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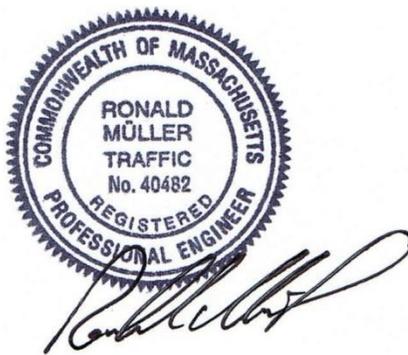
## Traffic Impact and Access Study

**Mixed-Use Development  
115 Main Street  
Maynard, Massachusetts**

**Prepared for:**

**MacDonald Development, Inc.  
10 Main Street  
Maynard, MA 01754**

**October 18, 2019**



### Quality



### Accuracy



### Integrity







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## Traffic Impact and Access Study

To: Ms. Jacque MacDonald  
MacDonald Development, Inc.  
10 Main Street  
Maynard, MA 01754

Reg: Mixed Use Development  
115 Main Street  
Maynard, MA

Date: October 18, 2019

From: Ron Müller, P.E., Principal

Project No.: 19035

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### INTRODUCTION

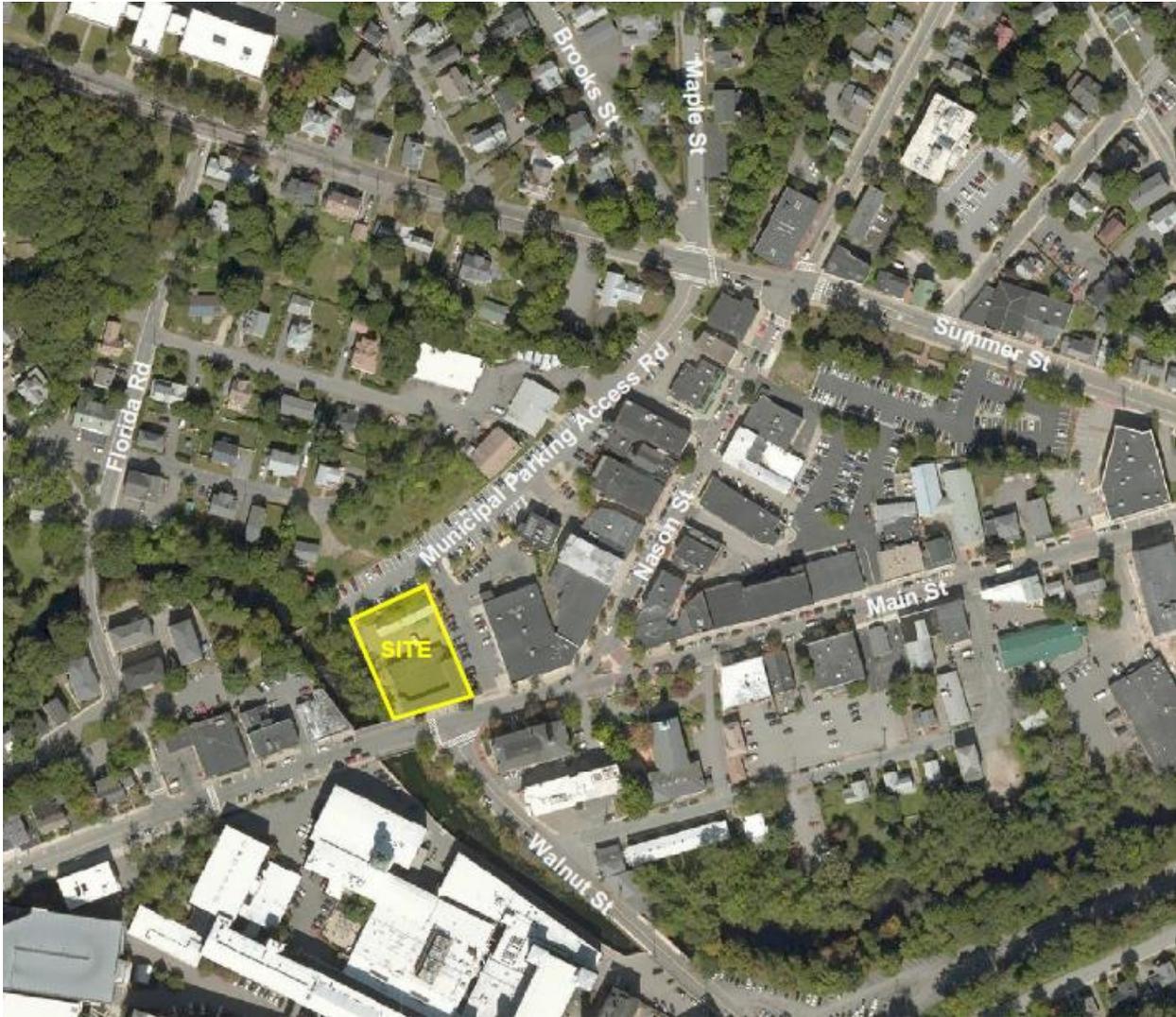
*Ron Müller & Associates* (RMA) has conducted this Traffic Impact and Access Study to evaluate the traffic impacts of a proposed redevelopment of the former Gruber Bros. furniture store located at 115 Main Street (Route 62) in Maynard, Massachusetts. As proposed, the existing building on site will be razed and replaced with a mixed-use development consisting of 26 apartment units and 1,800 square-feet of ground floor retail space. The site location in relation to the surrounding roadways is shown on Figure 1.

