

Updated Transportation Impact Assessment

Proposed Mixed-Use Development

119 Main Street

Medway, Massachusetts

Prepared for:

The Meehan Group
32 Hastings Street
Mendon, Massachusetts

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Revised August 2026

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EXECUTIVE SUMMARY

DESCRIPTION OF PROJECT

Vanasse & Associates, Inc. (VAI) has prepared this Updated Transportation Impact Assessment (UTIA) to identify traffic impacts associated with a proposed mixed-use development to be located at 119 Main Street in Medway, Massachusetts (the “Project”). The purpose of this UTIA is to review existing and future traffic conditions in the vicinity of the site, determine the traffic impact of the proposed Project at key intersections expected to experience increased traffic levels from the Project, and review the need for improvements to mitigate the Project’s traffic impact.

Elements of the UTIA have been revised based on a peer review from Chappell Engineering Associates as part of their June 2026 review of the study.

PROPOSED PROJECT

The Project site is bounded by Main Street to the north; open and wooded areas and residential buildings to the south; commercial and residential buildings to the east; and Elm Street and residential buildings to the west. Currently, the Project site contains several commercial buildings with a total of eleven curb cuts onto Main Street. The Project will result in the closure of six curb cuts, leaving five curb cuts onto Main Street, and will provide 490 parking spaces. The Project entails constructing five buildings, including one building with 267 multifamily units, a 3,500 square foot (sf) restaurant, a 2,000 sf bank, and a 5,400 sf convenience store/ gas station with 20 vehicle fuel pumps.

EXISTING CONDITIONS

A comprehensive field inventory was conducted to collect existing roadway geometrics, traffic volumes, operating characteristics, speed limits, sight distances, and land use information. Traffic volumes were collected in March 2025 at intersections expected to receive traffic impacts from the Project. The study area locations are listed below:

- Main Street at Milford Street and Franklin Street
- Main Street at Winthrop Street and Evergreen Street (added during peer review process and counted in July 2026)
- Main Street at Pond Street and Elm Street
- Main Street at the Medway Place driveway and the Project site driveway
- Main Street at Holliston Street

PROJECT-GENERATED TRAFFIC

The Project is expected to generate 4,612 net new vehicle trips on an average weekday and 6,820 net new vehicle trips on an average Saturday (two-way, 24-hour volume), with 553 net new vehicle trips (244 entering and 309 exiting) during the weekday morning peak hour, 498 net new vehicle trips (274 entering and 224 exiting) during the weekday evening peak hour, and 516 net new vehicle trips (269 entering and 247 exiting) during the Saturday midday peak hour.

Project-related traffic-volume increases in the study area relative to 2032 No-Build conditions are anticipated to range from 18 to 67 vehicles or 2.1 to 5.6 percent during the peak periods.

TRAFFIC OPERATIONS ANALYSIS

Under future conditions, operations are generally preserved with minor increases in delays and vehicle queue lengths on the various approaches. Independent of the Project, several movements at the Main Street and Milford Street or Main Street at Holliston Street intersections operate at LOS E or F under the existing and No-Build conditions during all analyzed peak periods.

RECOMMENDATIONS

Recommendations include additional safety analysis, promoting Transportation Demand Management (TDM) measures, and off-site mitigation. Restriping Main Street will be required based on the removal of several driveways that currently have left-turn lanes. A Roadway Safety Audit is recommended for two signalized intersections with crash rates higher than statewide and district-wide averages.

CONCLUSIONS

As documented in this study, Project-related traffic increases will result in minor increases in traffic volumes or delays at intersections within the study area, but increases in overall intersection delay at the signalized locations will be under 11 seconds. Closing six curb cuts will improve overall flow along the Main Street corridor. From a safety perspective, it is recommended to conduct a Roadway Safety Audit to identify intersection deficiencies and possible countermeasures. It is also recommended that the pavement markings on Main Street be adjusted as needed to accommodate the proposed driveway locations for the Project. Based on these analyses, Project-related traffic is expected to be adequately accommodated within the existing and future infrastructure, with minimal impact on traffic operations within the study area.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Updated Transportation Impact Assessment (UTIA) in order to identify the traffic impacts associated with the proposed mixed-use development to be located at 119 Main Street in Medway, Massachusetts. This report identifies and analyzes existing and future traffic conditions both with and without the Project and reviews access requirements, potential off-site improvements, and safety considerations.

STUDY METHODOLOGY

This study was prepared in accordance with the State guidelines for TIAs and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area, including an inventory of roadway geometry, observations of traffic flow, and collection of peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed, along with future traffic demand due to expected traffic growth independent of the Project. A seven-year time horizon was selected for these analyses, consistent with State guidelines for preparing TIAs. The traffic analysis conducted in stage two identifies projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if necessary, based on the results from stage two.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in March 2025. The field investigation consisted of an inventory of existing roadway geometrics, traffic volumes, and operating characteristics, as well as posted speed limits, sight distances, and land-use information within the study area. The Project study area includes the major roadway providing access to the Project, as well as the intersections expected to accommodate the majority of Project-related traffic. The study area is listed below and graphically depicted on Figure 1.

- Main Street at Milford Street and Franklin Street
- Main Street at Winthrop Street and Evergreen Street
- Main Street at Pond Street and Elm Street
- Main Street at the Medway Place driveway and the Project site driveway
- Main Street at Holliston Street
- Main Street at site driveway (three locations)

GEOMETRY

Roadway

Main Street

Main Street is classified as a local roadway under Town jurisdiction. Main Street runs in a general east-to-west alignment throughout the study area and provides one general-purpose travel lane in each direction, separated by a double-yellow line with exclusive turn lanes provided at some intersections. The speed limit is designated as 35 miles per hour (mph) in both directions for this section of Main Street. Land uses along Main Street throughout the study area generally consist of commercial use and open and wooded spaces.

Intersections

Figure 2 summarizes existing lane use, travel lane widths, and sidewalk and crosswalk locations at the study area intersections.



Figure 1

**Site Location and
Study Area Map**

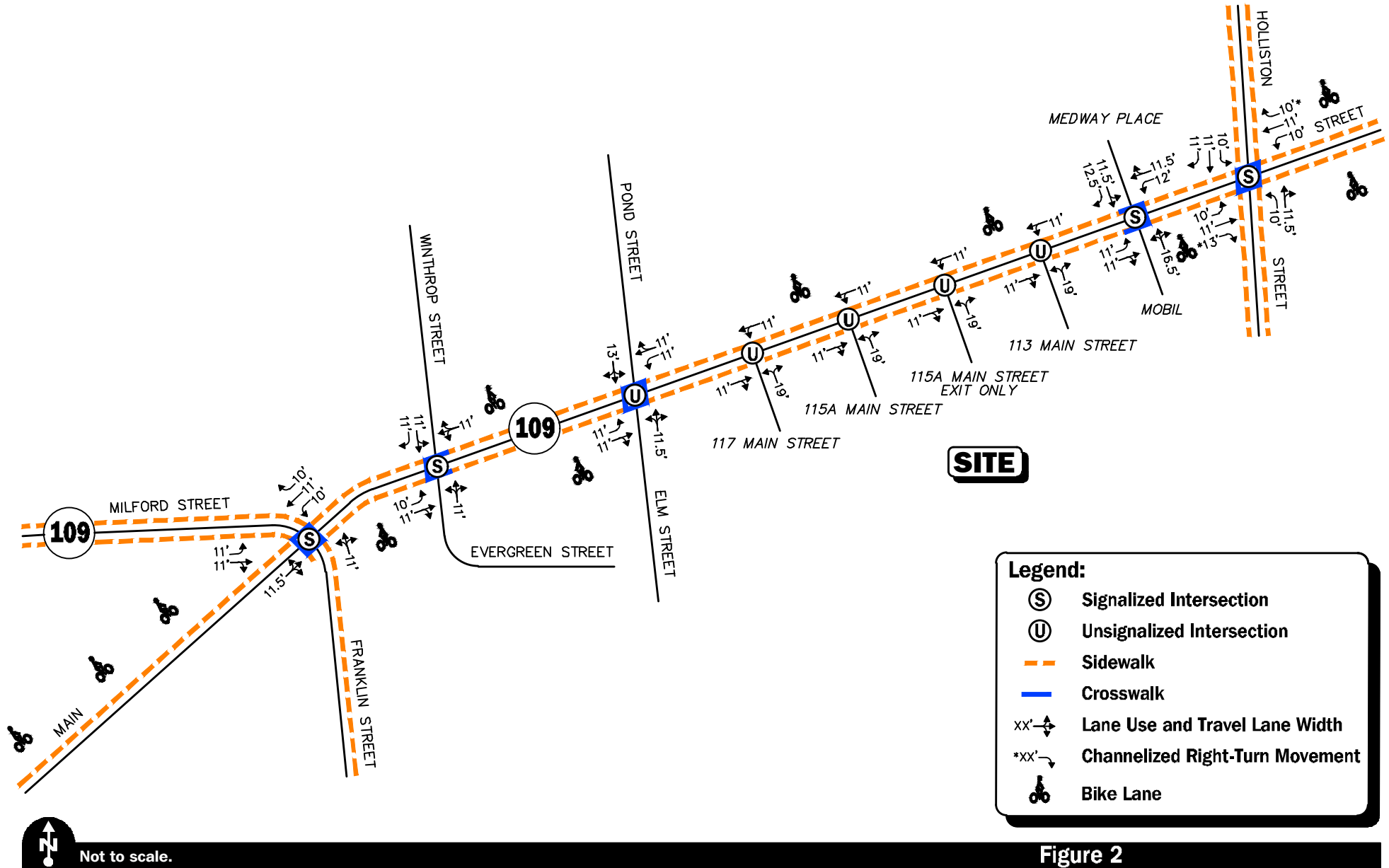


Figure 2

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

EXISTING TRAFFIC VOLUMES

To establish baseline traffic volume demands and flow patterns within the study area, manual turning movement counts (TMCs) were conducted in March 2025. The TMCs were conducted during the 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 periods. Bicycles and pedestrians were also counted.

In response to peer review comments, additional traffic counts were collected at the intersection of Main Street at Winthrop Street and Evergreen Street during the same periods on Thursday, July 23, and Saturday, July 25, 2026.

Additionally, an automatic traffic recorder (ATR) was used to identify traffic flow patterns on Main Street in March 2025. The ATR was conducted for a 72-hour period from March 27 to March 29, 2025. Speed and volume measurements were collected in 15-minute increments.

Traffic-Volume Adjustments

To develop 2025 Existing traffic-volume conditions, the Massachusetts Department of Transportation (MassDOT) weekday seasonal factors for Urban Group 3 (other principal arterials) were reviewed.¹ Based on a review of this data, it was determined that traffic volumes for the month of March are above average-month conditions. As such, the traffic volumes were not adjusted in order to be representative of average-month conditions.

MassDOT no longer requires pandemic-related adjustments to traffic counts performed after March 2022, except at locations where the predominant land use is offices or similar uses.² Given that the predominant land use within the study area is residential, no further adjustment (beyond the seasonal adjustment) is necessary.

Since the Project collected two separate counts, the intersection of Main Street at Winthrop Street was volume-balanced with the adjacent Main Street at Pond Street intersection. By doing this, the analysis provided consistent through movements of Route 109, while retaining the turning volumes on the side streets.

As can be seen in Table 1, Main Street was observed to carry approximately 18,311 vehicles per day (vpd) during an average weekday and 15,323 vpd during an average Saturday, with 1,335 vehicles per hour (vph) during the weekday morning peak hour, 1,406 vph during the weekday evening peak hour, and 1,393 vph during the Saturday midday peak hour. During the weekday morning peak hour, 59 percent of the traffic is traveling eastbound; during the weekday evening peak hour, 52 percent of the traffic is traveling westbound; and during the Saturday midday peak hour, 53 percent of the traffic is traveling westbound.

¹MassDOT statewide Traffic Data Collection; 2023 Weekday Seasonal Factors, Groups U3.

²25% Design Submission Guidelines; MassDOT Highway Division, Traffic and Safety Engineering; Revised May 31, 2022.

Table 1
2025 EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY

Location/Peak Hour	Daily Volume (vpd) ^a	Volume (vph) ^b	K Factor ^c	Directional Distribution ^d
<i>Main Street, west of Medway Place:</i>				
Weekday Daily	18,311	--	--	--
Weekday Morning	--	1,335	7.4	59% EB
Weekday Evening	--	1,406	7.8	52% WB
Saturday Daily	15,323	--	--	--
Saturday Midday	--	1,393	9.1	53% WB

Source: TMCs conducted by VAI in March 2025.

^aTwo-way daily traffic expressed in vehicles per day, based on ATR conducted by VAI in March 2025.

^bTwo-way peak-hour volume expressed in vehicles per hour.

^cThe percentage of daily traffic that occurs during the peak hour.

^dPercent traveling in peak direction.

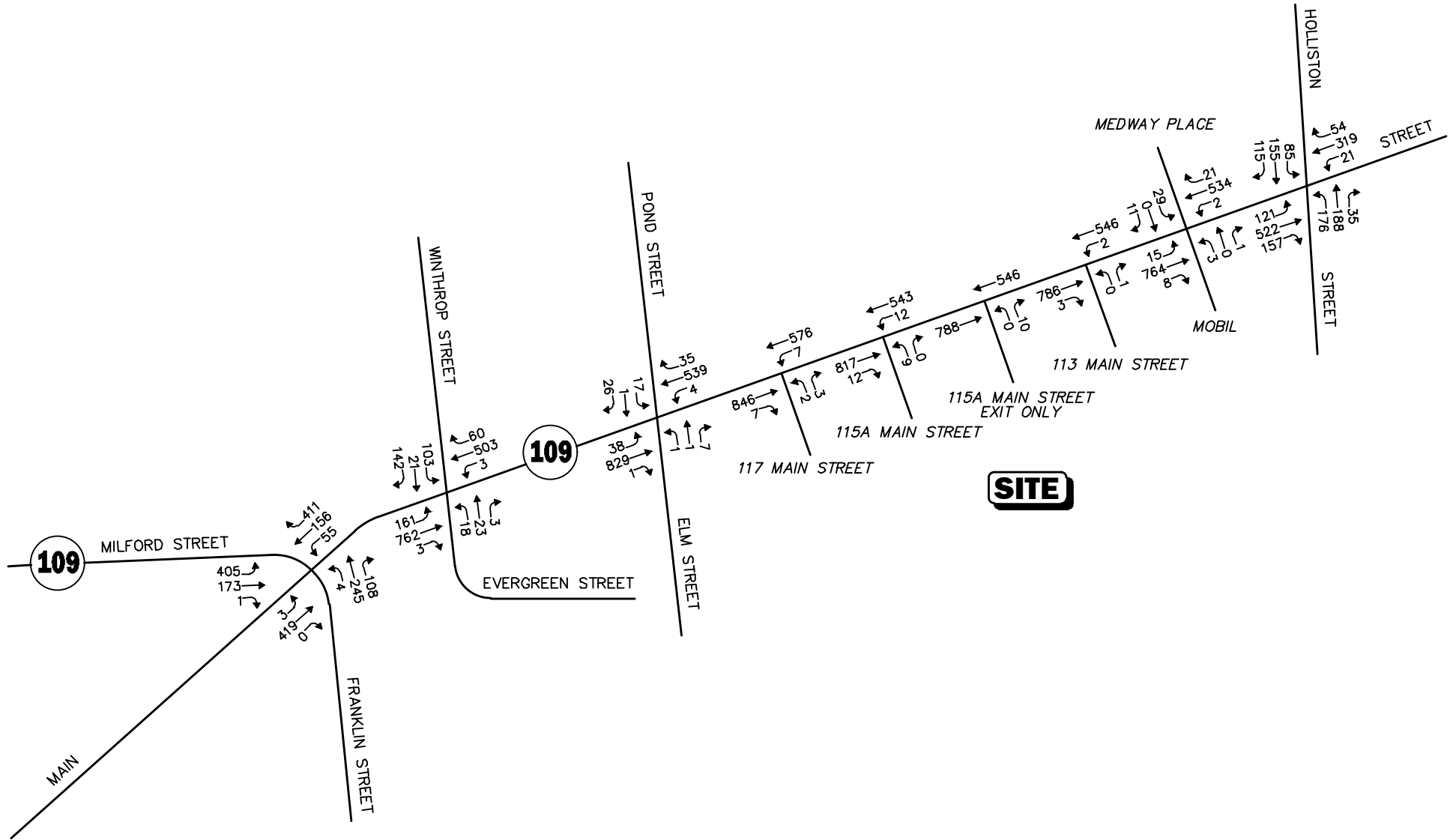
Existing Site Trips

The existing site currently contains several businesses that operate within the peak-hour analysis periods. The following existing sites are used in the existing and No-Build analysis:

- ***Select Used Cars – 117 Main Street*** – Identified as a 9,036 sf used auto sales dealership with one full-access driveway.
- ***All Washed Up Auto Wash – 115A Main Street*** – Identified as a 2,896 sf automated car wash with one tunnel. The site is managed with one full-access driveway and one exit-only driveway.
- ***Herbalife and Dental Office – 113 Main Street*** – Identified as a 1,732 sf dental office. The site is managed with one full-access driveway.

Since these driveways were not included as part of the Project's traffic data collection program, trip-generation statistics published by the Institute of Transportation Engineers (ITE)³ for similar land uses as those existing and occupied on the site were used. The ITE Land Use Code (LUC) 720, *Medical-Dental Office Building – Stand Alone*; LUC 948, *Automated Car Wash*; and LUC 841, *Automobile Sales (Used)* were used to develop the anticipated traffic characteristics of the existing site. These existing trip generations were incorporated into the study area, and the existing weekday morning, evening, and Saturday midday peak-hour traffic volumes for the study area intersections are graphically depicted on Figures 3, 4, and 5, respectively. Further information on trip generation for these sites is provided later in the report.

³*Trip Generation Manual*, 12th Edition; Institute of Transportation Engineers; Washington, DC; 2025.



