEPP LLC did contact the office, which did not identify significant background projects.

COMMENT T7

The revised TIAS reflects the corrections.

COMMENT T8

The revised TIAS reflects the corrections.

COMMENT T9

See the response to Comment T2.

COMMENT T10

The applicant is willing to provide a TDM program.