Access to the site will be provided via the existing municipal parking lot and access drive to Summer Street. The existing Gruber Bros. driveway connecting Main Street and the municipal lot just west of the existing building will be closed. A pedestrian connection between Main Street and the municipal parking lot and Assabet River Rail Trail is proposed in its place for public use along the river including the creation of a pedestrian promenade. These amenities will significantly improve public pedestrian accessibility between these points and provide a much safer connection than exists today where pedestrians have to walk within driveways and parking lots, either on this site or on the adjacent CVS lot.

This study provides an estimate of the expected traffic generation of the proposed redevelopment project, evaluates the safety and capacity impacts of that traffic at the affected intersection, evaluates on-site circulation with respect to the vehicular and pedestrian traffic, and assesses the adequacy of on-site parking. This study was prepared in conformance with Massachusetts Department of Transportation (MassDOT) standards. As documented in this report, traffic increases on Summer Street as a result of the project are expected in the range of 3 to 15 vehicles during the weekday AM and PM peak hours representing an average increase of approximately one additional vehicle every 4 to 20 minutes. These numbers do not account for a significant

portion of residents that are expected to also work in Maynard and therefore may not require the use of a car.

**Figure 1**  
**Site Location Map**



Redevelopment of the site is expected to result in minimal increases in delay and vehicle queues at the Municipal Parking Access Road (site driveway) intersection with Summer Street and Maple Street. All intersection approaches currently operate at acceptable levels during peak hours. These conditions will not change with the addition of site redevelopment traffic. The available sight lines

at the Municipal Parking Access Road (site driveway) approach to Summer Street exceed minimum requirements and safe operation can therefore be expected.

Although the number of on-site parking spaces does not meet the Town of Maynard zoning requirements in the Downtown Overlay District, more than adequate supply of parking will be provided to exceed the anticipated demand based on nationally-accepted standards and parking demand studies conducted at 10 other apartment developments owned and maintained by the applicant.

Recommendations are included in this report to restrict access to/from the site through the adjacent CVS parking lot. These include installation of a NO RIGHT TURN sign on the municipal lot (northeast) approach to the CVS lot and incorporation of language in the tenant lease agreements prohibiting use of the CVS lot for access to/from Main Street with fines specified for violators

## **EXISTING CONDITIONS**

### **Study Area**

Evaluation of the traffic impacts associated with the project requires an evaluation of existing and projected traffic volumes, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets. In preparing this study, the Summer Street intersection with Maple Street and the Municipal Parking Access Road was analyzed and evaluated, as all site traffic has to travel through this location.

Based on the anticipated traffic generation as documented in this report, the project is expected to have a negligible effect on traffic operations beyond this study area. The study area intersection and roadways are described in detail below.

**Summer Street** is an urban collector under local jurisdiction and generally oriented in the east/west direction. Summer Street serves as a connection between Great Road (Route 117) to the west and Waltham Street to the east. Within the study area, Summer Street is a two-way, two-lane roadway with a double yellow center line and pavement in good condition. There are sidewalks on both side of Summer Street in the vicinity of the site. The posted speed limit on Summer Street in the vicinity of the site is 20 mph traveling eastbound and 25 mph traveling westbound. Land use east of Maple Street is predominately retail/commercial while west of Maple Street, land use is mostly residential.

**Maple Street** is approximately 1,000 feet long connecting Concord Street and Summer Street. It is classified as a local roadway and is oriented in the north/south direction. Maple Street is a two-way, two-lane roadway with pavement in fair condition. There is no posted speed limit on Maple Street. There are sidewalks on both sides of the road and land use is residential.

**Summer Street meets Maple Street** to form a four-way unsignalized intersection. The Maple Street and Municipal Parking Access Road are under stop-control while Summer Street operates freely. All approaches to the intersection provide a single shared lane. Crosswalks are provided on Summer Street on both the east and westbound approaches to the intersection as well as on the northbound approach to the intersection. There is a rectangular rapid flashing beacon (RRFB) on the east leg of the intersection to accommodate the crossing of the Assabet River Rail Trail, which parallels the Municipal Parking Access Road on the west side and continues northeast of the intersection.