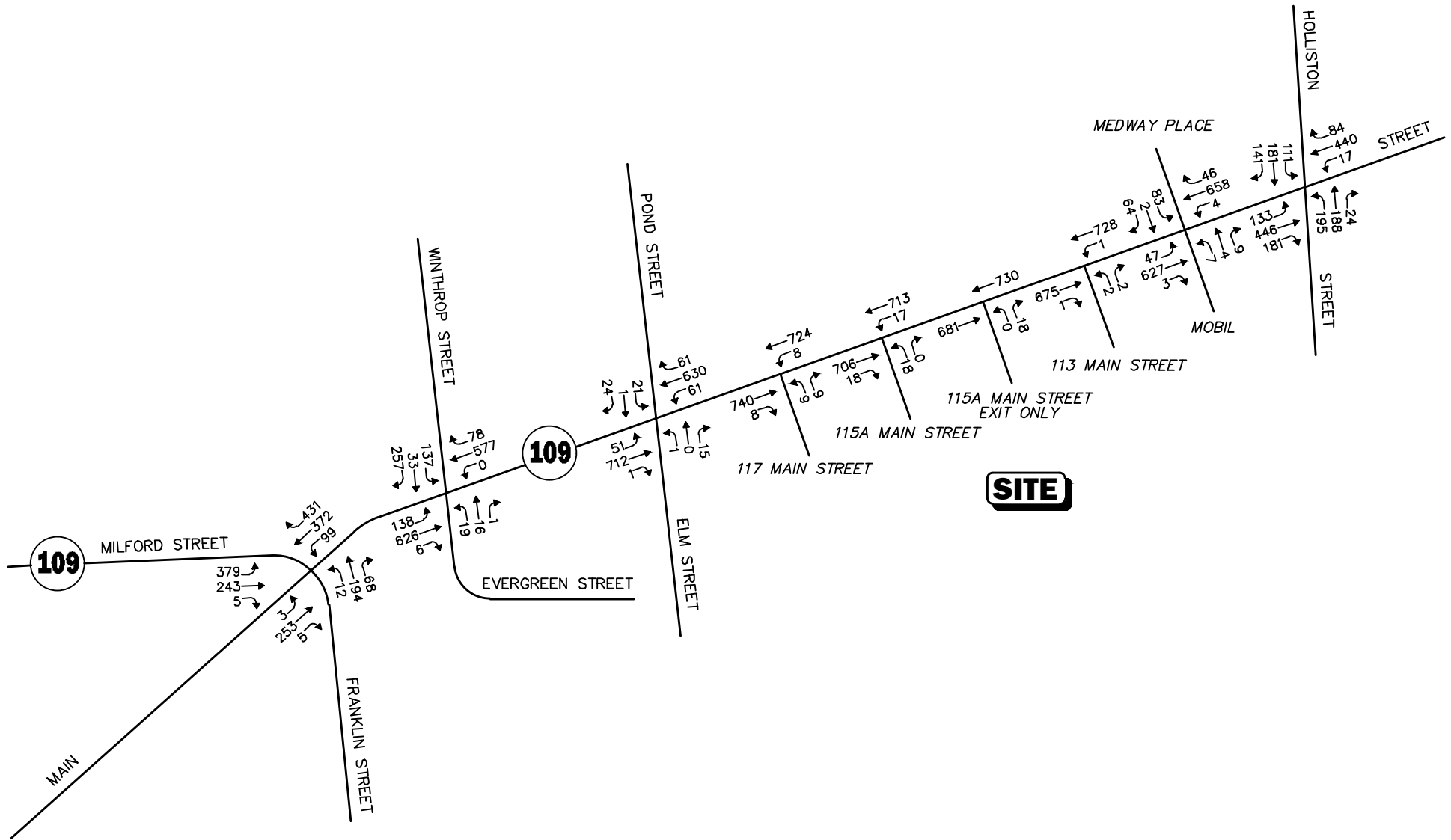
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 3

2025 Baseline
Weekday Morning
Peak-Hour Traffic Volumes



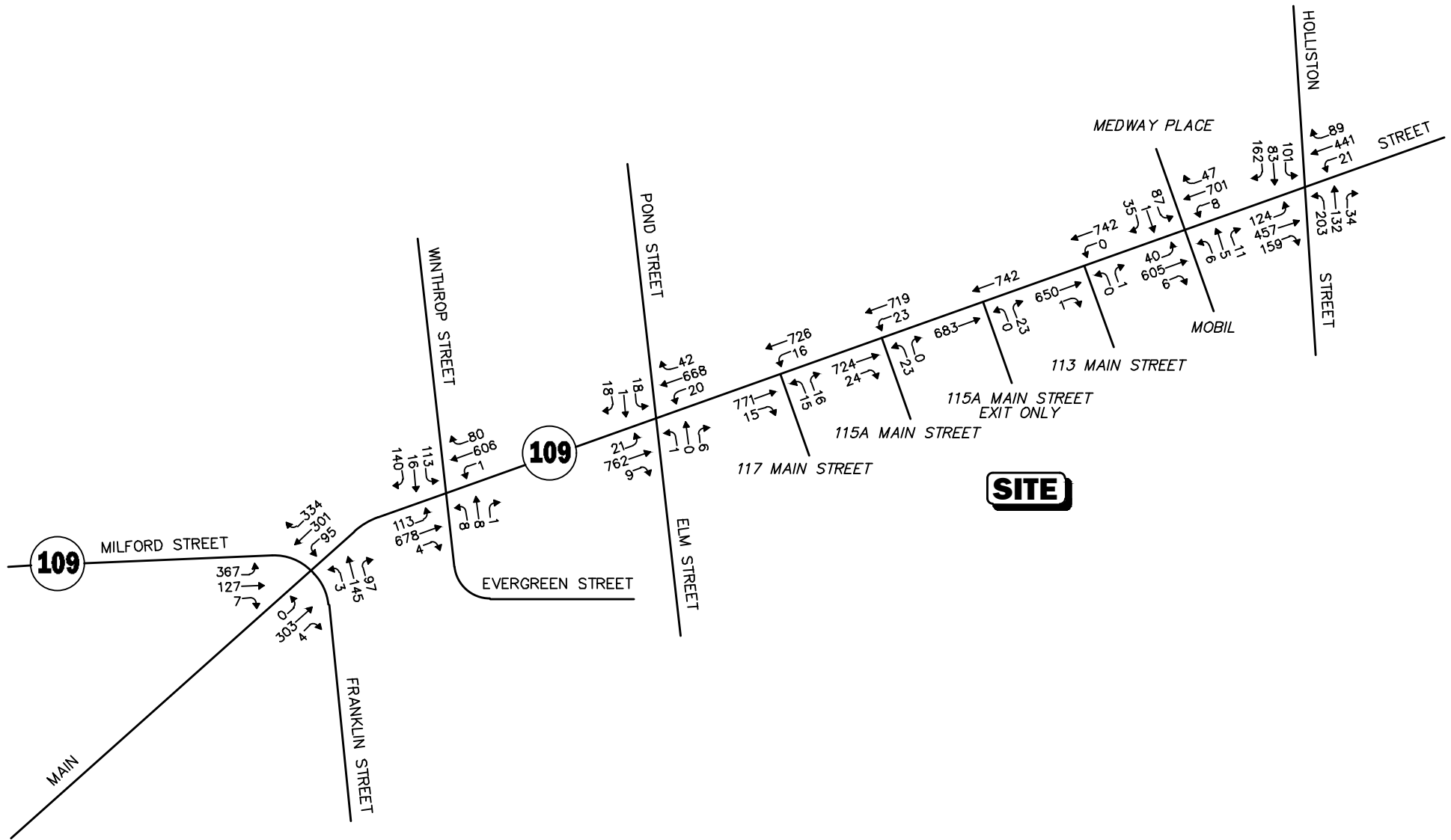
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 4

2025 Baseline
Weekday Evening
Peak-Hour Traffic Volumes



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

Not to scale.



Figure 5

2025 Baseline
Saturday Midday
Peak-Hour Traffic Volumes

PEDESTRIAN AND BICYCLE FACILITIES

An inventory of pedestrian and bicycle facilities within the study area was undertaken in April 2025 and July 2026. There are sidewalks and bike lanes along both sides of Main Street. The full field inventory of the study area is shown on Figure 2.

PUBLIC TRANSPORTATION

Public transportation service is provided within the study area by the Greater Attleboro and Taunton Regional Transit Authority (GATRA). Just outside of the study area, GATRA operates the Norfolk T Shuttle fixed-route bus service from the Medway Middle School. Schedule and fare information for the commuter rail and fixed-route service are provided in the Appendix.

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2019 through 2023) to examine motor vehicle crash trends within the study area. The data is summarized in Table 2 by intersection, type, weather condition, lighting condition, pavement condition, and severity.

Table 2
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	Main St./ Milford St./ Franklin St.	Main St./ Winthrop St./ Evergreen St.	Main St./ Pond St./ Elm St.	Main St./ Medway Place Dwy/ Project Site Dwy	Main St./ Holliston St.
<i>Year:</i>					
2019	5	2	2	0	15
2020	7	4	0	0	6
2021	8	4	1	0	14
2022	15	11	3	0	13
<u>2023</u>	<u>9</u>	<u>4</u>	<u>1</u>	<u>0</u>	<u>10</u>
Total	44	25	7	0	58
Average ^a	8.8	5.0	1.4	0.0	11.6
Crash Rate ^b	0.91	0.57	0.19	0.00	1.16
Significant ^c	Yes	No	No	No	Yes
<i>Type:</i>					
Angle	6	2	0	0	12
Rear-End	25	13	5	0	32
Head-On	3	2	0	0	2
Sideswipe	6	1	1	0	7
Pedestrian/Bike	0	0	0	0	0
Single Vehicle	4	7	1	0	5
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	44	25	7	0	58
<i>Weather Conditions:</i>					
Clear	32	22	5	0	44
Cloudy/Rain	5	2	2	0	13
Snow/Ice	6	1	0	0	1
Fog	0	0	0	0	0
<u>Unknown/Other</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	44	25	7	0	58
<i>Lighting Conditions:</i>					
Daylight	33	17	4	0	44
Dawn/Dusk	2	2	0	0	3
Dark (lit)	9	6	3	0	11
Dark (unlit)	0	0	0	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	46	25	7	0	58
<i>Pavement Conditions :</i>					
Dry	27	21	4	0	43
Wet	9	4	2	0	12
Snow/Ice	5	0	0	0	0
<u>Unknown/Other</u>	<u>3</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>3</u>
Total	44	25	7	0	58
<i>Severity:</i>					
Property Damage Only	33	14	6	0	39
Personal Injury	6	8	0	0	10
Fatality	0	0	0	0	0
<u>Unknown/Other</u>	<u>5</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>9</u>
Total	44	25	7	0	58

^aAverage number of crashes over five-year period.

^bCrash rate per million entering vehicles (mev).

^cSignificant if crash rate > 0.89 for signalized intersections and > 0.61 for unsignalized intersections (MassDOT District 3 rates).

Source: MassDOT Crash Data, 2019 through 2023.

As can be seen in Table 2, the intersection of Main Street at Milford Street and Franklin Street experienced 44 crashes over the five-year period, averaging 8.8 crashes per year. A majority of these crashes were rear-end and angle collisions that occurred in clear, dry conditions, during daytime hours, and resulted in property damage only.

The intersection of Main Street at Winthrop Street and Evergreen Street experienced 25 crashes over the five-year period, averaging 5.0 crashes per year. A majority of these crashes were rear-end collisions, followed by single-vehicle collisions that occurred in clear, dry conditions, during daytime hours, and resulted in property damage only.

The unsignalized intersection of Main Street at Elm Street and Pond Street experienced 7 crashes over a five-year period, averaging 1.4 crashes per year. A majority of these crashes were rear-end collisions that occurred in clear, dry conditions, during daytime hours, and resulted in property damage only.

The signalized intersection of Main Street at Holliston Street experienced 58 crashes over the five-year period, averaging 11.6 crashes per year. A majority of these crashes were rear-end and angle collisions that occurred in clear, dry conditions, during daytime hours, and resulted in property damage only.

No crashes were reported at the intersection of Main Street at the Medway Place driveway entrance.

Two of the intersections were identified as having crash rates above the MassDOT and statewide averages. Neither of them was observed to be within MassDOT's top 5% Highway Safety Improvement Program (HSIP) cluster (2019-2021 data). A review of the MassDOT crash-based network screening tool identifies that the two identified intersections are ranked among the top 5% statewide for total crashes.

It is also worth noting that this analysis was updated from 2018-2022 to the current 2019-2023 data set. Two intersections reported slightly lower crash averages. No significant changes were otherwise noted in the updated analysis and/or findings.

VEHICLE SPEED MEASUREMENTS

Existing vehicle speeds along Main Street, west of Medway Place, in the vicinity of the Project site were recorded in conjunction with the ATR to determine the average and 85th percentile vehicle speeds. The speed limit on this section of Main Street is posted at 35 mph. The results of the speed measurements are shown in Table 3.

Table 3
VEHICLE TRAVEL SPEED MEASUREMENTS

	Main Street	
	Eastbound	Westbound
Average Travel Speed (mph)	28	31
85 th Percentile Speed (mph)	32	34
Speed Limit (mph)	35	35

mph = miles per hour.

As shown in Table 3, the mean vehicle travel speeds along Main Street in the vicinity of the Project site were 28 and 31 mph in the eastbound and westbound directions, respectively. The measured 85th percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be 32 and 34 mph in the eastbound and westbound directions. This is below the posted speed limit in both directions of 35 mph.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, existing traffic volumes in the study area were projected to the year 2032. Traffic volumes on the roadway network at that time, in the absence of the Project (that is, the No-Build condition), would include existing traffic, new traffic from general background traffic growth, and traffic from specific developments by others expected to be completed by 2032. Inclusion of these factors resulted in the development of 2032 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop the 2032 Build traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development impacting the study area. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all existing traffic volumes under study. The drawback of such a procedure is that some turning volumes may grow at a higher or lower rate at particular intersections.

In addition, we identified the location and type of planned development affecting the study area, estimated the traffic it would generate, and assigned it to the area roadway network. This produces a more realistic estimate of local traffic growth. However, a drawback of this procedure is that it does not account for potential population and development growth outside the study area.

To provide a conservative analysis framework, both procedures were used in this UTIA.

General Background Growth

Traffic volume data compiled by MassDOT from permanent count stations and historical traffic counts in the area were reviewed to determine general background traffic growth trends. Based on a review of this data and other area traffic studies, it was determined that traffic volumes are increasing by approximately 0.11 percent per year on average. Therefore, a 1.0 percent per year compounded annual background traffic growth rate was used to account for future traffic growth, including presently unforeseen development within the study area.

Specific Development by Others

The Town of Medway, Town of Millis, and Town of Bellingham were contacted to determine whether any planned or approved development projects are expected to influence future traffic volumes within the study area. Based on these discussions, the following projects were identified for possible inclusion in this assessment:

- ***Proposed Residential Redevelopment – 192 Main Street*** – This project entails constructing a new townhouse development with two residential units. This project is currently before the planning board and is anticipated to be fully occupied by 2032. Based on the site characteristics and unit count, the development is expected to be captured within the background growth rate.
- ***Proposed Residential Redevelopment – 20 Milford Street*** – This project entails the redevelopment of an existing building into a six-unit multifamily development. This project was recently approved by the planning board and is expected to be fully occupied by 2032. Based on the site characteristics and unit count, the development is expected to be captured within the background growth rate.
- ***Proposed Municipal Building Complex – 120 Main Street*** – This project entails constructing a new municipal complex that will house police, fire, and town services. This project is currently in the design stages, with construction slated to begin in 2027. Based on the current timeline, the project is anticipated to be completed by 2032. Traffic volumes associated with this project were obtained from the TIA⁴ that was prepared for the development and included in the analysis.
- ***Proposed Industrial Complex – 205-245 Hartford Avenue, Bellingham*** – This project entails the construction of an approximate 700,000 sf parcel-hub warehouse space. This project is currently approved and is anticipated to be completed by 2032. To provide a conservative analysis, traffic volumes obtained from the TIAS⁵ were projected to continue up Route 126 and pass through the Route 109 corridor intersections. As such, these volumes were included in the analysis.

No other developments were identified at this time that are expected to increase traffic within the study area beyond the general background traffic growth rate of 1.0 percent.

Planned Roadway Improvements

The Town of Medway and MassDOT were contacted to determine whether any planned roadway improvement projects are expected to be completed within the study area over the seven-year planning horizon. Based on these discussions, no roadway improvement projects were identified in the study area at this time, beyond general maintenance.

No-Build Traffic Volumes

The 2032 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2025 Existing peak-hour traffic

⁴Traffic Impact Assessment, Proposed Municipal Complex, 120 Main Street, Medway, MA; VAI, April 2026.

⁵Traffic Impact and Access Study, 205-245 Hartford Avenue, Bellingham, MA; Ron Muller and Associates, December 2021.

volumes for a seven-year period. The resulting 2032 No-Build weekday morning, evening, and Saturday midday peak-hour traffic-volume networks are shown on Figures 6, 7, and 8, respectively.

EXISTING SITE-GENERATED TRAFFIC

As discussed earlier in the TIA, trip-generation statistics published by the ITE⁶ were used to develop the anticipated traffic characteristics of the existing site. Table 4 shows the expected vehicle trips generated by the existing site.

As shown below in Table 4, the existing site is expected to generate approximately 2,414 vehicle trips on an average weekday and 2,164 vehicle trips on an average Saturday (two-way, 24-hour volume), with 82 vehicle trips (53 entering and 29 exiting) during the weekday morning peak hour, 140 vehicle trips (62 entering and 78 exiting) during the weekday evening peak hour, and 194 vehicle trips (94 entering and 100 exiting) during the Saturday midday peak hour.

Table 4
EXISTING SITE TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Mobil Gas Station	Medical-Dental Office Building ^c	Automated Car Wash ^d	Automobile Sales (Used) ^e	Total Trips
Weekday Daily	1,376 ^a	58	734	246	2,414
<i>Weekday Morning Peak Hour:</i>					
Entering	10	5	24	14	53
<u>Exiting</u>	<u>4</u>	<u>1</u>	<u>19</u>	<u>5</u>	<u>29</u>
Total	14 ^b	6	43	19	82
<i>Weekday Evening Peak Hour:</i>					
Entering	9	2	35	16	62
<u>Exiting</u>	<u>20</u>	<u>4</u>	<u>36</u>	<u>18</u>	<u>78</u>
Total	29 ^b	6	71	34	140
Saturday Daily	952 ^a	10	742	460	2,164
<i>Saturday Midday Peak Hour:</i>					
Entering	15	1	47	31	94
<u>Exiting</u>	<u>22</u>	<u>1</u>	<u>46</u>	<u>31</u>	<u>100</u>
Total	37 ^b	2	93	62	194

^aBased on ITE LUC 944, *Gasoline/Service Station*; 8 vfps.

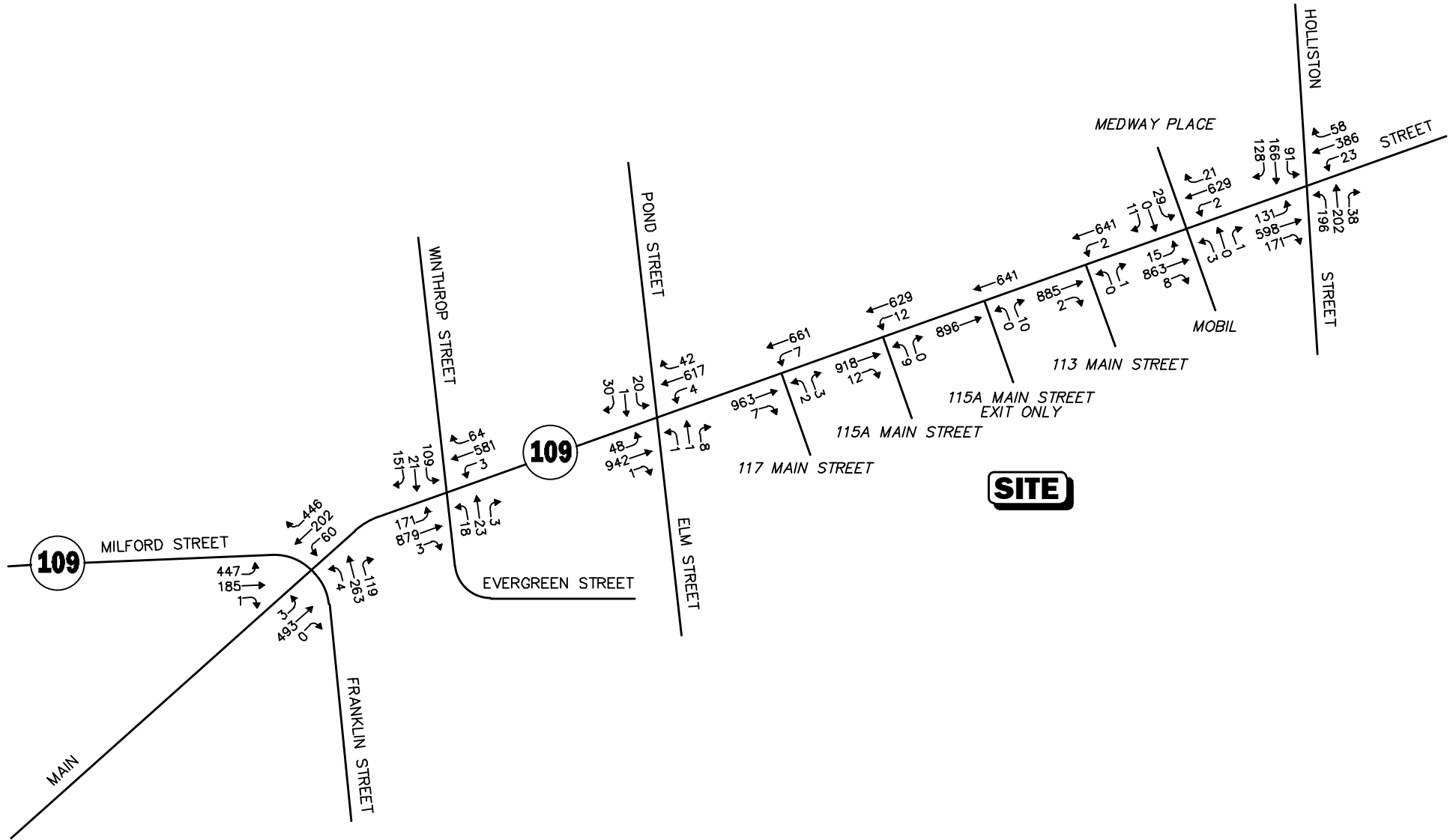
^bBased on TMC entering and exiting the north approach of Main Street at the Medway Place driveway and Project site driveway intersection.