**Traffic Volumes**

Base traffic conditions within the study area were developed by conducting an automatic traffic recorder (ATR) count on Summer Street near the site as well as manual turning movement counts (TMC’s) at the study intersection. Both the ATR and TMC’s were collected in September 2019 when area schools were in session. The ATR count was conducted to collect weekday daily volume conditions and the TMC’s were conducted during the weekday AM peak period (7:00 to 9:00 AM) and the weekday PM peak period (4:00 to 6:00 PM). All traffic count data are provided in the Appendix. The count data indicate that the weekday AM peak hour occurs from 7:15 to 8:15 AM and the weekday PM peak hour occurs from 4:45 to 5:45 PM.

To determine if the count data needed to be adjusted to represent annual average-month conditions consistent with state guidelines for traffic impact assessment, historical traffic volume data were obtained from the MassDOT. Based on the nearest MassDOT permanent count station located on Elm Street in Concord east of the rotary (Station 403), traffic during the month of September is approximately two percent below annual average-month conditions. Therefore, the September counts were increased by 2.0 percent. The MassDOT permanent count station data are provided in the Appendix. Table 1 summarizes the 2019 Existing Traffic Volumes on the study roadways and the peak hour traffic flow networks are provided on Figure 2.

**Table 1**  
**Existing Traffic Volume Summary**

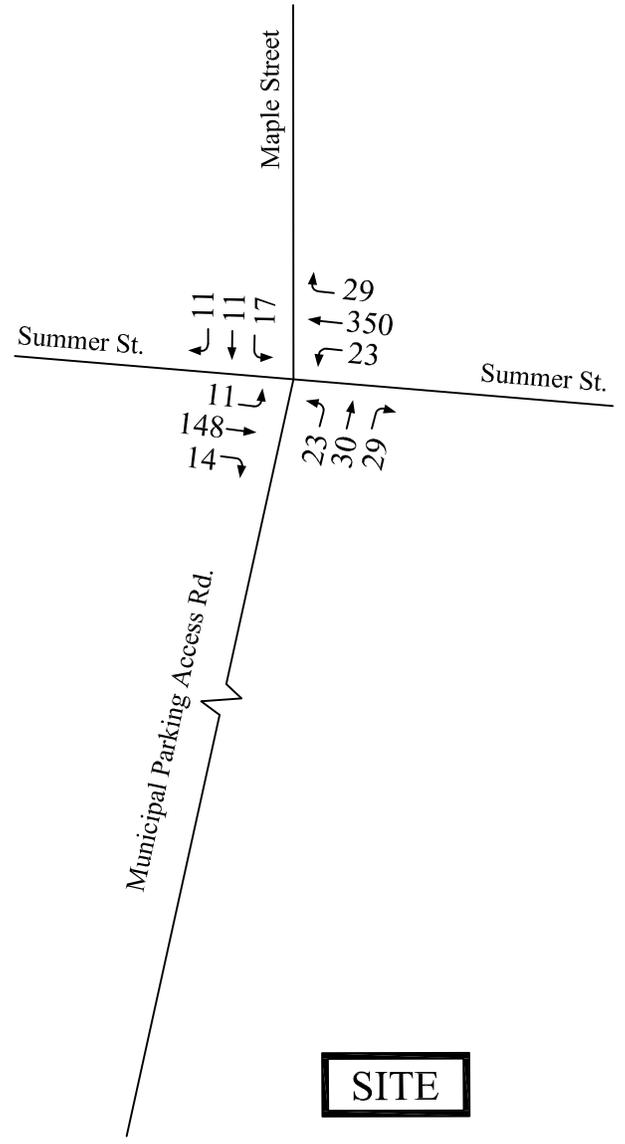
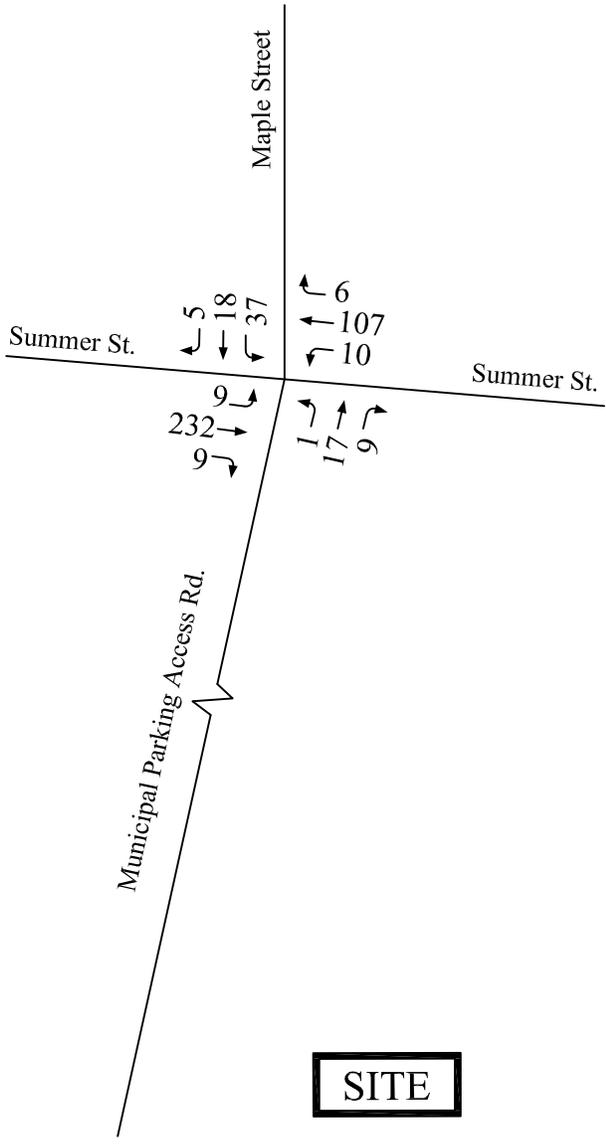
Location/Time Period	Daily Volume <sup>a</sup>	Peak Hour Volume <sup>b</sup>	K-Factor <sup>c</sup>	Directional Distribution <sup>d</sup>
<b>Summer Street:</b>				
Weekday	5,365	AM: 384 PM: 552	7.2% 10.3%	71% EB 68% WB