^cBased on ITE LUC 720, *Medical-Dental Office Building – Stand Alone*; 1,730 sf.

^dBased on ITE LUC 948, *Automated Car Wash*; 2,896 sf.

^eBased on ITE LUC 841, *Automobile Sales (Used)*; 9,036 sf.

⁶Ibid 3.



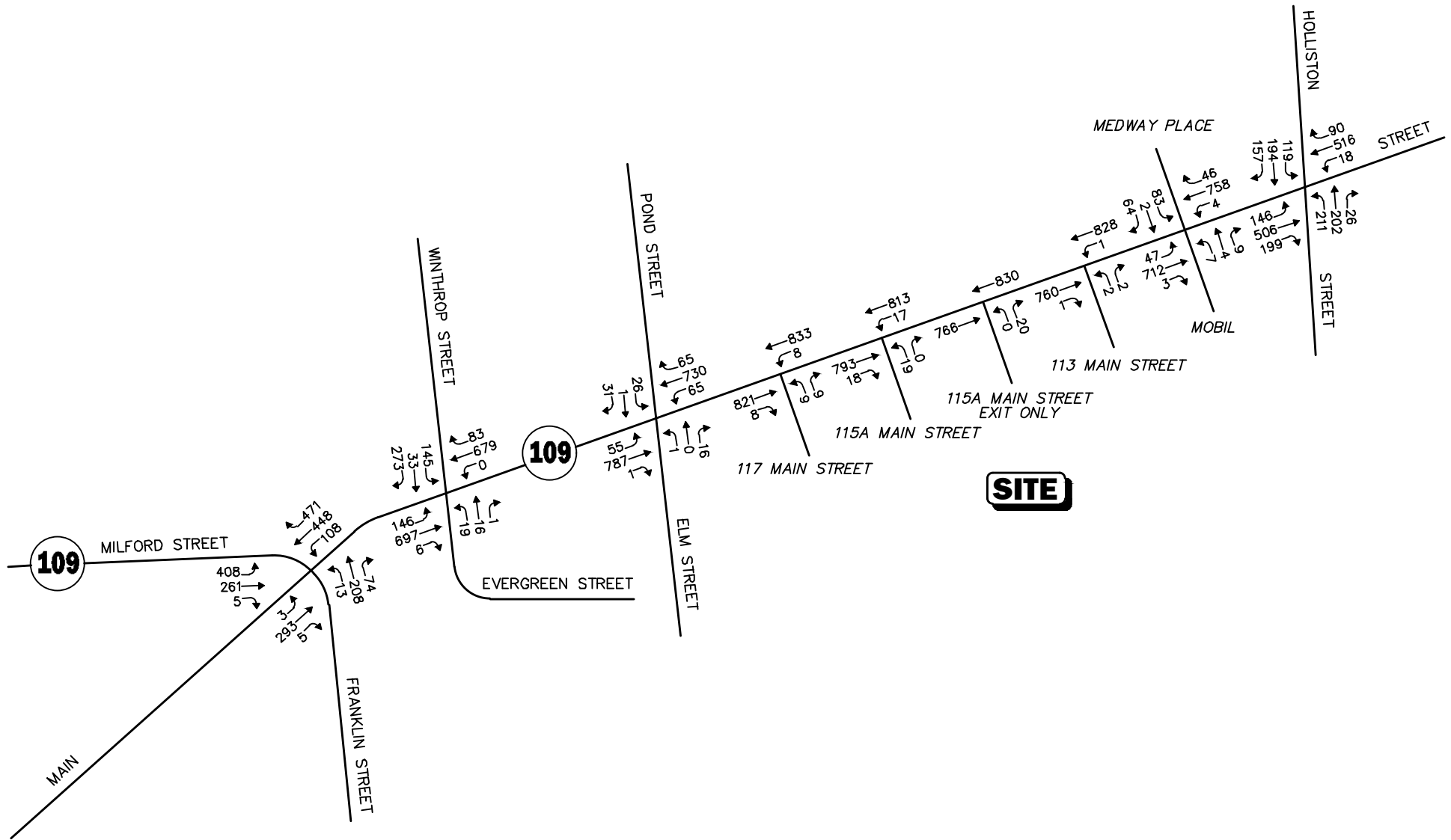
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 6

2032 No-Build
Weekday Morning
Peak-Hour Traffic Volumes



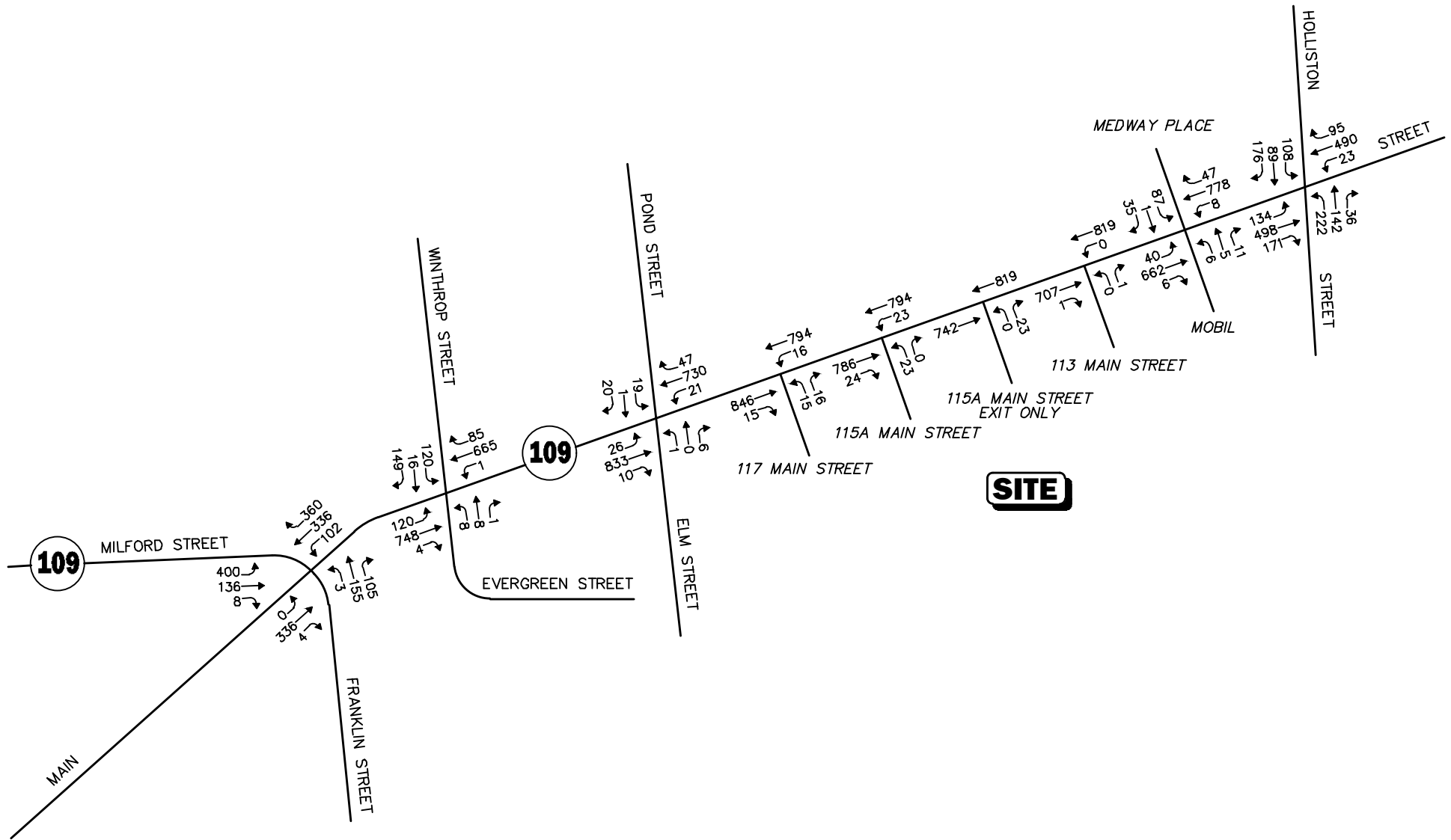
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 7

2032 No-Build
Weekday Evening
Peak-Hour Traffic Volumes



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

Not to scale.



Figure 8

2032 No-Build
Saturday Midday
Peak-Hour Traffic Volumes

PROJECT-GENERATED TRAFFIC

The Project entails redeveloping the site to contain residential apartments, a restaurant, a drive-in bank, and a convenience store/gas station. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published by the ITE⁷ for Land Use Code (LUC) 221, *Multifamily Housing (Mid-Rise)*; LUC 934, *Fast-Food Restaurant with Drive-Through*; LUC 912, *Drive-In Bank*; and LUC 945, *Convenience Store/Gas Station (4-5.5K)* were used to estimate the trips associated with the proposed mixed-use development.

Pass-By Trips

Not all of the trips expected to be generated by the proposed commercial buildings will be new trips on the roadway network. A portion of these trips will consist of pass-by trips, or of vehicles already traveling along the adjacent roadway for other purposes, that will patronize the Project site in conjunction with their trip and then continue to their original destination. These are not new trips on the roadway network resulting from the Project. According to statistics published by the ITE, the pass-by rate for a fast-food restaurant represents 50 percent of the trips during all but the weekday evening peak hour, which is 55 percent, and for a drive-in bank the pass-by rate is 29 percent, 35 percent, and 38 percent during the weekday morning, weekday evening, and Saturday midday, respectively. Finally, the convenience store/gas station has a pass-by rate of 75 percent on a typical weekday, 76 percent and 75 percent during weekday morning and evening peak hours, and 64 percent on a typical Saturday.

Trip-generation calculations were performed for a typical weekday, a typical Saturday, and the weekday morning, weekday evening, and Saturday midday peak hours, the critical time periods for Project-related traffic activity. A summary of the expected vehicle-trip generation is summarized in Table 5.

As shown below in Table 5, the Project is expected to generate approximately 3,140 external vehicle trips on an average weekday and 4,292 external vehicle trips on an average Saturday (two-way, 24-hour volume), with 269 external vehicle trips (114 entering and 155 exiting) during the weekday morning peak hour, 274 external vehicle trips (154 entering and 120 exiting) during the weekday evening peak hour, and 354 external vehicle trips (185 entering and 169 exiting) during the Saturday midday peak hour.

⁷Ibid 3.

Table 5
PROPOSED SITE TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Residential Apartments ^a (A)	Restaurant ^b (B)	Restaurant Pass-By Trips ^c (C)	Drive-In Bank ^d (D)	Drive-In Bank Pass-By Trips ^e (E)	Convenience Store/ Gas Station ^f (F)	Convenience Store/ Gas Station Pass-By Trips ^g (G)	Total Trips (H = A + B + D + F)	Total Pass-By Trips (I = C + E + G)	External Trips (J = H - I)
Weekday Daily	1,190	1,568	784	198	50	4,070	3,052	7,026	3,886	3,140
<i>Weekday Morning Peak Hour:</i>										
Entering	23	59	29	12	3	203	151	297	183	114
<u>Exiting</u>	<u>78</u>	<u>57</u>	<u>29</u>	<u>8</u>	<u>3</u>	<u>195</u>	<u>151</u>	<u>338</u>	<u>183</u>	<u>155</u>
Total	101	116	58	20	6	398	302	635	366	269
<i>Weekday Evening Peak Hour:</i>										
Entering	65	58	31	21	7	192	144	336	182	154
<u>Exiting</u>	<u>36</u>	<u>53</u>	<u>31</u>	<u>21</u>	<u>7</u>	<u>192</u>	<u>144</u>	<u>302</u>	<u>182</u>	<u>120</u>
Total	101	111	62	42	14	384	288	638	364	274
Saturday Daily	1,148	1,828	914	174	44	5,834	3,734	8,984	4,692	4,292
<i>Saturday Midday Peak Hour:</i>										
Entering	49	91	45	27	10	196	123	363	178	185
<u>Exiting</u>	<u>47</u>	<u>87</u>	<u>45</u>	<u>25</u>	<u>10</u>	<u>188</u>	<u>123</u>	<u>347</u>	<u>178</u>	<u>169</u>
Total	96	178	90	52	20	384	246	710	356	354

^aBased on ITE LUC 221, *Multifamily Housing (Mid-Rise)*; 267 units.
^bBased on ITE LUC 934, *Fast-Food Restaurant with Drive-Through*; 3,500 sf.
^cBased on ITE LUC 934, *Pass-By Rate*; Weekday, 50, Morning, 50, Evening, 55; Saturday, 50; Midday, 50 percent.
^dBased on ITE LUC 912, *Drive-In Bank*; 2,000 sf.
^eBased on ITE LUC 912, *Pass-By Rate*; Weekday, 25; Morning, 29; Evening, 35; Saturday, 25; Midday, 38 percent.
^fBased on ITE LUC 945, *Convenience Store/Gas Station (4-5.5K)*; 20 VFP.
^gBased on ITE LUC 945, *Pass-By Rate*; Weekday, 75; Morning, 76; Evening, 75; Saturday, 64; Midday, 64 percent.

The vehicle trips that were generated by the existing site were removed from those expected to be generated by the proposed site. Table 6 below summarizes the net new trips generated by the proposed mixed-use development.

Table 6
NET NEW TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Existing Site ^a (A)	Proposed Site ^b (B)	Net New Trips (C = B – A)
Weekday Daily	2,414	7,026	4,612
<i>Weekday Morning Peak Hour:</i>			
Entering	53	297	244
<u>Exiting</u>	<u>29</u>	<u>338</u>	<u>309</u>
Total	82	635	553
<i>Weekday Evening Peak Hour:</i>			
Entering	62	336	274
<u>Exiting</u>	<u>78</u>	<u>302</u>	<u>224</u>
Total	140	638	498
Saturday Daily	2,164	8,984	6,820
<i>Saturday Midday Peak Hour:</i>			
Entering	94	363	269
<u>Exiting</u>	<u>100</u>	<u>347</u>	<u>247</u>
Total	194	710	516

^aBased on Table 4; Total Existing Site Trips.

^bBased on Table 5; Total Proposed Site Trips.

As shown in Table 6, the Project represents an increase in vehicle trips beyond those expected to be generated at the proposed Project site. The proposed Project site vehicle trips were added to the 2032 No-Build traffic volumes with a reduction based on the No-Build Project site land uses.

Based on this analysis, the Project is expected to generate 4,612 net new vehicle trips on an average weekday and 6,820 net new vehicle trips on an average Saturday (two-way, 24-hour volume), with 553 net new vehicle trips (244 entering and 309 exiting) during the weekday morning peak hour, 498 net new vehicle trips (274 entering and 224 exiting) during the weekday evening peak hour, and 516 net new vehicle trips (269 entering and 247 exiting) during the Saturday midday peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution and assignment for the Project site's building program is separated between the residential and commercial components. The directional distribution of site-generated trips to and from the proposed residential component of the mixed-use development was developed from a review of the United States Census Bureau Destination Report, which identifies the employment locations of individuals residing within 1 mile of the Project site. The directional distribution of

site-generated trips to and from the proposed commercial component of the mixed-use development was determined by reviewing existing travel patterns at study-area intersections. The trip distribution for both components of the Project is summarized in Table 7 and graphically depicted on Figures 9 and 10 for the residential and commercial components, respectively. The weekday morning, weekday evening, and Saturday midday peak-hour traffic volumes expected to be generated by the proposed residential and commercial components of the Project site were assigned on the study area roadway network as shown on Figures 11 through 16.

Table 7
TRIP-DISTRIBUTION SUMMARY

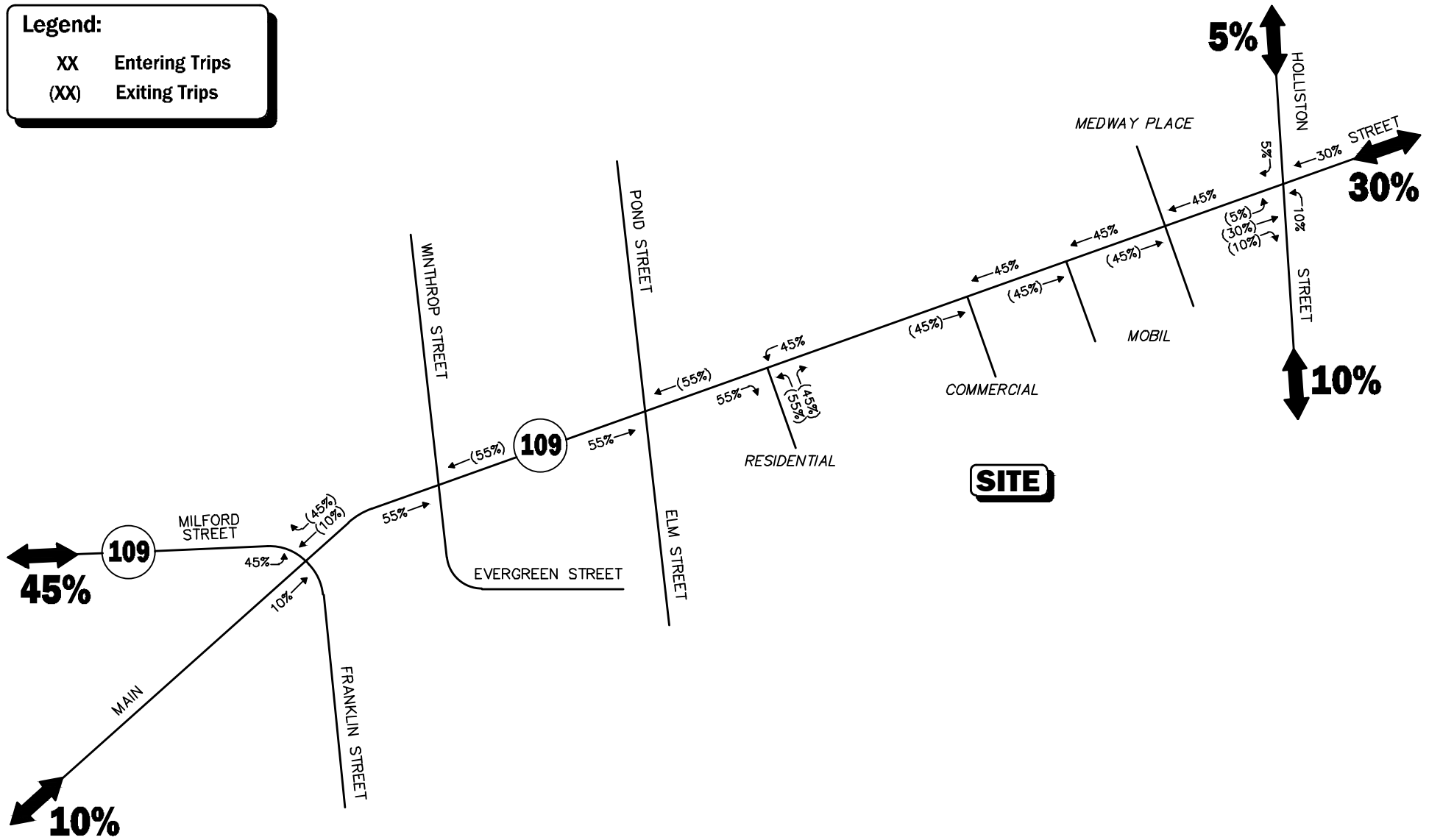
Roadway	Direction (To/From)	Residential Component Percent (To/From)	Commercial Component Percent (To/From)
Milford Street	North	45	25
Holliston Street	North	5	10
Franklin Street	South	0	5
Holliston Street	South	10	15
Main Street	East	30	25
Main Street	West	<u>10</u>	<u>20</u>
TOTAL		100	100

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2032 Build condition networks consist of the 2032 No-Build traffic volumes with the existing site-generated traffic removed and the anticipated Project-generated traffic added. The 2032 Build weekday morning, weekday evening, and Saturday midday peak-hour traffic-volume networks are shown in Figures 17, 18, and 19, respectively. Table 8 summarizes peak-hour projected traffic-volume increases external to the study area, the subject of this assessment. These volumes are based on the expected increases from the Project.