<sup>a</sup> In vehicles per day.  
<sup>b</sup> In vehicles per hour.  
<sup>c</sup> Percentage of daily traffic occurring during the peak hour.  
<sup>d</sup> EB = eastbound, WB = westbound.

Figure 2  
 2019 Existing  
 Peak Hour Traffic Volumes

**Weekday AM Peak Hour**

**Weekday PM Peak Hour**



## **Accidents**

Accident data for the study intersections were obtained from MassDOT for the period between 2016 and 2018, the latest three years of available data. A summary of the MassDOT accident data is provided in Table 2. In addition to the summary, accident occurrence should also be compared to the volume of traffic through a particular intersection to determine any significance. Accordingly, the accident rate was calculated for the study area intersection and compared with the statewide and district-wide averages. An intersection accident rate is a measure of the frequency of accidents compared to the volume of traffic through an intersection and is presented in accidents per million entering vehicles (acc/mev). For unsignalized intersections, the statewide average accident rate is 0.57 acc/mev and the district-wide (District 3) accident rate is 0.61 acc/mev. A comparison of the calculated accident rate to the averages can be used to establish the significance of accident occurrence and whether or not potential safety problems exist. The crash rate worksheet is provided in the Appendix.

**Table 2**  
**Accident Summary**

Location	Number of Accidents			Severity <sup>a</sup>			Accident Type <sup>b</sup>						% During Wet/Icy Conditions
	Total	Avg./Year	Accident Rate <sup>c</sup>	PD	PI	F	CM	RE	SS	FO	Ped	Other	
Summer Street at Maple Street	6	2	0.81	4	2	0	4	0	1	0	0	1	33%

Source: MassDOT Traffic Operations Safety Management System – 2016 through 2018 data.

<sup>a</sup> PD = property damage only; PI = personal injury; F = fatality.

<sup>b</sup> CM = cross movement/angle; RE = rear end; SS = sideswipe; FO = fixed object; Ped = pedestrian.

<sup>c</sup> Measured in accidents per million entering vehicles.

As shown in Table 2, the intersection of Summer Street and Maple Street experienced a total of six accidents over the three-year period, averaging two accidents per year. The calculated crash rate of 0.81 acc/mev is higher than both the district-wide and statewide averages, however, after assessing the data no trends were determined at the intersection to suggest a safety concern. Of the six reported accidents, four were angle type collisions, one was a sideswipe type collision and the other was unknown. Additionally, of the six crashes most (67-percent) involved property damage only. It should also be noted that the intersection of Summer Street at Maple Street is not listed as a top crash location in the MassDOT database of Highway Safety Improvement Program (HSIP) eligible clusters.

## **Vehicle Speeds**

Speed measurements were conducted along Main Street adjacent to the site by measuring the elapsed time for vehicles traveling a short, pre-measured distance between two checkpoints. The travel time was recorded using automatic traffic recorders and the speed is derived by dividing the elapsed time into the measured distance between checkpoints. The results of the speed measurements are summarized in Table 3.

**Table 3**  
**Observed Travel Speeds <sup>a</sup>**

<u>Location/Direction</u>	<u>Posted Speed Limit</u>	<u>Average Speed</u>	<u>85<sup>th</sup> Percentile Speed <sup>b</sup></u>
<b>Summer Street:</b>			
Eastbound			
Westbound	20	30	33
	25	30	33

<sup>a</sup> In miles per hour (mph).

<sup>b</sup> Speed at, or below which 85 percent of all observed vehicles travel.

As shown in Table 3, average travel speeds along Summer Street adjacent to the site are above the posted speed limit of 20 mph in the eastbound direction and 25 mph in the westbound direction. Additionally, the 85<sup>th</sup> percentile speeds were recorded to be 13 mph higher than the posted speed limit in the eastbound direction and 8 mph higher than the posted speed limit in the westbound direction. These higher speeds were accordingly used in the calculation of minimum sight distance requirements, as described below.

## **Sight Distance**

To identify potential safety concerns associated with site access and egress, sight distances have been evaluated at the existing intersection of Summer Street and Maple Street to determine if the available sight distances for vehicles exiting the site (from the Municipal Parking Access Road) meet or exceed the minimum distances required for approaching vehicles to safely stop. The available sight distances were compared with minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO)<sup>1</sup>. AASHTO is the national standard by which vehicle sight distance is calculated, measured, and reported. The MassDOT and the Executive Office of Energy and Environmental Affairs (EEA) require the use

<sup>1</sup>A *Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2009.

of AASHTO sight distance standards when preparing traffic impact assessments and studies, as stated in their guidelines for traffic impact assessment.

Sight distance is the length of roadway ahead that is visible to the driver. Stopping Sight Distance (SSD) is the minimum distance required for a vehicle traveling at a certain speed to safely stop before reaching a stationary object in its path. The values are based on a driver perception and reaction time of 2.5 seconds and a braking distance calculated for wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Stopping sight distance is measured from an eye height of 3.5 feet to an object height of 2 feet above street level, equivalent to the taillight height of a passenger car. The SSD is measured along the centerline of the traveled way of the major road.

Intersection sight distance (ISD) is provided on minor street approaches to allow the drivers of stopped vehicles a sufficient view of the major roadway to decide when to enter the major roadway. By definition, ISD is the minimum distance required for a motorist exiting a minor street to turn onto the major street, without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet above street level. The use of an object height equal to the driver eye height makes intersection sight distances reciprocal (i.e., if one driver can see another vehicle, then the driver of that vehicle can also see the first vehicle). When the minor street is on an upgrade that exceeds 3 percent, grade correction factors are applied.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersection. In accordance with the AASHTO manual, *“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”* Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

The available SSD and ISD at the existing Municipal Parking Access Road intersection with Summer Street were measured and compared to minimum requirements as established by AASHTO. Since the requirements are based on the adjacent street speed of traffic, the observed 85<sup>th</sup> percentile speed of 33 mph in both directions was used along Summer Street to calculate the minimum sight distance requirements. The required minimum sight distances for these speeds are compared to the available distances, as shown in Table 4.

**Table 4**  
**Sight Distance Summary**

Direction	Intersection Sight Distance (feet)		
	Measured	Minimum Required <sup>a</sup>	Desirable <sup>b</sup>
<b>Summer St. at Maple St.:</b>			
East of intersection	300+	230	280
West of Intersection	300+	230	225

<sup>a</sup> Values based on AASHTO SSD requirements for the 85<sup>th</sup> percentile speed of 33 mph on Summer Street.

<sup>b</sup> Values based on AASHTO ISD requirements for posted speed limit of 20 mph on Summer Street traveling eastbound and a posted speed limit of 25 mph traveling westbound.

As shown in Table 4, ample sight distances exist for vehicles exiting the Municipal Parking Access Road (site driveway) exceeding both minimum requirements and desirable distances and therefore safe operation can be expected.

### **Public Transportation and Pedestrian/Bicycle Accommodations**

A Maynard/Acton Commuter Shuttle sponsored by CrossTown Connect and the Towns of Maynard and Acton provides a shuttle with 7 stops in Maynard and Acton connecting to the South Acton Commuter Rail Station located along the Boston/Fitchburg Massachusetts Bay Transportation Authority (MBTA) rail line. The shuttle operates during the morning and evening commuting periods Monday through Friday at a cost of \$2 per trip. The stops in Maynard include the Mill & Main Building (Sudbury Street lot, Main Street lot, Building 5, and Building 1), the Summer Street municipal lot, and the Maynard Golf course. Current schedules and information can be found at [www.townofmaynard-ma.gov/shuttle](http://www.townofmaynard-ma.gov/shuttle).

A section of the Assabet River Rail Trail is located just north of the site adjacent to the municipal parking lot. The rail trail connects five towns including Acton, Maynard, Stow, Hudson and Marlborough and provides a connection to the South Acton commuter rail station. The rail trail was approved in 1998 and the first section was opened in 2005. There are future long-range plans to extend/connect various sections of the rail trail.