Legend:

XX Entering Trips
(XX) Exiting Trips



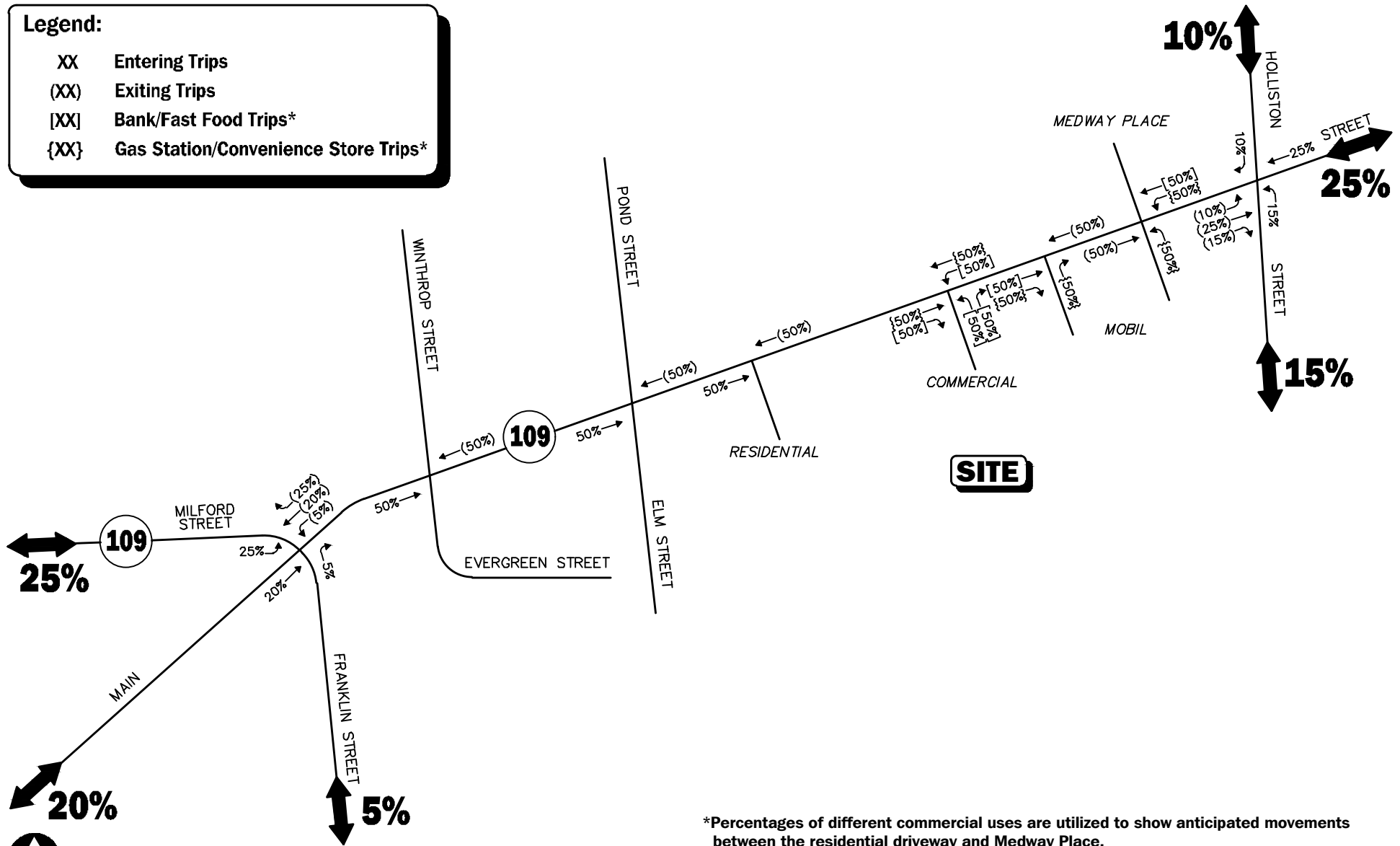
Not to scale.

Figure 9

Residential Trip Distribution

Legend:

- XX Entering Trips
- (XX) Exiting Trips
- [XX] Bank/Fast Food Trips*
- {XX} Gas Station/Convenience Store Trips*



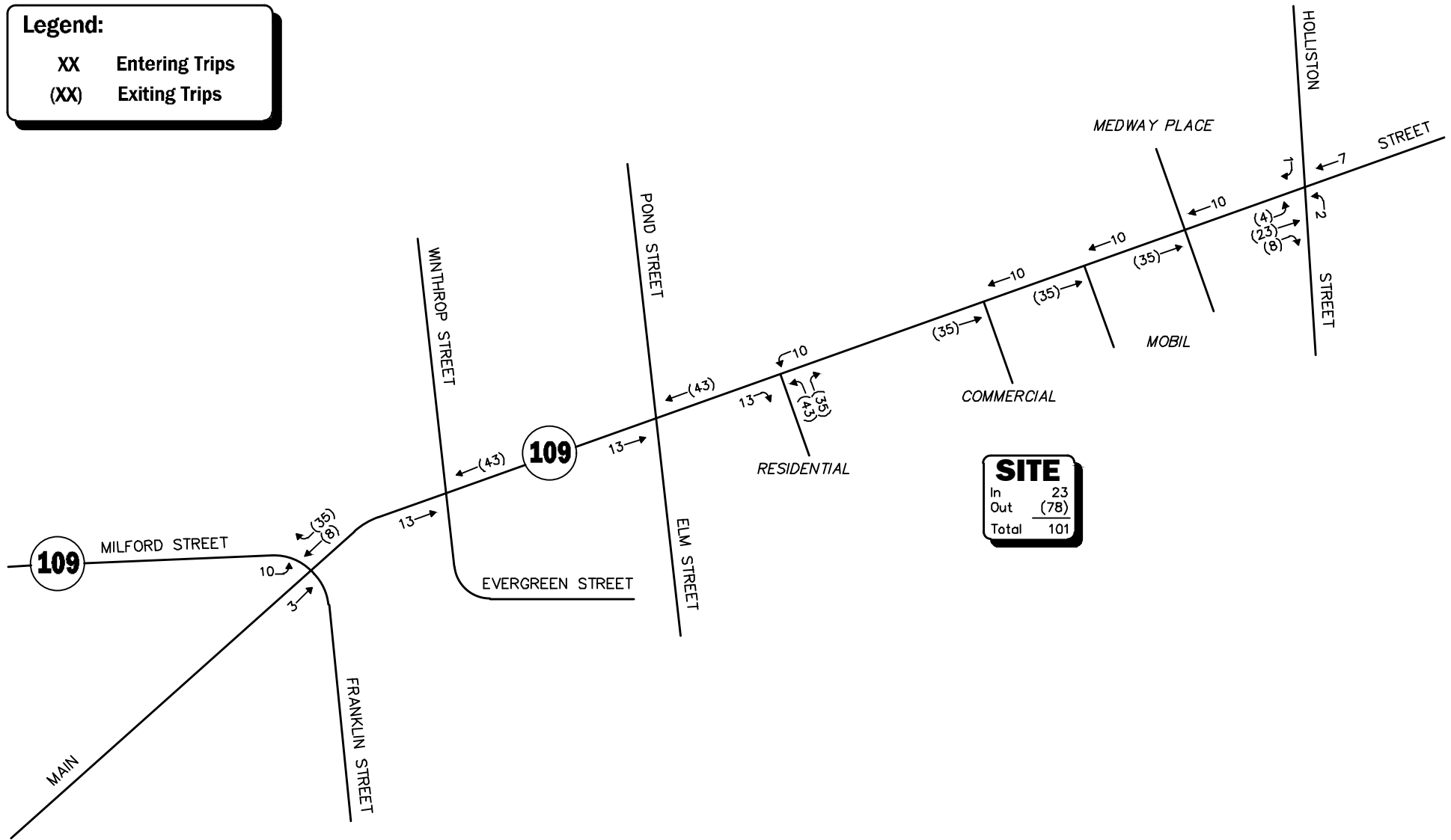
*Percentages of different commercial uses are utilized to show anticipated movements between the residential driveway and Medway Place.

Figure 10

Commercial Trip Distribution

Legend:

XX Entering Trips
(XX) Exiting Trips



Not to scale.

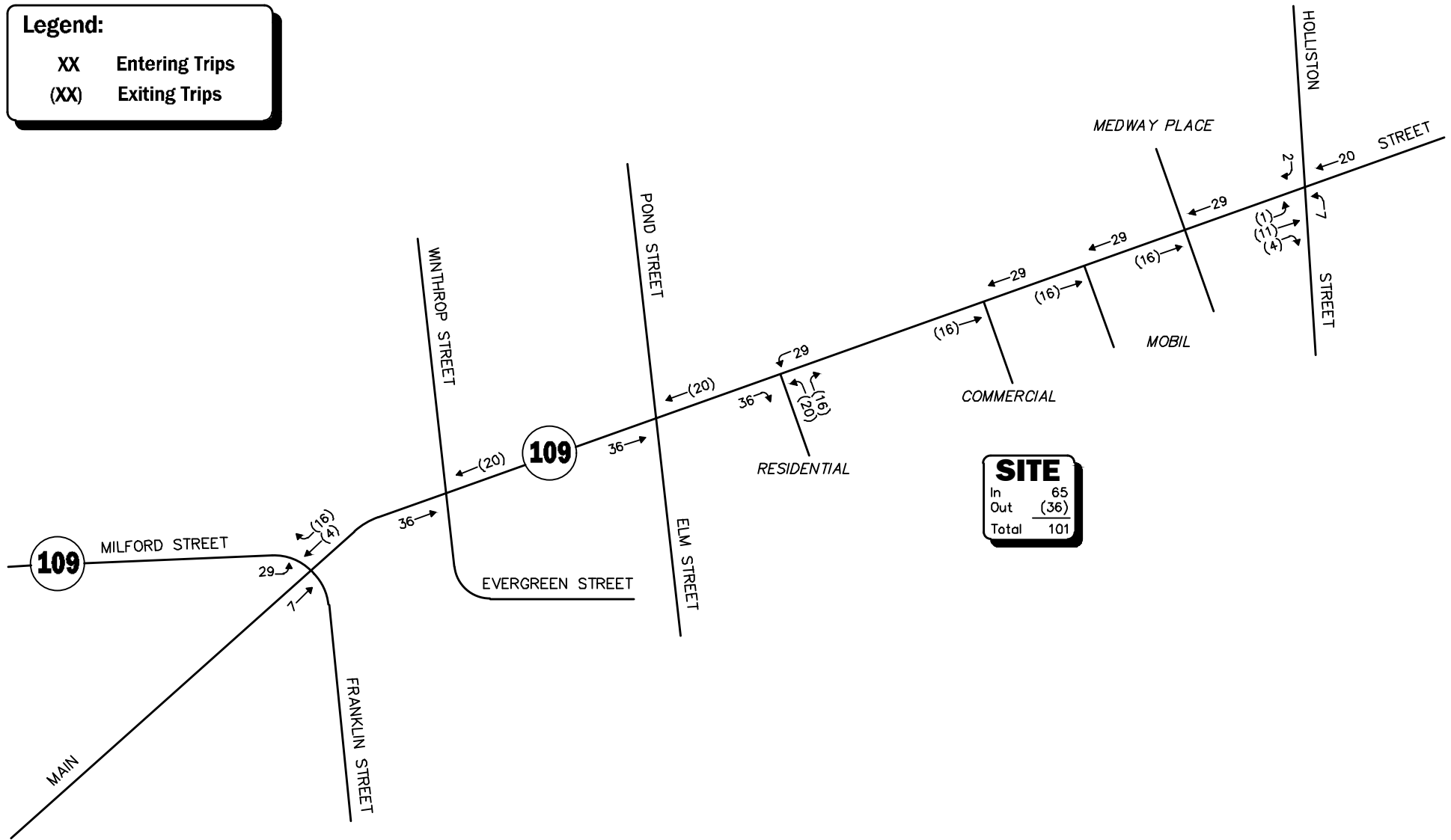
VA Vanasse & Associates inc

Figure 11

**Residential Site-Generated Trips
Weekday Morning
Peak-Hour Traffic Volumes**

Legend:

XX Entering Trips
(XX) Exiting Trips



Not to scale.

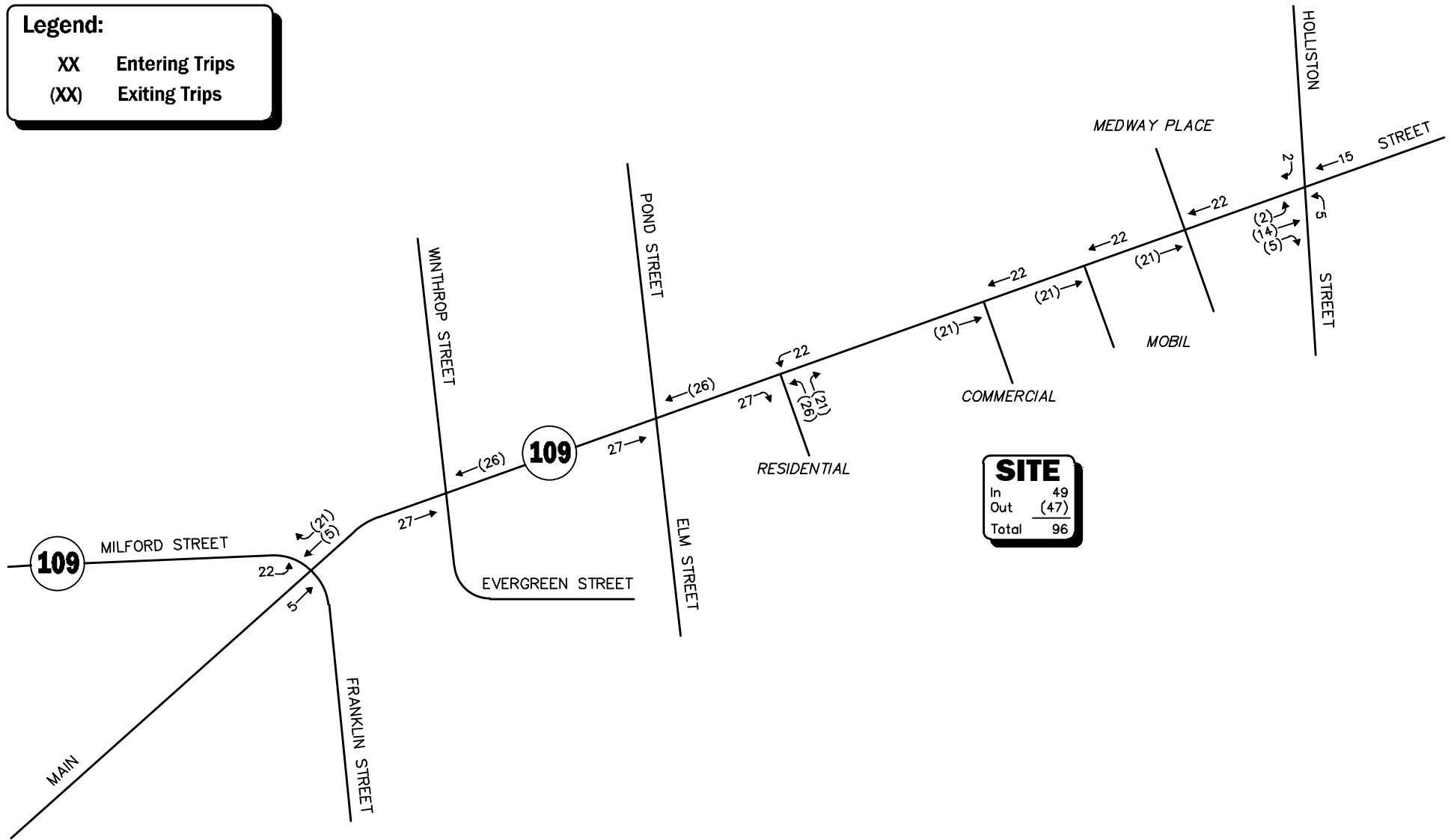
Vanasse & Associates inc

Figure 12

**Residential Site-Generated Trips
Weekday Evening
Peak-Hour Traffic Volumes**

Legend:

XX Entering Trips
(XX) Exiting Trips



Not to scale.

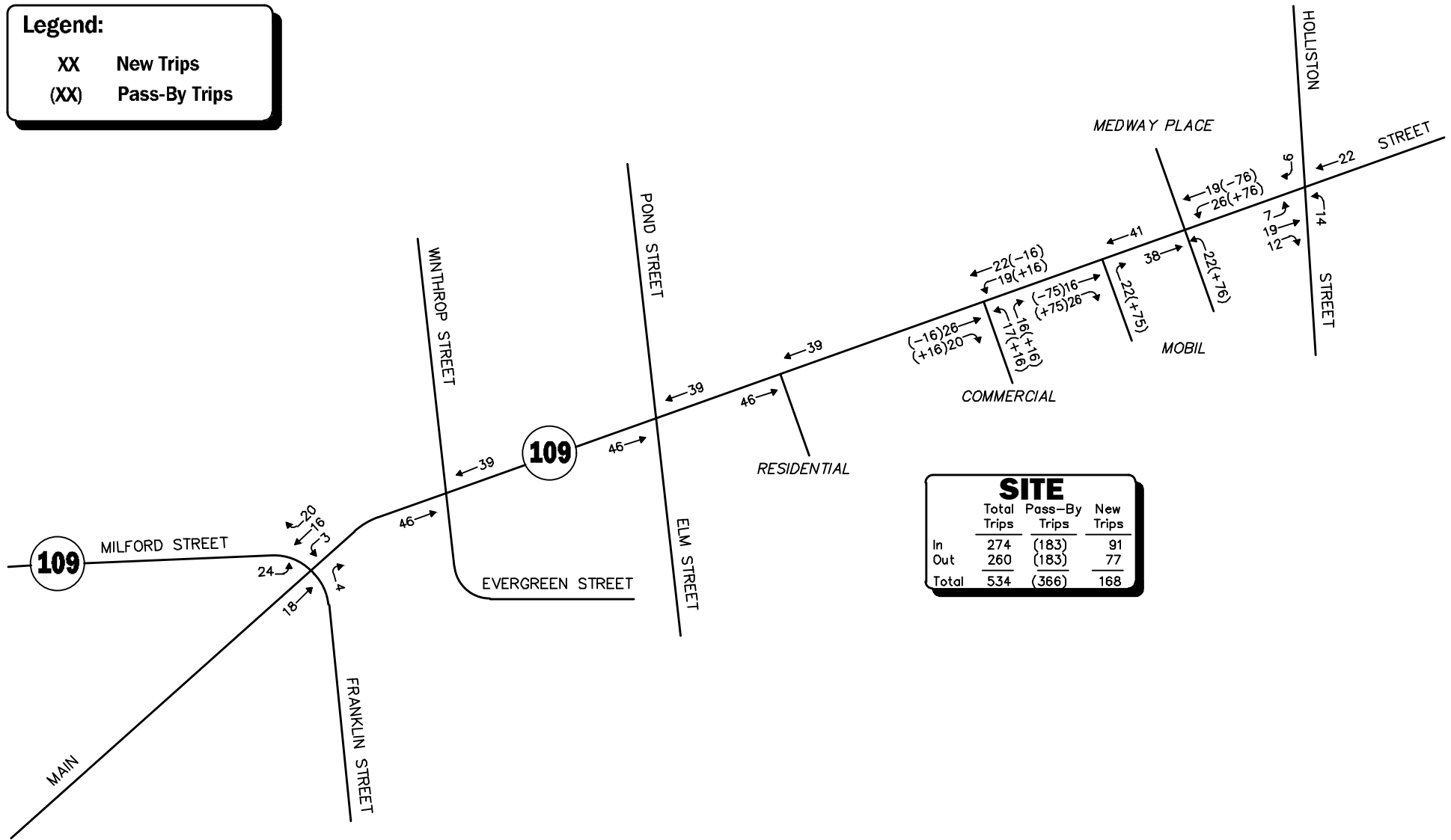
Vanasse & Associates inc

Figure 13

**Residential Site-Generated Trips
Saturday MIDDAY
Peak-Hour Traffic Volumes**

Legend:

XX New Trips
(XX) Pass-By Trips



Not to scale.

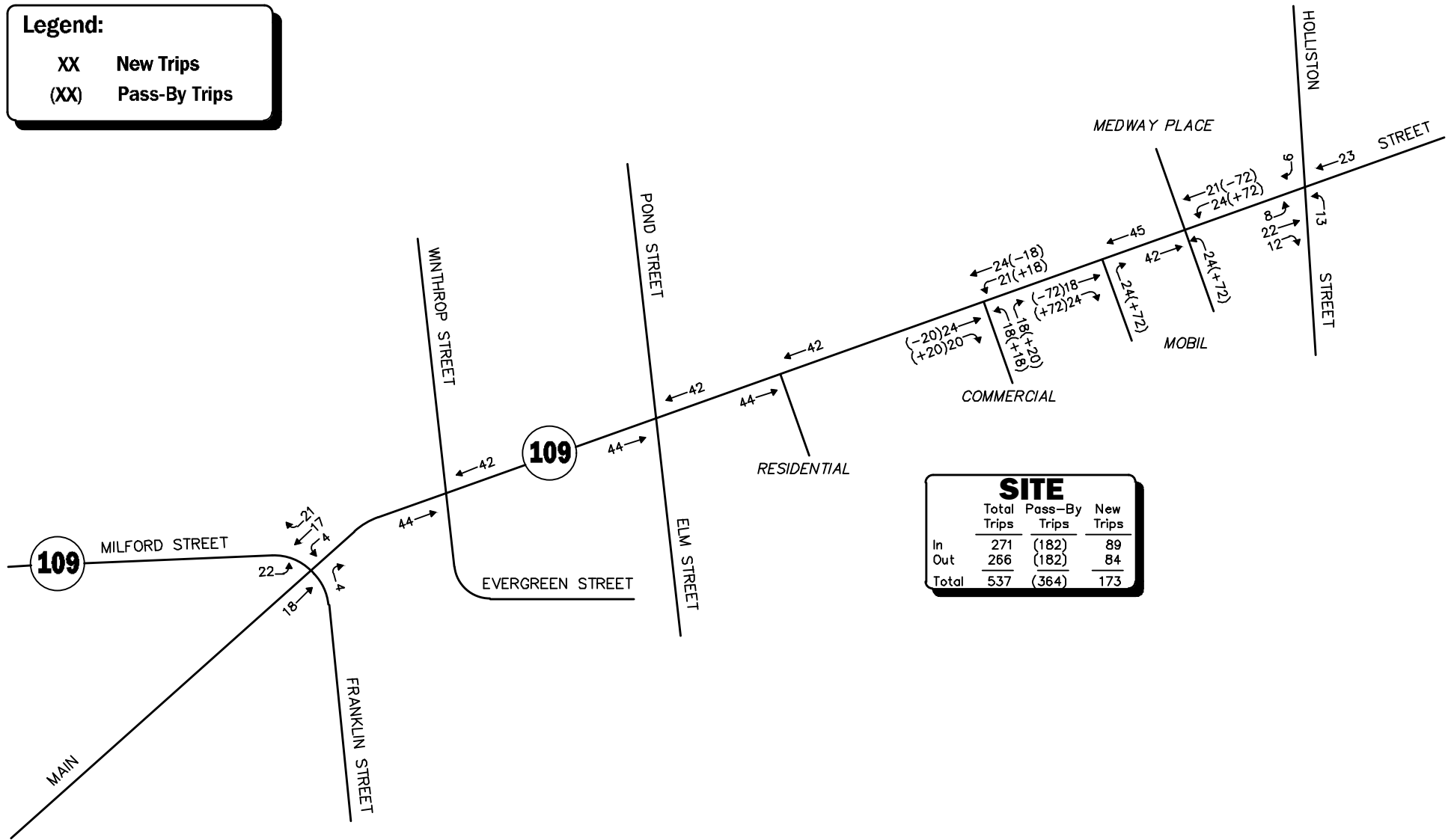
VA Vanasse & Associates inc

Figure 14

**Commercial Site-Generated Trips
Weekday Morning
Peak-Hour Traffic Volumes**

Legend:

XX New Trips
(XX) Pass-By Trips



Not to scale.

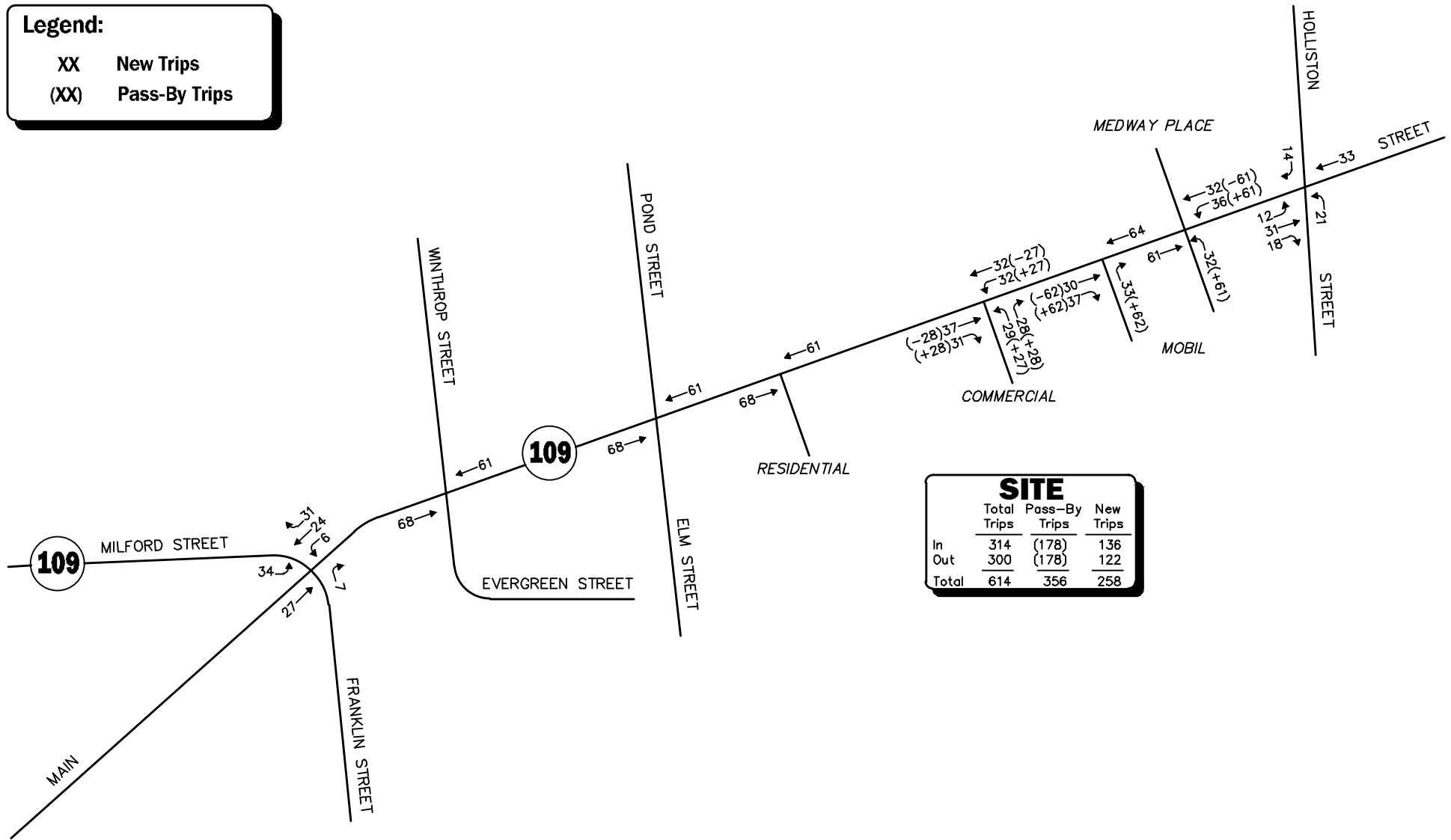
VA Vanasse & Associates inc

Figure 15

**Commercial Site-Generated Trips
Weekday Evening
Peak-Hour Traffic Volumes**

Legend:

XX New Trips
(XX) Pass-By Trips

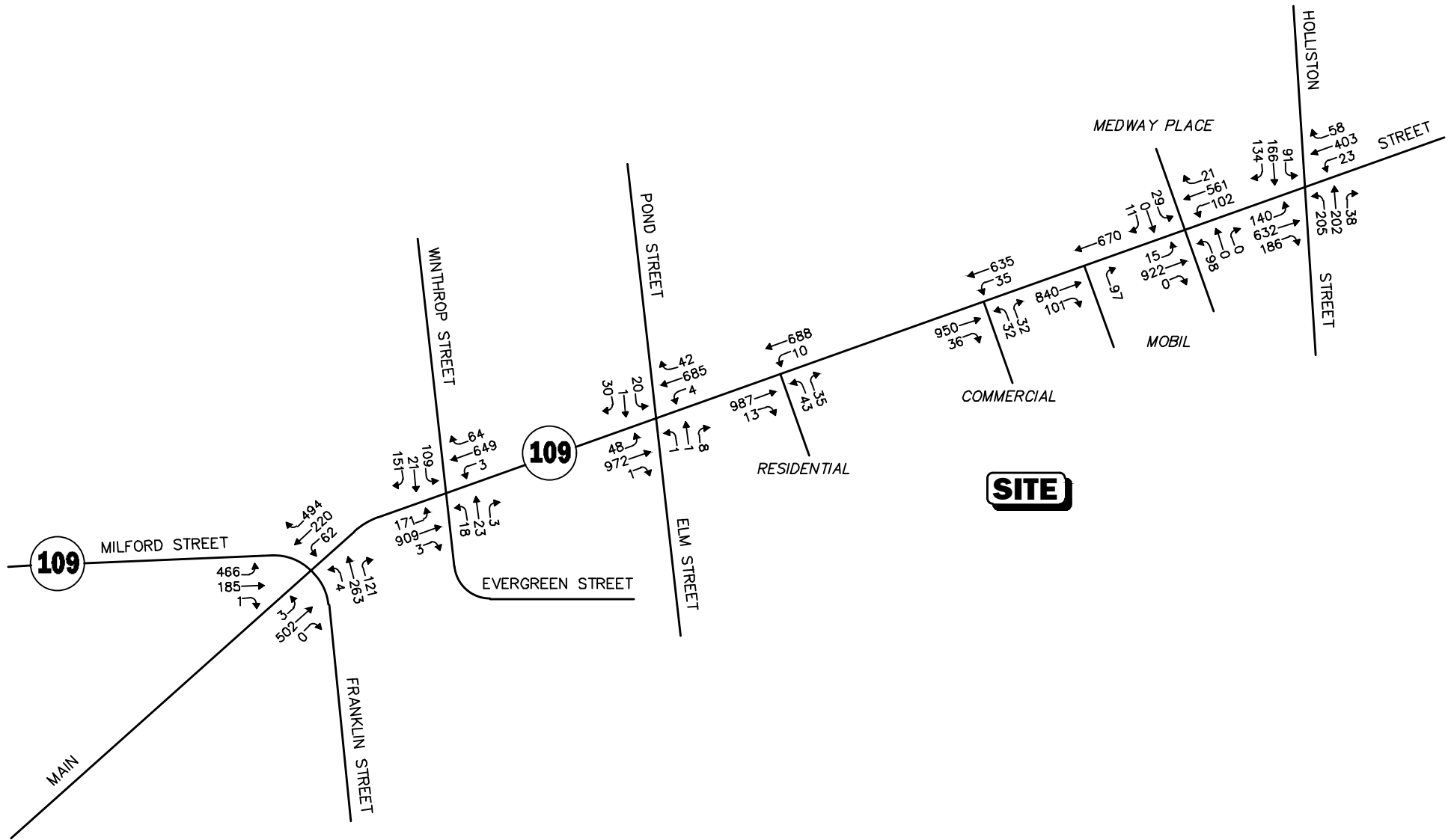


Not to scale.

VA Vanasse & Associates inc

Figure 16

**Commercial Site-Generated Trips
Saturday Midday
Peak-Hour Traffic Volumes**



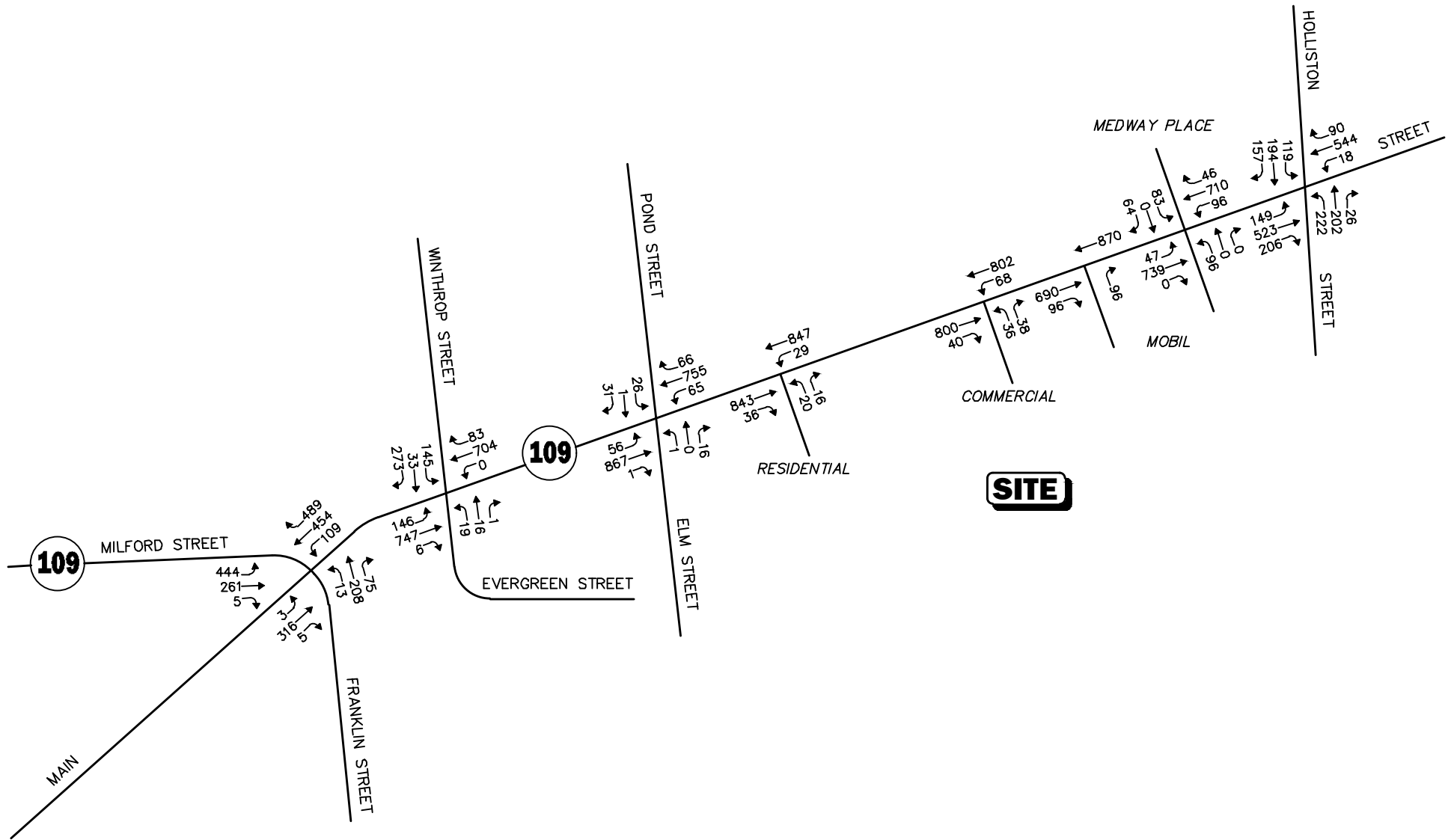
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 17

2032 Build
Weekday Morning
Peak-Hour Traffic Volumes



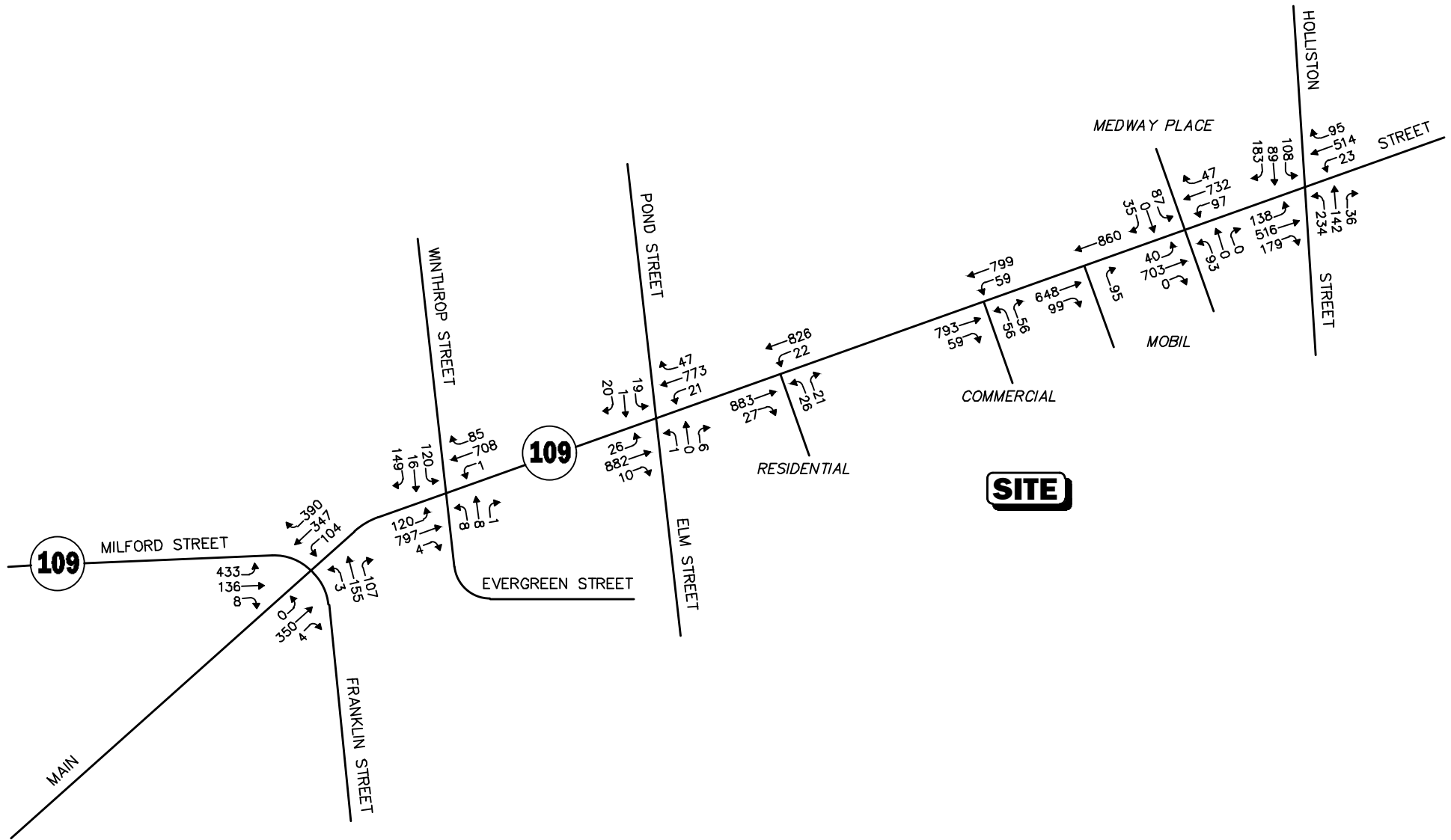
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to scale.