Within the study area, sidewalks are provided along both sides of Main Street. On the Municipal Parking Access Road, which provides access to the site, the rail trail on the western side of the road provides pedestrian access to and from the site to Summer Street. Crosswalks are provided on both the north and south approach as well as on the westbound approach to the intersection of Summer Street and Maple Street. On the eastern leg of the intersection is a Rectangular Rapid-Flashing Beacon (RRFB) providing improved crossing conditions for pedestrians crossing

Summer Street or proceeding along the rail trail. A crosswalk is provided for pedestrians to cross Main Street to Walnut Street. There is also a crosswalk across Walnut Street. No on-street bicycle accommodations exist along Main Street near the site; however, the Assabet River Rail Trail provides a bicycle route for cyclists traveling between Hudson and Acton.

## **FUTURE CONDITIONS**

### **Traffic Growth**

Future traffic conditions were projected to the year 2026, representing a 7-year design horizon consistent with state requirements for traffic impact analysis. To project traffic conditions within this design horizon, two components of traffic growth were included. First, an annual average traffic growth rate was determined to account for general population growth and smaller development projects that may impact traffic along roadways in the site vicinity. Based on historic traffic counts collected by MassDOT at the permanent count station on Elm Street in Concord, traffic volumes have increased on average by 0.30 percent per year over the last 10 years of collected data. MassDOT spot counts closer to the project site along Parker Street (Station #4886) and Route 117 (Station #4885) showed average annual growth rates of approximately 0.78 percent per year between 2004 and 2010. Based on the data as well as growth rates used in recent traffic studies for other area projects, a one percent annual growth rate was used.

Second, any planned or approved specific developments in the area that would generate a significant volume of traffic on study area roadways within the next seven years were investigated. Based on discussions with local officials, there are seven proposed or planned projects in the area:

- *Residential and Retail Development, 31 Main Street* - This project includes the construction of five 2-bedroom residential units and 750 square feet of retail space. Trip generation rates provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*<sup>2</sup> for residential units and retail space were used to estimate the potential traffic generation of this project and the traffic distributed through the project area as described in the Appendix.
- *170 Main Street* - This project includes the redevelopment of the existing gasoline and service station to a station with 8-fueling positions and a 3,300 square foot convenience store with coffee/donut shop and drive through window. Also included in the redevelopment is 800 square feet of office space. Trips were assigned to the study area roadways based on the trip distribution outlined in the traffic impact and access study submitted by RMA in March, 2019<sup>3</sup>.

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<sup>2</sup> *Trip Generation Manual, 10<sup>th</sup> Edition*; Institute of Transportation Engineers; Washington, DC; 2017.

<sup>3</sup> *Traffic Impact and Access Study, 170 Main Street, Maynard, Massachusetts*; Prepared for Dimopoulos Realty Trust; Prepared by Ron Müller & Associates.; Dated March 2019.

- *Residential Development, 173 Main Street* - This project includes the construction of five 3-bedroom residential units. The appropriate ITE trip rates were applied to the number of residential units and distributed through the project area as described in the Appendix.
- *Residential and Retail Development, 42 Summer Street* - This project includes the construction of 24 residential units. The appropriate ITE trip rates were applied to the number of residential units and distributed through the project area as described in the Appendix.
- *24 Main Street* - A recreational marijuana facility is proposed to be located on Main Street northeast of the project site. Trips were assigned to the study area roadways based on the trip distribution outlined in the traffic impact and access study submitted by Green International Affiliates, Inc. in March, 2019<sup>4</sup>.
- *4 Nason Street* - A recreational marijuana facility is proposed to be located on Nason Street just east of the project site. The appropriate ITE trip rates were applied to the square footage to be occupied by this use within the existing structure and distributed through the project area as described in the Appendix.
- *Maynard Crossing, 129 Parker Street* - This project proposes to redevelop the existing site which contains 50,300 square feet of commercial space with 240,490 square feet of retail space including a 68,000 square foot supermarket, 30,300 square feet of commercial, office, or retail space, a 20,000 square foot fitness center, 180 multi-family rental apartment units, and 143 units of senior independent living housing. Based on the submitted traffic study<sup>5</sup>, the project is not expected to impact traffic within the 115 Main Street project's study area. Accordingly, any potential traffic generated by this project within the study area was assumed to be included in the general background growth rate.

### **No-Build Conditions**

The 2026 No-Build networks were accordingly developed by applying a compounded one percent annual growth rate (7.2 percent over seven years) to the existing adjacent street volumes and by assuming completion of the above area development projects. The 2026 No-Build peak-hour traffic-flow networks are shown on Figure 3.

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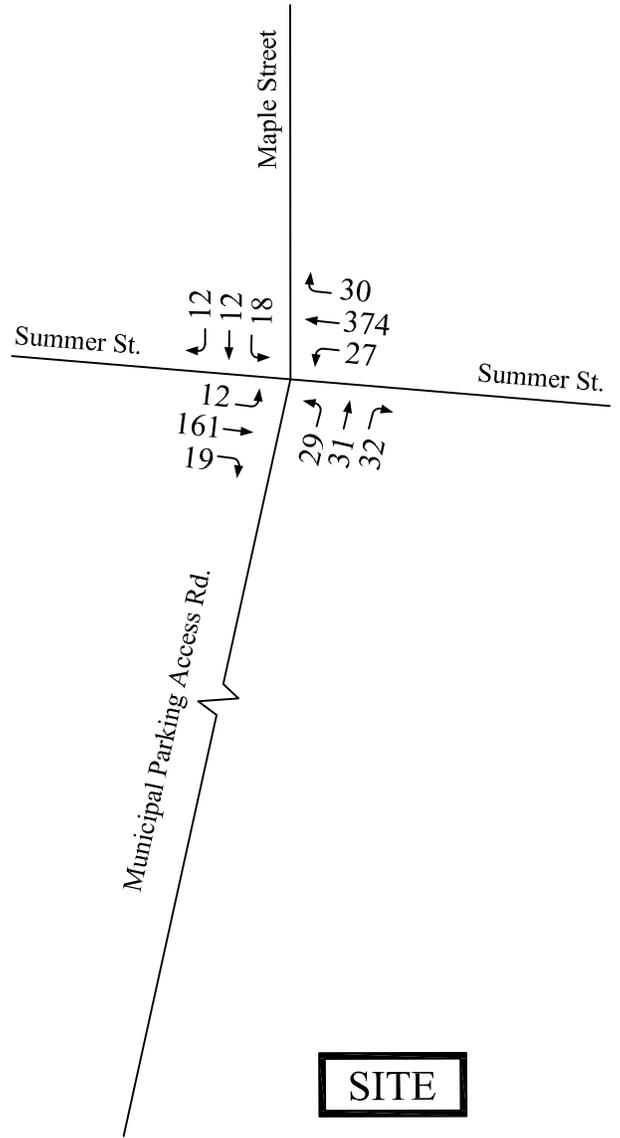
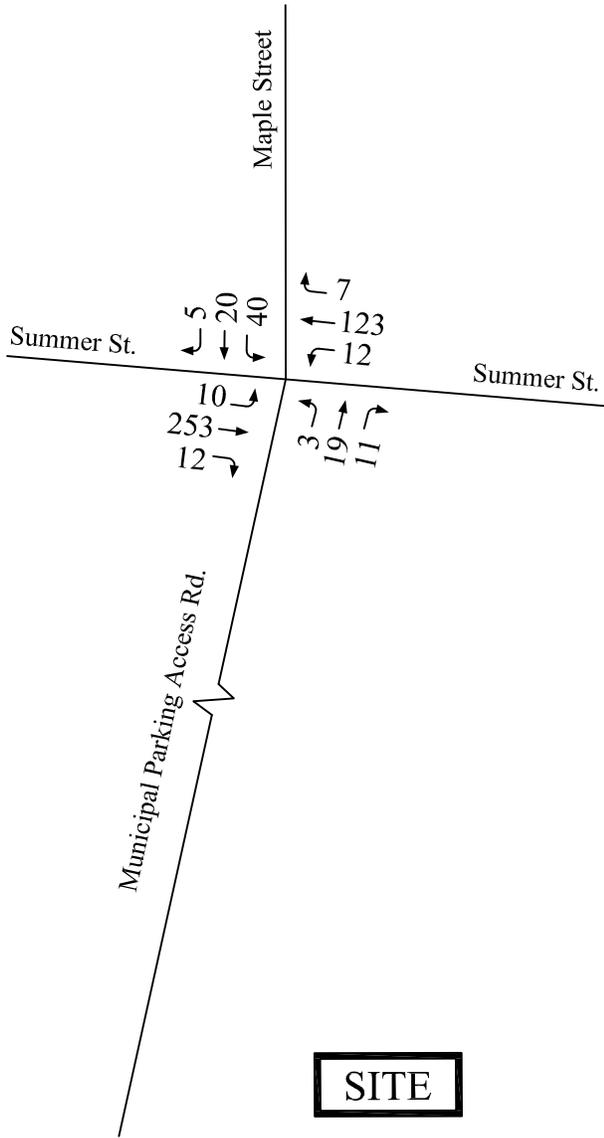
<sup>4</sup> *Traffic Impact and Access Study, 22-24 Main Street, Maynard, Massachusetts*; Prepared for Green Star Herbals; Prepared by Green International Affiliates, Inc.; Dated March 2019.