Figure 18

2032 Build
Weekday Evening
Peak-Hour Traffic Volumes



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

Not to scale.



Figure 19

2032 Build
Saturday Midday
Peak-Hour Traffic Volumes

Table 8
PEAK-HOUR TRAFFIC-VOLUME INCREASES

Location/Peak Hour	2032 No-Build	2032 Build	Traffic-Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Milford Street, north of Main Street:</i>				
Weekday Morning	1,345	1,412	67	4.7
Weekday Evening	1,356	1,410	54	3.8
Saturday Midday	1,059	1,122	63	5.6
<i>Holliston Street, south of Main Street:</i>				
Weekday Morning	796	820	24	3.0
Weekday Evening	850	868	18	2.1
Saturday Midday	683	703	20	2.9
<i>Main Street, east of Holliston Street:</i>				
Weekday Morning	1,194	1,245	51	4.3
Weekday Evening	1,275	1,320	45	3.5
Saturday Midday	1,250	1,292	42	3.3
<i>Main Street, west of Milford Street:</i>				
Weekday Morning	703	730	27	3.8
Weekday Evening	767	796	29	3.8
Saturday Midday	687	712	25	3.6

As shown in Table 8, Project-related traffic-volume increases external to the study area relative to 2032 No-Build conditions are anticipated to range from 18 to 67 vehicles, or 2.1 to 5.6 percent, during the peak periods.

PARKING DEMAND

The surface lot will accommodate approximately 490 parking spaces, including 14 accessible spaces and 11 EV charging spaces.

To determine the projected parking demand for the Project and confirm whether adequate parking will be provided for residents and visitors, a parking demand analysis was conducted. The analysis evaluates the proposed parking supply and compares it with the spaces required by local zoning regulations. The analysis determines the proposed demand using ITE ratios provided by the ITE *Parking Generation* manual.⁸

Parking demand was determined by using the Town of Medway Zoning Bylaws.⁹ Table 9 summarizes and compares the ITE parking demand data, local zoning requirements, and the proposed parking supply.

As shown in Table 9 below, this proposed supply exceeds the requirement specified by the Town of Medway Zoning Code and the ITE expected peak-parking demand. We conclude that the proposed 490 parking spaces will adequately accommodate peak demand from residents and customers.

⁸*Parking Demand*, 6th Edition, Institute of Transportation Engineers, Washington D.C., 2023.

⁹Town of Medway, Zoning Bylaw & Map, Section 7.1.1 Off-Street Parking and Loading, November 2024.

Table 9
PEAK-PARKING DEMAND

Land Use/units counts		Proposed Parking Supply (Spaces)	Medway Zoning Ordinance ^a		Peak-Parking Demand ITE	
			Supply Ratio	Supply (Spaces)	Parking Average Rate	Parking Demand
<i>Residential:</i>						
Multi-Family Units	267		1.5	401	1.23 ^b	328
<i>Commercial:</i>						
Restaurant	10 employees/75 seats/3,500 sf		1 space/employee + 1 space/3 seats	35	7.51 ^c	26
Bank	2,000 sf		1 space/300 sf	7	3.40 ^d	7
Convenience Store	5,400		1 space/300 sf	18	8.21 ^e	44
Fueling Station	20		1 space/vfp	20		
TOTAL		490		481	--	405

^aBased on Zoning Bylaw & Map, Section 7.1.1 Off-Street Parking and Loading, Table 3.

^bBased on ITE *Parking Generation*, 6th Ed LUC 221, *Multifamily Housing*.

^cBased on ITE *Parking Generation*, 6th Ed LUC 934, *Fast Food Restaurant with Drive-Through*.

^dBased on ITE *Parking Generation*, 6th Ed LUC 912, *Drive-In Bank*.

^eBased on ITE *Parking Generation*, 6th Ed LUC 945, *Convenience Store/Gas Station*.

DRIVE-THROUGH ANALYSIS

The fast-food restaurant and bank proposed as part of the Project will both contain drive-through windows that serve mobile-order customers only. To assess potential vehicle queuing associated with the proposed drive-through window facilities, a statistical vehicle queuing analysis was performed. This analysis was based on the anticipated operating characteristics of the Project, which include: i) the maximum number of customers served during the peak hour (calculated to be 27 vehicles during the Saturday midday peak hour for the fast-food restaurant and 16 vehicles for the bank)¹⁰ and ii) the processing rate, or time between arrival and departure of the customer vehicle (expected to be approximately two (2) minutes).

Assuming random arrivals and a process rate of two minutes per customer during the peak hours results in a theoretical 95th percentile vehicle queue of up to 16 vehicles for the fast-food and 4 vehicles for the bank. Given that the proposed fast-food drive-through facility can accommodate up to 21 vehicles in queue measured from the pick-up window to the end of the drive-through lane and the bank can accommodate 8 vehicles, the proposed design for both drive-throughs is sufficient to accommodate the theoretical 95th percentile vehicle queue without inhibiting circulation within the Project site or the movement of vehicles, pedestrians, or bicyclists.

The detailed statistical analysis is provided in the Appendix.

¹⁰ Assumed to be 30 percent of the entering trips associated with the restaurant and 60 percent of the entering trips associated with the bank during the Saturday midday peak hour. See Appendix for detailed calculations.

SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the four new site driveway intersections with Main Street in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)¹¹ recommendations. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance recommended to be provided by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD is the sight distance recommended to be provided by a driver entering or crossing an intersecting roadway to perceive an oncoming vehicle and safely complete a turning or crossing maneuver with oncoming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the recommended SSD value for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. Table 10 presents the measured SSD and ISD at the subject intersections.

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

Table 10
SIGHT DISTANCE ANALYSIS^a

Intersection/Sight Distance Measurement	Recommended Minimum Distances (Feet) ^b	Desirable Distances (Feet)	Measured
Main Street at Residential Site Driveway (A)			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	250	--	500+
Main Street approaching from the west	250	--	500+
<i>Intersection Sight Distance^c:</i>			
Looking to the east from Site Driveway A	250	390	500+
Looking to the west from Site Driveway A	250	390	500+
Main Street at Residential/Commercial Site Driveway (B)			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	250	--	500+
Main Street approaching from the west	250	--	500+
<i>Intersection Sight Distance^c:</i>			
Looking to the east from Site Driveway B	250	390	500+
Looking to the west from Site Driveway B	250	390	500+
Main Street at Convenience Store/Gas Station Site Driveway (C)			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	250	--	500+
Main Street approaching from the west	250	--	500+
<i>Intersection Sight Distance^c:</i>			
Looking to the east from Site Driveway C	250	390	500+
Looking to the west from Site Driveway C	250	390	500+

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018.

^bBased on the Posted Speed on Main Street, 35 mph in both directions.

^cValues shown are the intersection sight distance for a vehicle turning left, exiting a roadway under STOP control.

As shown in Table 10, the sight distance at all site driveway intersections with Main Street exceeded the recommended and desirable values for SSD and ISD. This is based on a 35 mph speed limit.

TRAFFIC OPERATIONS ANALYSIS

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

METHODOLOGY

Levels of Service

A primary result of capacity analysis is the assignment of level of service to traffic facilities under various traffic-flow conditions.¹² The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

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

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

Signalized Intersections

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

¹²The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

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

Levels of service for signalized intersections were calculated using the Percentile Delay Method implemented as a part of the Synchro™ 12 software as required by MassDOT. The Percentile Delay Method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on “percentile” delay. Level-of-service designations are based on the criterion of percentile delay per vehicle and are a measure of: i) driver discomfort; ii) motorist frustration; and iii) fuel consumption; and include a uniform delay based on percentile volumes using a Poisson arrival pattern, an initial queue move-up time, and a queue interaction delay that accounts for delays resulting from queues extending from adjacent intersections. Table 11 summarizes the relationship between level-of-service and percentile delay and uses the same numerical delay thresholds as the HCM method. The tabulated percentile delay criterion may be applied to assign level-of-service designations to individual lane groups, individual intersection approaches, or entire intersections.

Table 11
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS^a

Level of Service	Percentile Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

^aSource: Highway Capacity Manual; Transportation Research Board; Washington, DC; 2000; page 16-2.

Unsignalized Intersections

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

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

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 7th Edition*. Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 7th Edition*. Table 12 summarizes the relationship between level of service and average control delay.

Table 12
LEVEL-OF-SERVICE CRITERIA FOR
UNSIGNALIZED INTERSECTIONS^a

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

^aSource: *Highway Capacity Manual 7th Edition*; Transportation Research Board; Washington, DC; 2022; page 20-6.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2025 Existing, 2032 No-Build, and 2032 Build conditions for the study area intersections. The intersection capacity analysis results within the study area are described below, with a tabular summary provided in Tables 13 and 14.

Signalized Intersections

Main Street at Franklin Street and Milford Street

Under 2025 Existing and 2032 No-Build conditions, this intersection operates at an overall LOS D during the weekday morning peak hour and LOS C during the weekday evening and Saturday midday peak hour. Under the Build conditions, the weekday evening and Saturday midday peak hours experience a change in overall level of service from LOS C to D. The increase in overall intersection delay due to Project-generated traffic is less than 3.5 seconds, with additional vehicle queuing of up to 3 vehicles for any given movement.

Main Street at Winthrop Street and Evergreen Street

Under 2025 Existing and 2032 No-Build conditions, this intersection operates at an overall LOS C for all analysis periods. Under the Build conditions, the overall LOS changes from C to D during the weekday morning peak hour and retains LOS C during the weekday evening and Saturday midday peak hours. The increases in overall intersection delay due to Project-generated traffic are at most 5.0 seconds, with the largest increase occurring on westbound movements. Additional vehicle queuing of up to 6 vehicles per movement.

Main Street at Medway Place and Project Site Driveway

Under 2025 Existing and 2032 No-Build conditions, this intersection operates at an overall LOS B during the weekday morning and evening peak hours and LOS C during the Saturday midday peak hour. Under the Build conditions, LOS for all analysis periods changes from LOS B to C. The increases in overall intersection delay due to Project-generated traffic are 9 seconds or less during the respective peak hours, with the majority of the delay attributable to the reconstructed site driveway. Vehicle queuing on the Main Street approaches is anticipated to increase by no more than 4 vehicles during any analysis period.

Main Street at Holliston Street

Under 2025 Existing and 2032 No-Build conditions, this intersection operates at an overall LOS C. Under the Build conditions, no overall change to the level of service occurs for the weekday morning and Saturday midday peak hours, while the weekday evening peak hour changes from LOS C to D. The increases in overall delay due to Project-generated traffic are less than 6.5 seconds. Vehicle queuing on the Main Street approaches is anticipated to increase by no more than 2 vehicles during any analysis period.

Table 13
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Franklin Street and Milford Street												
<i>Weekday Morning:</i>												
Main Street EB LT/TH/RT	0.86	59.7	E	367/736	0.94	68.1	E	420/925	0.96	72.2	E	434/947
Main Street WB LT	0.30	32.9	C	30/81	0.33	32.8	C	31/87	0.35	33.5	C	3/90
Main Street WB TH	0.26	30.7	C	92/198	0.32	30.5	C	116/258	0.35	31.1	C	129/281
Main Street WB RT	0.43	2.3	A	0/34	0.45	2.3	A	0/36	0.49	2.5	A	0/37
Franklin Street NB LT/TH/RT	0.85	56.9	E	317/528	0.86	59.3	E	293/603	0.86	59.0	E	296/610
Milford Street SB LT	1.02	74.1	E	257/665	1.10	>80	F	335/783	1.14	>80	F	370/830
Milford Street SB TH/RT	0.21	18.9	B	78/178	0.22	19.4	B	82/190	0.22	19.3	B	82/190
Overall	--	44.1	D	--	--	51.1	D	--	--	54.6	D	--
<i>Weekday Evening:</i>												
Main Street EB LT/TH/RT	0.72	50.2	D	153/371	0.81	55.0	E	187/470	0.87	61.3	E	205/518
Main Street WB LT	0.43	29.3	C	48/112	0.44	29.6	C	45/122	0.47	30.4	C	46/123
Main Street WB TH	0.72	36.5	D	226/425	0.74	37.3	D	245/587	0.75	37.7	D	249/597
Main Street WB RT	0.46	1.9	A	0/13	0.44	1.8	A	0/27	0.45	1.9	A	0/27
Franklin Street NB LT/TH/RT	0.90	68.5	E	174/462	0.96	>80	F	184/491	0.96	>80	F	185/493
Milford Street SB LT	0.78	33.3	C	186/474	0.80	35.6	D	188/531	0.87	42.3	D	218/604
Milford Street SB TH/RT	0.30	16.7	B	92/220	0.31	17.0	B	90/235	0.31	17.0	B	90/235
Overall	--	31.2	C	--	--	34.9	C	--	--	37.2	D	--
<i>Saturday Midday:</i>												
Main Street EB LT/TH/RT	0.74	48.6	D	180/451	0.90	65.3	E	216/541	0.94	71.5	E	227/570
Main Street WB LT	0.38	28.3	C	39/107	0.45	30.0	C	43/116	0.45	30.1	C	44/118
Main Street WB TH	0.50	29.6	C	141/321	0.55	30.9	C	166/371	0.57	31.4	C	173/385
Main Street WB RT	0.32	1.5	A	0/24	0.34	1.5	A	0/24	0.37	1.6	A	0/25
Franklin Street NB LT/TH/RT	0.76	50.9	D	144/388	0.84	59.1	E	153/414	0.84	59.9	E	154/416
Milford Street SB LT	0.67	25.2	C	133/398	0.78	33.2	C	176/513	0.84	38.9	D	204/581
Milford Street SB TH/RT	0.15	15.6	B	40/117	0.17	15.9	B	45/129	0.17	15.9	B	45/129
Overall	--	28.6	C	--	--	34.6	C	--	--	36.8	D	--

See notes at end of table.

Table 13 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Winthrop Street and Evergreen Street												
<i>Weekday Morning:</i>												
Main Street EB LT	0.32	9.8	A	28/121	0.38	13.0	B	25/127	0.40	13.3	B	25/127
Main Street EB TH/RT	0.70	16.8	B	230/930	0.82	23.4	C	255/1155	0.84	27.1	C	274/1219
Main Street WB LT/TH/RT	0.74	30.6	C	248/837	0.87	42.8	D	290/1039	0.96	54.3	D	344/1179
Evergreen Street NB LT/TH/RT	0.21	37.4	D	27/72	0.20	42.9	D	21/76	0.20	42.9	D	21/76
Winthrop Street SB LT/TH	0.60	48.1	D	77/176	0.61	54.7	D	67/189	0.61	54.7	D	67/189
Winthrop Street SB RT	0.26	3.1	A	0/16	0.25	3.3	A	0/28	0.25	3.3	A	0/28
Overall	--	22.2	C	--	--	30.5	C	--	--	35.5	D	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.44	17.7	B	27/131	0.45	18.1	B	27/139	0.46	18.3	B	27/139
Main Street EB TH/RT	0.57	14.1	B	180/586	0.62	14.9	B	198/684	0.67	16.1	B	223/772
Main Street WB LT/TH/RT	0.90	40.5	D	363/986	0.96	49.9	D	405/1188	0.99	55.7	E	425/1238
Evergreen Street NB LT/TH/RT	0.14	35.5	D	19/62	0.13	35.6	D	16/62	0.13	35.5	D	16/62
Winthrop Street SB LT/TH	0.69	49.6	D	101/271	0.71	52.2	D	96/298	0.71	51.9	D	95/299
Winthrop Street SB RT	0.38	3.2	A	0/24	0.37	3.2	A	0/35	0.37	3.2	A	0/35
Overall	--	25.8	C	--	--	29.8	C	--	--	32.2	C	--
<i>Saturday Midday:</i>												
Main Street EB LT	0.24	9.0	A	15/87	0.28	9.4	A	17/91	0.29	9.5	A	17/91
Main Street EB TH/RT	0.57	13.0	B	137/643	0.64	14.4	B	169/758	0.68	15.5	B	190/908
Main Street WB LT/TH/RT	0.77	28.2	C	255/918	0.89	36.7	D	331/1133	0.94	42.8	D	362/1218
Evergreen Street NB LT/TH/RT	0.10	34.0	C	11/31	0.07	34.6	C	8/36	0.07	34.6	C	8/36
Winthrop Street SB LT/TH	0.61	48.5	D	64/178	0.62	48.6	D	68/189	0.62	48.4	D	67/189
Winthrop Street SB RT	0.23	3.6	A	0/27	0.24	3.5	A	0/28	0.24	3.5	A	0/28
Overall	--	28.6	C	--	--	24.5	C	--	--	27.4	C	--

See notes at end of table.

Table 13 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at the Mobil Gas Station/Gas Station East Dwy and Medway Place												
<i>Weekday Morning:</i>												
Main Street EB LT	0.03	5.4	A	1/13	0.03	5.3	A	1/13	0.03	6.3	A	2/14
Main Street EB TH/RT	0.58	12.2	B	99/822	0.65	13.3	B	124/963	0.84	25.7	C	409/1058
Main Street WB LT	0.00	6.0	A	0/4	0.00	6.0	A	0/4	0.43	14.9	B	11/79
Main Street WB TH/RT	0.42	10.1	B	53/431	0.50	11.7	B	70/629	0.49	12.8	B	88/549
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.03	0.3	A	0/0	0.02	0.0	A	0/0	0.64	56.3	E	60/122
Medway Place SB LT/TH	0.28	44.6	D	20/44	0.26	44.1	D	18/45	0.18	38.3	D	17/44
Medway Place SB RT	0.04	0.3	A	0/0	0.04	0.2	A	0/0	0.03	0.2	A	0/0
Overall	--	11.9	B	--	--	13.0	B	--	--	22.4	C	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.14	6.7	A	5/32	0.15	6.9	A	5/32	0.13	6.9	A	5/32
Main Street EB TH/RT	0.55	13.3	B	117/631	0.57	13.5	B	120/743	0.66	18.9	B	250/788
Main Street WB LT	0.01	7.3	A	1/6	0.01	7.3	A	1/6	0.26	7.3	A	10/57
Main Street WB TH/RT	0.64	18.2	B	234/760	0.72	20.2	C	291/891	0.68	19.1	B	261/823
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.11	25.2	C	7/26	0.11	25.4	C	6/28	0.65	56.6	E	59/111
Medway Place SB LT/TH	0.63	56.4	E	53/100	0.62	55.6	E	51/99	0.49	46.2	D	49/94
Medway Place SB RT	0.16	5.6	A	0/25	0.16	5.4	A	0/24	0.16	5.4	A	0/24
Overall	--	17.3	B	--	--	18.3	B	--	--	20.8	C	--
<i>Saturday Middy:</i>												
Main Street EB LT	0.13	8.0	A	4/32	0.13	7.5	A	3/30	0.12	7.5	A	3/30
Main Street EB TH/RT	0.58	15.2	B	105/659	0.56	14.3	B	92/716	0.71	22.1	C	212/808
Main Street WB LT	0.02	8.4	A	1/10	0.02	7.6	A	1/10	0.25	7.9	A	9/61
Main Street WB TH/RT	0.74	23.5	C	232/847	0.79	23.9	C	284/966	0.73	21.4	C	256/898
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.11	19.4	B	5/23	0.09	20.9	C	4/28	0.49	38.0	D	37/110
Medway Place SB LT/TH	0.58	40.6	D	44/96	0.50	38.3	D	35/102	0.43	35.4	D	34/102
Medway Place SB RT	0.09	2.6	A	0/4	0.07	1.5	A	0/6	0.07	1.5	A	0/6
Overall	--	20.1	C	--	--	19.9	B	--	--	21.8	C	--

See notes at end of table.

Table 13 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Holliston Street												
<i>Weekday Morning:</i>												
Main Street EB LT	0.34	17.5	B	35/99	0.45	20.8	C	41/113	0.51	23.3	C	45/142
Main Street EB TH	0.67	29.7	C	200/660	0.82	36.7	D	265/802	0.87	41.1	D	293/851
Main Street EB RT	0.16	2.6	A	1/24	0.18	3.4	A	5/32	0.19	3.6	A	7/36
Main Street WB LT	0.08	16.0	B	6/26	0.10	16.6	B	6/27	0.10	16.7	B	7/27
Main Street WB TH	0.57	31.8	C	165/404	0.69	36.3	D	204/497	0.74	38.8	D	220/522
Main Street WB RT	0.07	0.1	A	0/0	0.07	0.2	A	0/0	0.07	0.2	A	0/0
Holliston Street NB LT	0.56	31.3	C	81/155	0.58	31.7	C	85/190	0.60	32.1	C	89/205
Holliston Street NB TH/RT	0.63	41.0	D	130/300	0.62	40.2	D	132/324	0.61	39.5	D	131/324
Holliston Street SB LT	0.31	24.4	C	34/80	0.33	24.3	C	37/85	0.32	24.0	C	36/85
Holliston Street SB TH	0.59	45.0	D	90/189	0.63	46.9	D	98/207	0.64	47.7	D	98/207
Holliston Street SB RT	0.22	4.6	A	0/34	0.24	5.5	A	0/43	0.25	5.4	A	0/44
Overall	--	27.3	C	--	--	30.2	C	--	--	32.0	C	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.57	27.0	C	50/136	0.57	26.9	C	49/162	0.57	27.2	C	51/164
Main Street EB TH	0.71	32.7	C	213/570	0.71	32.5	C	218/655	0.75	35.0	C	233/677
Main Street EB RT	0.20	2.4	A	2/21	0.19	2.6	A	2/27	0.20	2.7	A	3/29
Main Street WB LT	0.07	17.2	B	5/23	0.08	17.1	B	6/23	0.08	17.3	B	6/23
Main Street WB TH	0.87	49.8	D	263/573	0.96	63.9	E	316/668	1.06	>80	F	377/709
Main Street WB RT	0.11	1.1	A	0/7	0.11	1.2	A	0/8	0.12	1.2	A	0/8
Holliston Street NB LT	0.62	31.8	C	89/204	0.62	32.3	C	86/228	0.62	31.6	C	89/247
Holliston Street NB TH/RT	0.60	39.0	D	122/268	0.60	39.4	D	118/295	0.56	37.7	D	116/295
Holliston Street SB LT	0.40	24.4	C	45/99	0.40	24.7	C	45/105	0.38	24.0	C	44/105
Holliston Street SB TH	0.69	49.3	D	110/224	0.69	49.3	D	111/243	0.69	49.3	D	111/243
Holliston Street SB RT	0.26	5.1	A	0/40	0.27	5.1	A	0/47	0.27	5.1	A	0/47
Overall	--	31.5	C	--	--	35.0	C	--	--	41.3	D	--
<i>Saturday Midday:</i>												
Main Street EB LT	0.37	17.2	B	34/112	0.42	17.8	B	35/120	0.46	18.6	B	37/123
Main Street EB TH	0.58	26.0	C	161/604	0.61	26.4	C	172/676	0.64	26.9	C	182/710
Main Street EB RT	0.15	3.0	A	4/33	0.16	3.2	A	5/38	0.16	3.3	A	6/41
Main Street WB LT	0.06	15.5	B	5/28	0.07	15.2	B	6/31	0.07	15.3	B	6/31
Main Street WB TH	0.76	37.6	D	233/606	0.82	40.6	D	259/693	0.86	43.9	D	277/739
Main Street WB RT	0.11	2.6	A	0/19	0.11	2.7	A	0/20	0.11	2.7	A	0/20
Holliston Street NB LT	0.68	37.7	D	112/218	0.63	35.3	D	100/269	0.66	36.8	D	106/297
Holliston Street NB TH/RT	0.66	46.1	D	109/196	0.61	44.0	D	95/213	0.61	44.0	D	95/213
Holliston Street SB LT	0.40	29.0	C	47/111	0.37	28.4	C	45/119	0.37	28.4	C	45/119
Holliston Street SB TH	0.32	38.4	D	49/111	0.32	38.8	D	47/119	0.32	38.8	D	47/119
Holliston Street SB RT	0.32	5.4	A	0/38	0.32	5.4	A	0/53	0.33	5.4	A	0/53
Overall	--	27.3	C	--	--	27.4	C	--	--	28.5	C	--

^aVolume-to-capacity ratio. ^bControl (signal) delay per vehicle in seconds. ^cLevel of service. ^dQueue length in feet.

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

Unsignalized Intersections

Main Street at Elm Street and Pond Street

Under 2025 Existing conditions, the minor street approaches at this intersection operate at LOS D and E during the weekday morning peak hour and LOS C and F during the evening and Saturday midday peak hours. Under the 2032 No-Build conditions, Pond Street's weekday morning peak-hour operation changes to LOS D. All other movements during their respective peak hours are unchanged. Under the Build conditions, Elm Street's level of service changes from LOS D to E during the weekday morning peak hour and from LOS C to D during the Saturday midday peak hour. The weekday evening peak-hour LOS remains at C and F with or without the Project. Queues are expected to increase by no more than 1 vehicle due to Project-generated traffic.

Main Street at Project Residential Driveway Entrance

Under the Build conditions, the level of service for the driveway exit is anticipated to be LOS F during all peak periods. This delay results in a queue of up to 4 vehicles during any given analysis period, which is contained within the driveway without negatively impacting site circulation. This level of service is consistent with that of the driveways under STOP control along Main Street.

Main Street at Project Commercial Driveway Entrance

Under the Build conditions, the level of service for the driveway exit is anticipated to be LOS F during all peak periods. This delay results in a queue of up to 8 vehicles during any given analysis period, all contained within the driveway without negatively impacting site circulation or commercial operations. This level of service is consistent with that of the driveways under STOP control along Main Street.

Main Street at Project Gas Station/Convenience Store Driveway Entrance

Under the Build conditions, the driveway exit is anticipated to be LOS C under all analysis periods. This delay is an improvement to that observed at the original 113 Main Street property under the 2025 Existing and 2032 No-Build conditions. The delay results in a queue of up to 2 vehicles during any given analysis period, which is contained within the driveway without negatively impacting site circulation or commercial business operations.

Table 14
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/ Critical Movement/Peak Hour	2025 Existing				2032 No-Build				2032 Build			
	Demand ^a	Delay ^b	LOS ^c	Queue ^d	Demand	Delay	LOS	Queue	Demand	Delay	LOS	Queue
Main Street at Elm Street and Pond Street												
<i>Weekday Morning:</i>												
Elm Street NB LT/TH/RT	9	27.8	D	10	10	34.9	D	8	10	40.0	E	8
Pond Street SB LT/TH/RT	44	37.8	E	30	51	70.1	F	60	51	94.1	F	73
<i>Weekday Evening:</i>												
Elm Street NB LT/TH/RT	16	20.7	C	10	17	21.0	C	5	17	22.9	C	8
Pond Street SB LT/TH/RT	46	114.4	F	90	50	>120	F	103	58	>120	F	115
<i>Saturday Midday:</i>												
Elm Street NB LT/TH/RT	7	23.4	C	5	7	24.5	C	3	7	27.2	D	3
Pond Street SB LT/TH/RT	37	77.5	F	68	39	69.4	F	48	39	88.3	F	55
Main Street at 117 Main Street Dwy/Residential Dwy												
<i>Weekday Morning:</i>												
Main Street WB Left	7	9.9	A	0	7	10.5	B	0	10	10.7	B	0
117 Main Street Dwy NB LT/RT	5	23.6	C	3	5	30.0	D	3	--	--	--	--
Residential Dwy NB LT/RT	--	--	--	--	--	--	--	--	78	91.7	F	100
<i>Weekday Evening:</i>												
Main Street WB Left	8	9.8	A	0	8	9.8	A	0	29	10.2	B	3
117 Main Street Dwy NB LT/RT	18	32.0	D	10	18	36.1	D	13	--	--	--	--
Residential Dwy NB LT/RT	--	--	--	--	--	--	--	--	36	56.0	F	38
<i>Saturday Midday:</i>												
Main Street WB Left	16	10.1	B	3	16	10.0	B	3	22	10.3	B	3
117 Main Street Dwy NB LT/RT	31	37.0	E	23	31	40.6	E	23	--	--	--	--
Residential Dwy NB LT/RT	--	--	--	--	--	--	--	--	47	64.8	F	53
Main Street at 115A Main Street Dwy/ Commercial Dwy												
<i>Weekday Morning:</i>												
Main Street WB Left	12	9.9	A	3	12	10.4	B	3	35	10.9	B	5
115A Main Street Dwy NB LT/RT	9	33.6	D	5	9	46.1	E	8	--	--	--	--
Commercial Dwy NB LT/RT	--	--	--	--	--	--	--	--	65	67.4	F	70
<i>Weekday Evening:</i>												
Main Street WB Left	17	9.8	A	3	17	9.8	A	3	68	10.4	B	8
115A Main Street Dwy NB LT/RT	19	49.4	E	18	19	59.1	F	23	--	--	--	--
Commercial Dwy NB LT/RT	--	--	--	--	--	--	--	--	74	89.3	F	95
<i>Saturday Midday:</i>												
Main Street WB Left	23	10.0	A	3	23	9.8	A	3	59	10.3	B	8
115A Main Street Dwy NB LT/RT	23	54.1	F	23	23	62.0	F	28	--	--	--	--
Commercial Dwy NB LT/RT	--	--	--	--	--	--	--	--	112	>120	F	178

See notes at end of table.

Table 14 (Continued)
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/ Critical Movement/Peak Hour	2025 Existing				2032 No-Build				2032 Build							
	Demand ^a	Delay ^b	LOS ^c	Queue ^d	Demand	Delay	LOS	Queue	Demand	Delay	LOS	Queue				
Main Street at 115A Main Street Exit-Only Dwy																
<i>Weekday Morning:</i>																
115A Main Street Exit-Only Dwy NB LT/RT	10	15.5	C	3	10	17.2	C	3	Intersection does not exist under Build condition							
<i>Weekday Evening:</i>																
115A Main Street Exit-Only Dwy NB LT/RT	20	15.2	C	5	20	15.4	C	5								
<i>Saturday Midday:</i>																
115A Main Street Exit-Only Dwy NB LT/RT	23	15.5	C	5	23	15.1	C	5								
Main Street at 113 Main Street Dwy/Gas Station Dwy																
<i>Weekday Morning:</i>																
113 Main Street Dwy NB LT/RT	1	15.1	C	0	1	16.7	C	0	--	--	--	--				
Gas Station Dwy NB LT/RT	--	--	--	--	--	--	--	--	97	22.7	C	38				
<i>Weekday Evening:</i>																
113 Main Street Dwy NB LT/RT	4	26.1	D	3	4	29.1	D	3	--	--	--	--				
Gas Station Dwy NB LT/RT	--	--	--	--	--	--	--	--	96	17.8	C	28				
<i>Saturday Midday:</i>																
113 Main Street Dwy NB LT/RT	1	14.3	B	0	2	14.1	B	0	--	--	--	--				
Gas Station Dwy NB LT/RT	--	--	--	--	--	--	--	--	95	16.8	C	25				

^aDemand in vehicles per hour.

^bDelay in seconds per vehicle.

^cLevel of service.

^d95th percentile queue length in feet.

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

RECOMMENDATIONS AND CONCLUSIONS

VAI has prepared this UTIA to identify traffic impacts associated with a mixed-use development to be located at 119 Main Street in Medway, Massachusetts. This study was prepared in accordance with MassDOT Guidelines for TIAs and was conducted in accordance with the standards of the traffic engineering and transportation planning professions for the preparation of such reports. Based on the results of this study, the following can be concluded:

- Two of the study intersections have crash rates that exceed the MassDOT district and statewide averages. A Roadway Safety Audit should be conducted at these two locations to identify any safety deficiencies.
- The Project is expected to generate 4,612 net new vehicle trips on an average weekday and 6,820 net new vehicle trips on an average Saturday (two-way, 24-hour volume), with 553 vehicle trips (244 entering and 309 exiting) during the weekday morning peak hour, 498 net new vehicle trips (274 entering and 224 exiting) during the weekday evening peak hour, and 516 vehicle trips (269 entering and 247 exiting) during the Saturday midday peak hour.
- Due to the retail components and their ability to pull vehicle trips from the adjacent passing traffic stream, not all of the above trips will be new to the area.
- Project-related traffic increases are projected to range from 18 to 67 vehicles during peak hours, with percentage increases ranging from 2.1 to 5.6 percent.
- The drive-through window facilities are appropriately designed to accommodate the predicted maximum vehicle queue without impeding access, circulation, or the movement of vehicles, pedestrians, or bicyclists;
- The sight distances at the site driveways with Main Street were found to exceed the recommended SSD and ISD values.
- The Project will not have a significant impact (increase) on motorist delays or vehicle queuing at intersection approaches compared to anticipated future conditions without the Project (No-Build conditions). Several movements at existing unsignalized intersections currently operate at LOS E or F, and this is likely to continue with or without the addition of Project-related traffic.

RECOMMENDATIONS

The following recommendations were developed as part of this evaluation and, where applicable, will be implemented in conjunction with the Project, subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the Project site will be provided via four access points. One access point will utilize the existing signal system at Medway Place. Two other access points will mirror the locations of the existing buildings along Main Street and will be full access. The final access point, to the gas station/convenience store, will be right-in/right-out due to its proximity to the signalized intersection. The following recommendations are offered with respect to the design and operation of the Project site driveways:

- All unsignalized driveways should be placed under STOP-sign control, with a painted STOP-bar included.
- It is recommended that a NO LEFT TURN (R3-2) sign be placed at the gas station/convenience store entrance to deter vehicles turning left onto Main Street.
- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current *Manual on Uniform Traffic Control Devices* (MUTCD).¹³
- The Main Street corridor should be restriped, where appropriate, to reconfigure the left-turn lanes between the commercial properties on the northern frontage and the Project driveways. As part of the restriping, a new crossing location for Main Street has been incorporated to connect the residential area to other commercial businesses across the street.
- Signs and landscaping installed as part of the Project within the intersection sight triangle areas should be designed and maintained so as not to restrict lines of sight.
- Snow accumulations (windrows) within sight triangle areas should be promptly removed where such accumulations would impede sightlines.

Transportation Demand Management (TDM) Plan

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented as a part of the Project:

- A “welcome packet” should be provided to residents and employees that details available public transportation services, walking alternatives, bicycling facilities, and commuter options.
- To encourage the use of public transportation, the property management team will make schedules available and post them in a centralized location for residents and employees.
- The property management team will provide information on available pedestrian facilities in the vicinity of the Project site. This information will be posted in a centralized location.

¹³ *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

Off-Site

Based on the peer-review comments, VAI has conducted additional analyses to identify potential benefits of signal retiming at each studied signalized intersection. The mitigated analysis focuses only on signal optimization within the existing geometry. Signal optimization was conducted to balance overall delays while maintaining through movements on Route 109. Additionally, the analysis was conducted with the Medway Place and Holliston Street intersections operating out of coordination, as the two intersections appear to be far enough apart to not warrant coordination. Table 15 shows the results of the mitigated analysis with signal optimization only.

Main Street at Milford Street and Franklin Street

The critical time period with the greatest increase in overall delay is the weekday morning peak hour. The addition of Project-generated traffic increases overall delay by approximately 3.5 seconds. Additionally, multiple movements are shown to be at capacity in the No-Build condition, with three competing movements operating at LOS E or F. As seen in the optimization, there is no significant benefit to changing the timings during the weekday morning peak hour. However, overall delay decreases relative to the No-Build condition during the weekday evening and Saturday midday peak hours. Additionally, delays can be balanced to remove an otherwise over-capacity movement in the weekday evening peak hour.

Main Street at Winthrop Street and Evergreen Street

The critical time period with the greatest increase in overall delay is the weekday morning peak hour. The addition of Project-generated traffic increases overall delay by 5.0 seconds. The introduction of Project-generated traffic also adds over 10 seconds of delay to the Route 109 westbound movement. As seen in the optimization, the intersection would reduce overall delay across all analysis time periods to levels lower than those observed in the No-Build conditions. This optimization greatly benefits the Route 109 through movements, at the cost of adding additional delay to the Winthrop Street and Evergreen Street approaches.

Main Street at Medway Place driveway and the Project Site Driveway

As noted in the results, the critical time period with the most overall delay is the weekday morning peak hour. The addition of Project-generated traffic increases delay by less than 11 seconds, primarily affecting the eastbound through movement. As shown in the optimization, there is no significant benefit to changing the timings without significantly impacting the Medway Place and Project site driveway approaches. The results show that even increasing the minor approaches' delays to LOS E does not substantially impact the Main Street through movements.

Main Street at Holliston Street

The critical time period with the most overall delay is the weekday evening peak hour. Independent of the Project, the westbound through approach to the intersection is predicted to operate at capacity (LOS E) with a v/c ratio of nearly 1.0. With the removal of coordination and the implementation of retiming, overall intersection operations improved by about 9.5 seconds compared to the Build unmitigated conditions, with no movement shown to operate at or over capacity. The signal also does not reduce overall delay during the weekday morning peak hour. This is mainly due to the removal of coordination, which minimizes stops for westbound vehicles during weekday morning peak hours.

Table 15
MITIGATED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Franklin Street and Milford Street												
<i>Weekday Morning:</i>												
Main Street EB LT/TH/RT	0.94	68.1	E	420/925	0.96	72.2	E	434/947	0.96	74.3	E	465/936
Main Street WB LT	0.33	32.8	C	31/87	0.35	33.5	C	3/90	0.35	33.2	C	35/89
Main Street WB TH	0.32	30.5	C	116/258	0.35	31.1	C	129/281	0.35	32.0	C	137/279
Main Street WB RT	0.45	2.3	A	0/36	0.49	2.5	A	0/37	0.48	2.2	A	0/31
Franklin Street NB LT/TH/RT	0.86	59.3	E	293/603	0.86	59.0	E	296/610	0.89	68.0	E	335/702
Milford Street SB LT	1.10	>80	F	335/783	1.14	>80	F	370/830	1.10	>80	F	397/851
Milford Street SB TH/RT	0.22	19.4	B	82/190	0.22	19.3	B	82/190	0.22	20.8	C	90/201
Overall	--	51.1	D	--	--	54.6	D	--	--	53.8	D	--
<i>Weekday Evening:</i>												
Main Street EB LT/TH/RT	0.81	55.0	E	187/470	0.87	61.3	E	205/518	0.81	55.3	E	212/507
Main Street WB LT	0.44	29.6	C	45/122	0.47	30.4	C	46/123	0.52	35.7	D	50/135
Main Street WB TH	0.74	37.3	D	245/587	0.75	37.7	D	249/597	0.78	41.6	D	273/633
Main Street WB RT	0.44	1.8	A	0/27	0.45	1.9	A	0/27	0.46	2.1	A	0/27
Franklin Street NB LT/TH/RT	0.96	>80	F	184/491	0.96	>80	F	185/493	0.81	55.2	E	186/458
Milford Street SB LT	0.80	35.6	D	188/531	0.87	42.3	D	218/604	0.85	37.1	D	198/578
Milford Street SB TH/RT	0.31	17.0	B	90/235	0.31	17.0	B	90/235	0.30	16.4	B	90/232
Overall	--	34.9	C	--	--	37.2	D	--	--	33.1	C	--
<i>Saturday MIDDAY:</i>												
Main Street EB LT/TH/RT	0.90	65.3	E	216/541	0.94	71.5	E	227/570	0.85	57.6	E	233/561
Main Street WB LT	0.45	30.0	C	43/116	0.45	30.1	C	44/118	0.54	36.9	D	47/130
Main Street WB TH	0.55	30.9	C	166/371	0.57	31.4	C	173/385	0.57	33.2	C	188/405
Main Street WB RT	0.34	1.5	A	0/24	0.37	1.6	A	0/25	0.37	1.7	A	0/24
Franklin Street NB LT/TH/RT	0.84	59.1	E	153/414	0.84	59.9	E	154/416	0.78	52.3	D	155/379
Milford Street SB LT	0.78	33.2	C	176/513	0.84	38.9	D	204/581	0.84	36.6	D	196/571
Milford Street SB TH/RT	0.17	15.9	B	45/129	0.17	15.9	B	45/129	0.17	15.5	B	46/128
Overall	--	34.6	C	--	--	36.8	D	--	--	33.5	C	--

See notes at end of table.

Table 15 (Continued)
MITIGATED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Winthrop Street and Evergreen Street												
<i>Weekday Morning:</i>												
Main Street EB LT	0.38	13.0	B	25/127	0.40	13.3	B	25/127	0.42	11.9	B	27/114
Main Street EB TH/RT	0.82	23.4	C	255/1155	0.84	27.1	C	274/1219	0.83	24.6	C	290/1169
Main Street WB LT/TH/RT	0.87	42.8	D	290/1039	0.96	54.3	D	344/1179	0.86	35.3	D	327/921
Evergreen Street NB LT/TH/RT	0.20	42.9	D	21/76	0.20	42.9	D	21/76	0.20	48.9	D	22/83
Winthrop Street SB LT/TH	0.61	54.7	D	67/189	0.61	54.7	D	67/189	0.61	59.5	E	71/249
Winthrop Street SB RT	0.25	3.3	A	0/28	0.25	3.3	A	0/28	0.28	5.3	A	0/42
Overall	--	30.5	C	--	--	35.5	D	--	--	28.4	D	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.45	18.1	B	27/139	0.46	18.3	B	27/139	0.52	15.8	B	26/121
Main Street EB TH/RT	0.62	14.9	B	198/684	0.67	16.1	B	223/772	0.63	13.6	B	217/731
Main Street WB LT/TH/RT	0.96	49.9	D	405/1188	0.99	55.7	E	425/1238	0.82	28.9	C	403/1064
Evergreen Street NB LT/TH/RT	0.13	35.6	D	16/62	0.13	35.5	D	16/62	0.16	44.5	D	22/68
Winthrop Street SB LT/TH	0.71	52.2	D	96/298	0.71	51.9	D	95/299	0.76	65.4	E	124/340
Winthrop Street SB RT	0.37	3.2	A	0/35	0.37	3.2	A	0/35	0.42	4.8	A	0/50
Overall	--	29.8	C	--	--	32.2	C	--	--	22.9	C	--
<i>Saturday Middy:</i>												
Main Street EB LT	0.28	9.4	A	17/91	0.29	9.5	A	17/91	0.28	8.3	A	20/86
Main Street EB TH/RT	0.64	14.4	B	169/758	0.68	15.5	B	190/908	0.64	13.6	B	229/802
Main Street WB LT/TH/RT	0.89	36.7	D	331/1133	0.94	42.8	D	362/1218	0.80	26.9	C	401/1079
Evergreen Street NB LT/TH/RT	0.07	34.6	C	8/36	0.07	34.6	C	8/36	0.07	43.2	D	10/40
Winthrop Street SB LT/TH	0.62	48.6	D	68/189	0.62	48.4	D	67/189	0.68	62.0	E	93/241
Winthrop Street SB RT	0.24	3.5	A	0/28	0.24	3.5	A	0/28	0.28	5.1	A	0/40
Overall	--	24.5	C	--	--	27.4	C	--	--	21.4	C	--

See notes at end of table.

Table 15 (Continued)
MITIGATED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at the Mobil Gas Station/Gas Station East Dwy and Medway Place												
<i>Weekday Morning:</i>												
Main Street EB LT	0.03	5.3	A	1/13	0.03	6.3	A	2/14	0.03	5.1	A	2/14
Main Street EB TH/RT	0.65	13.3	B	124/963	0.84	25.7	C	409/1058	0.88	26.8	C	409/1144
Main Street WB LT	0.00	6.0	A	0/4	0.43	14.9	B	11/79	0.40	9.3	A	11/66
Main Street WB TH/RT	0.50	11.7	B	70/629	0.49	12.8	B	88/549	0.49	10.6	B	88/493
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.02	0.0	A	0/0	0.64	56.3	E	60/122	0.67	64.4	E	58/148
Medway Place SB LT/TH	0.26	44.1	D	18/45	0.18	38.3	D	17/44	0.18	44.2	D	16/53
Medway Place SB RT	0.04	0.2	A	0/0	0.03	0.2	A	0/0	0.03	0.2	A	0/0
Overall	--	13.0	B	--	--	22.4	C	--	--	22.5	C	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.15	6.9	A	5/32	0.13	6.9	A	5/32	0.13	6.4	A	4/30
Main Street EB TH/RT	0.57	13.5	B	120/743	0.66	18.9	B	250/788	0.70	19.5	B	240/750
Main Street WB LT	0.01	7.3	A	1/6	0.26	7.3	A	10/57	0.26	7.1	A	9/53
Main Street WB TH/RT	0.72	20.2	C	291/891	0.68	19.1	B	261/823	0.72	20.1	B	250/783
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.11	25.4	C	6/28	0.65	56.6	E	59/111	0.57	45.9	E	43/129
Medway Place SB LT/TH	0.62	55.6	E	51/99	0.49	46.2	D	49/94	0.45	40.0	D	36/101
Medway Place SB RT	0.16	5.4	A	0/24	0.16	5.4	A	0/24	0.14	6.2	A	0/29
Overall	--	18.3	B	--	--	20.8	C	--	--	20.6	C	--
<i>Saturday Middy:</i>												
Main Street EB LT	0.13	7.5	A	3/30	0.12	7.5	A	3/30	0.12	6.4	A	4/26
Main Street EB TH/RT	0.56	14.3	B	92/716	0.71	22.1	C	212/808	0.66	18.5	B	221/698
Main Street WB LT	0.02	7.6	A	1/10	0.25	7.9	A	9/61	0.25	6.9	A	9/53
Main Street WB TH/RT	0.79	23.9	C	284/966	0.73	21.4	C	256/898	0.74	20.9	C	266/818
Mobil Gas Station/Gas Station East Dwy NB LT/TH/RT	0.09	20.9	C	4/28	0.49	38.0	D	37/110	0.55	45.2	D	42/126
Medway Place SB LT/TH	0.50	38.3	D	35/102	0.43	35.4	D	34/102	0.47	40.6	D	39/106
Medway Place SB RT	0.07	1.5	A	0/6	0.07	1.5	A	0/6	0.08	1.3	A	0/5
Overall	--	19.9	B	--	--	21.8	C	--	--	20.7	C	--

See notes at end of table.

Table 15 (Continued)
MITIGATED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th	V/C	Delay	LOS	Queue Avg/95 th
Main Street at Holliston Street												
<i>Weekday Morning:</i>												
Main Street EB LT	0.45	20.8	C	41/113	0.51	23.3	C	45/142	0.48	21.1	C	40/125
Main Street EB TH	0.82	36.7	D	265/802	0.87	41.1	D	293/851	0.89	41.6	D	263/883
Main Street EB RT	0.18	3.4	A	5/32	0.19	3.6	A	7/36	0.19	3.3	A	7/36
Main Street WB LT	0.10	16.6	B	6/27	0.10	16.7	B	7/27	0.10	15.4	B	6/28
Main Street WB TH	0.69	36.3	D	204/497	0.74	38.8	D	220/522	0.76	36.2	D	190/485
Main Street WB RT	0.07	0.2	A	0/0	0.07	0.2	A	0/0	0.07	0.4	A	0/2
Holliston Street NB LT	0.58	31.7	C	85/190	0.60	32.1	C	89/205	0.58	29.7	C	76/234
Holliston Street NB TH/RT	0.62	40.2	D	132/324	0.61	39.5	D	131/324	0.57	36.7	D	115/325
Holliston Street SB LT	0.33	24.3	C	37/85	0.32	24.0	C	36/85	0.31	25.3	C	31/99
Holliston Street SB TH	0.63	46.9	D	98/207	0.64	47.7	D	98/207	0.61	45.4	D	84/244
Holliston Street SB RT	0.24	5.5	A	0/43	0.25	5.4	A	0/44	0.25	6.5	A	0/51
Overall	--	30.2	C	--	--	32.0	C	--	--	30.9	C	--
<i>Weekday Evening:</i>												
Main Street EB LT	0.57	26.9	C	49/162	0.57	27.2	C	51/164	0.65	29.9	C	41/187
Main Street EB TH	0.71	32.5	C	218/655	0.75	35.0	C	233/677	0.69	28.7	C	191/672
Main Street EB RT	0.19	2.6	A	2/27	0.20	2.7	A	3/29	0.20	2.4	A	3/29
Main Street WB LT	0.08	17.1	B	6/23	0.08	17.3	B	6/23	0.06	15.0	B	5/24
Main Street WB TH	0.96	63.9	E	316/668	1.06	>80	F	377/709	0.90	46.6	D	279/709
Main Street WB RT	0.11	1.2	A	0/8	0.12	1.2	A	0/8	0.11	2.0	A	0/14
Holliston Street NB LT	0.62	32.3	C	86/228	0.62	31.6	C	89/247	0.71	37.1	D	90/257
Holliston Street NB TH/RT	0.60	39.4	D	118/295	0.56	37.7	D	116/295	0.61	39.9	D	114/286
Holliston Street SB LT	0.40	24.7	C	45/105	0.38	24.0	C	44/105	0.45	29.2	C	45/123
Holliston Street SB TH	0.69	49.3	D	111/243	0.69	49.3	D	111/243	0.73	53.3	D	104/289
Holliston Street SB RT	0.27	5.1	A	0/47	0.27	5.1	A	0/47	0.29	6.2	A	0/54
Overall	--	35.0	C	--	--	41.3	D	--	--	31.8	C	--
<i>Saturday Midday:</i>												
Main Street EB LT	0.42	17.8	B	35/120	0.46	18.6	B	37/123	0.52	22.1	C	35/130
Main Street EB TH	0.61	26.4	C	172/676	0.64	26.9	C	182/710	0.66	27.0	C	177/662
Main Street EB RT	0.16	3.2	A	5/38	0.16	3.3	A	6/41	0.16	2.3	A	2/26
Main Street WB LT	0.07	15.2	B	6/31	0.07	15.3	B	6/31	0.08	14.6	B	6/29
Main Street WB TH	0.82	40.6	D	259/693	0.86	43.9	D	277/739	0.83	39.0	D	249/666
Main Street WB RT	0.11	2.7	A	0/20	0.11	2.7	A	0/20	0.11	2.2	A	0/16
Holliston Street NB LT	0.63	35.3	C	100/269	0.66	36.8	D	106/297	0.59	31.3	C	96/264
Holliston Street NB TH/RT	0.61	44.0	D	95/213	0.61	44.0	D	95/213	0.54	37.4	D	83/199
Holliston Street SB LT	0.37	28.4	C	45/119	0.37	28.4	C	45/119	0.41	28.9	C	41/114
Holliston Street SB TH	0.32	38.8	D	47/119	0.32	38.8	D	47/119	0.36	40.2	D	45/118
Holliston Street SB RT	0.32	5.4	A	0/53	0.33	5.4	A	0/53	0.37	6.6	A	0/58
Overall	--	27.4	C	--	--	28.5	C	--	--	26.5	C	--

^aVolume-to-capacity ratio. ^bControl (signal) delay per vehicle in seconds. ^cLevel of service. ^dQueue length in feet.

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

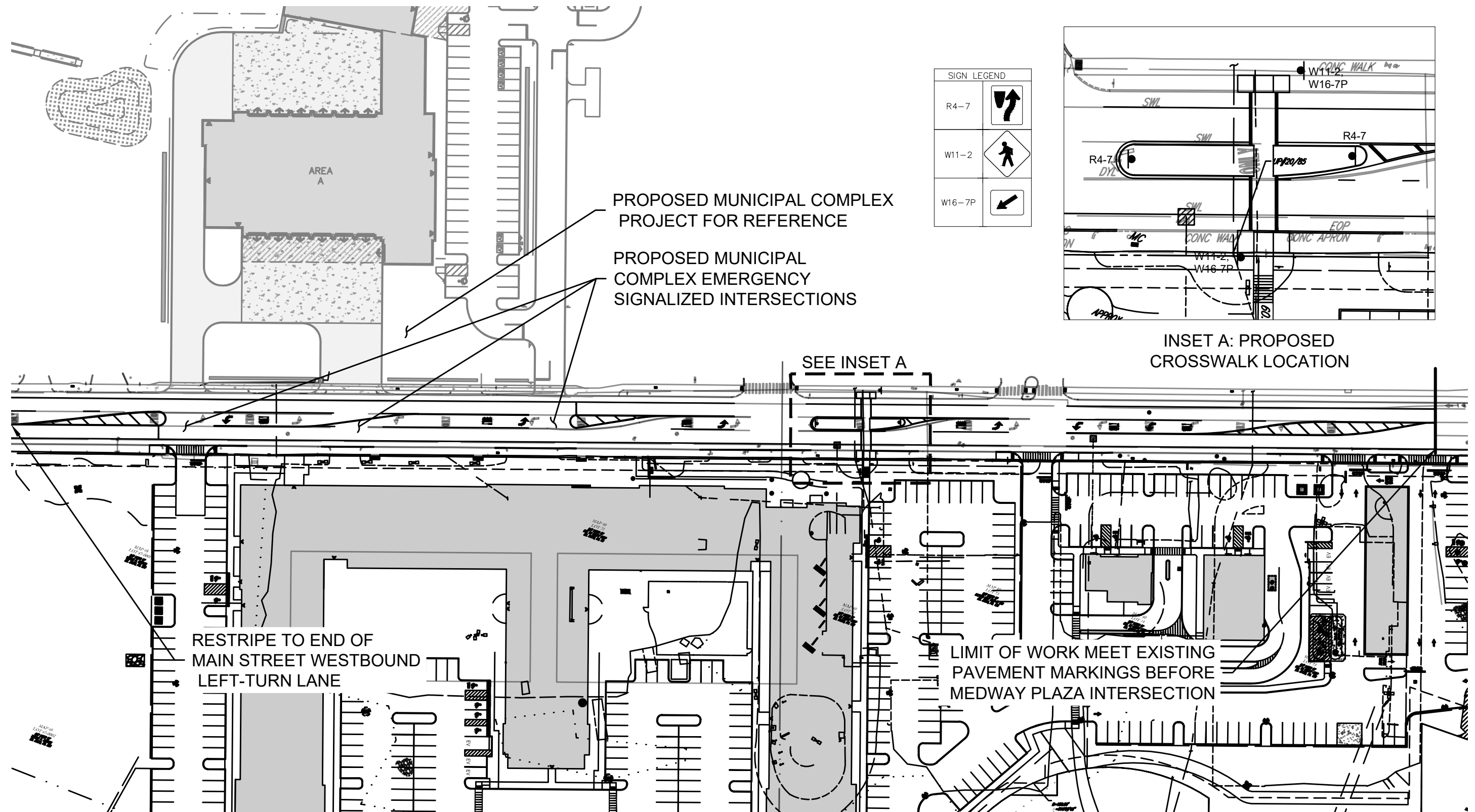
Off-Site Commitments

Based on the findings above, the Applicant has committed to the following off-site improvements:

- **Safety:** The Applicant will coordinate with the Town to undertake a Road Safety Audit (RSA) at the Main Street/Milford Street/Franklin Street and Main Street/Holliston Street intersections in order to identify crash patterns and potential safety enhancements. This information can be used by the Town to apply for a Community One Stop for Growth grant or other appropriate state grant program to implement safety enhancements at these intersections.
- **Capacity:** The Applicant will coordinate with the Town to explore the feasibility of an optimal traffic signal timing, phasing, and coordination plan inclusive of the following intersections:
 1. Main Street/Milford Street/Franklin Street
 2. Main Street at Winthrop Street and Evergreen Street
 3. Main Street/Medway Place driveway/Project site driveway
 4. Main Street/Holliston Street
- **Mobility:** The Applicant will design and construct a pedestrian crossing of Main Street as shown on Figure C1 that will include the construction of a raised pedestrian refuge island in the center of Main Street and the installation of a pedestrian actuated Rectangular Rapid Flashing Beacon (RRFB).
- **Vehicle Queue Management:** The Applicant will coordinate with the Town to evaluate the traffic signal equipment and vehicle detection system at the Main Street/Medway Place driveway/Project site driveway and Main Street/Holliston Street intersections to determine if the system is capable of dynamic traffic signal control or can be reasonably upgraded to an adaptive traffic control system.

CONCLUSIONS

As documented in this study, Project-related traffic increases will result in minor increases in traffic volumes or delays at intersections within the study area but increases in overall intersection delay at the signalized locations will be under 11 seconds. The closure of six curb cuts will improve overall flow along the Main Street corridor. From a safety perspective, it is recommended to conduct a Roadway Safety Audit to identify deficiencies at intersections and potential countermeasures. It is also recommended that the pavement markings on Main Street be adjusted as needed to accommodate the Project's proposed driveway locations. Based on additional analysis, three of the four signalized intersections could benefit from signal optimization during peak periods to reduce overall travel times on Route 109. Based on these analyses, it is expected that Project-related traffic will be adequately accommodated by the existing and future infrastructure, with minimal impact on traffic operations in the study area.



Scale: 1" = 80'

Figure C1

Conceptual Improvement Plan
Main Street Restriping