<sup>5</sup> *Traffic Impact and Access Study, 129 Parker Street, Maynard Crossing, Maynard, Massachusetts*; Prepared for Capital Group Properties; Prepared by Green International Affiliates, Inc.; Dated January 2017.

Figure 3  
2026 No-Build  
Peak Hour Traffic Volumes

**Weekday AM Peak Hour**

**Weekday PM Peak Hour**



## **Trip Generation**

As proposed, the redevelopment project will raze the former Gruber Bros. furniture store to construct 26 apartment units with 1,800 square feet of ground floor retail space. To estimate the volume of traffic to be generated by redevelopment of the site, trip-generation rates published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* were researched. ITE land use code (LUC) 220 provides trip generation characteristics for apartment units while LUC 820 provides trip generation characteristics for retail developments.

As shown in Table 5, the redevelopment project is expected to generate an additional 15 vehicle trips during the weekday AM peak hour (4 entering and 11 exiting) and an additional 25 vehicle trips during the PM peak hour (14 entering and 11 exiting). These additional trips will be realized at the site driveway and at the intersection of Summer Street and Maple Street.

**Table 5**  
**Trip Generation Summary**

Time Period	Apartment Units <sup>a</sup>	Retail Space <sup>b</sup>	New Trips
<b>Weekday Daily</b>	160	70	<b>230</b>
<b>Weekday AM Peak Hour</b>			
Enter	3	1	<b>4</b>
Exit	<u>10</u>	<u>1</u>	<u><b>11</b></u>
Total	13	2	<b>15</b>
<b>Weekday PM Peak Hour</b>			
Enter	11	3	<b>14</b>
Exit	<u>7</u>	<u>4</u>	<u><b>11</b></u>
Total	18	7	<b>25</b>

<sup>a</sup> ITE Land Use Code 220 (Apartment) for 26 apartment units

<sup>b</sup> ITE Land Use Code 820 (Shopping Center) for 1,800 square-feet

## **Trip Distribution**

The distribution of new site traffic on the area roadways for the retail portion of the development is based on existing travel patterns observed at the Summer Street intersection with Maple Street while the distribution of residential traffic was based on Journey-to-Work data provided by the U.S. Census Bureau for people residing in Maynard. It should be noted that a large portion (over 20-percent) of Maynard residents work within Maynard. These residents were assumed to work in the downtown area of Maynard and would likely walk to work and not drive. Therefore, those residents were not considered when determining the distribution. However, no reduction in total

site traffic generation was assumed in this report to account for this phenomenon. Accordingly, for the residential portion of the development, approximately 15-percent of site traffic is expected on Summer Street to and from the west and 65-percent to and from the east. Approximately 20-percent of the new residential site traffic is expected to and from the north on Maple Street. For the retail portion of the development approximately 45-percent of site traffic is expected to and from both the east and west directions on Summer Street while 10-percent is expected to and from the north on Maple Street.

### **Build Conditions**

Based on the traffic generation and distribution estimates for this project, the traffic volumes generated by the proposed project were assigned to the roadway network as shown on Figure 4 and were added to the 2026 No-Build traffic volumes to develop the 2026 Build traffic volumes. The 2026 Build peak hour traffic volumes are graphically depicted on Figure 5.

### **Traffic Increases**

The proposed redevelopment project will result in increases in traffic on the study roadways. Traffic-volume increases on Summer Street to the east and west of the study area are expected in the range of 3 to 15 vehicles during the peak hours. These increases represent, on average, approximately one additional vehicle every 4 to 20 minutes on Summer Street. Negligible increases in traffic are expected on Maple Street.

### **Site Access and Pedestrian Circulation**

The site currently provides one full access and egress to the Municipal Parking Access Road. As part of the site redevelopment, the existing site driveway off of Main Street just west of the existing Gruber Bros. building will be closed. In place of this access drive, a pedestrian connection between Main Street and the municipal parking lot and adjacent rail trail is proposed for public use along the Assabet River.

The site frontage is to be modified to provide enhanced pedestrian accommodations between the site, Main Street, the Assabet River and the Assabet River Rail Trail. Site connections to and from the Assabet River Rail Trail are proposed directly through a series of on-site walkways and landscaped areas. Additionally, a promenade is proposed along the Assabet River that will provide accommodations for public access. The site redevelopment also proposes pedestrian improvements along the Main Street site frontage that will limit vehicle/pedestrian conflict points with the removal of the Main Street site driveway. These amenities will significantly improve public pedestrian accessibility between Main Street and the municipal parking lot and rail trail and provide a much safer connection between these points than exists today where pedestrians have to walk within driveways and parking lots, either on this site or on the adjacent CVS lot.

Figure 4  
Site Generated  
Peak Hour Traffic Volumes

**Weekday AM Peak Hour**

**Weekday PM Peak Hour**

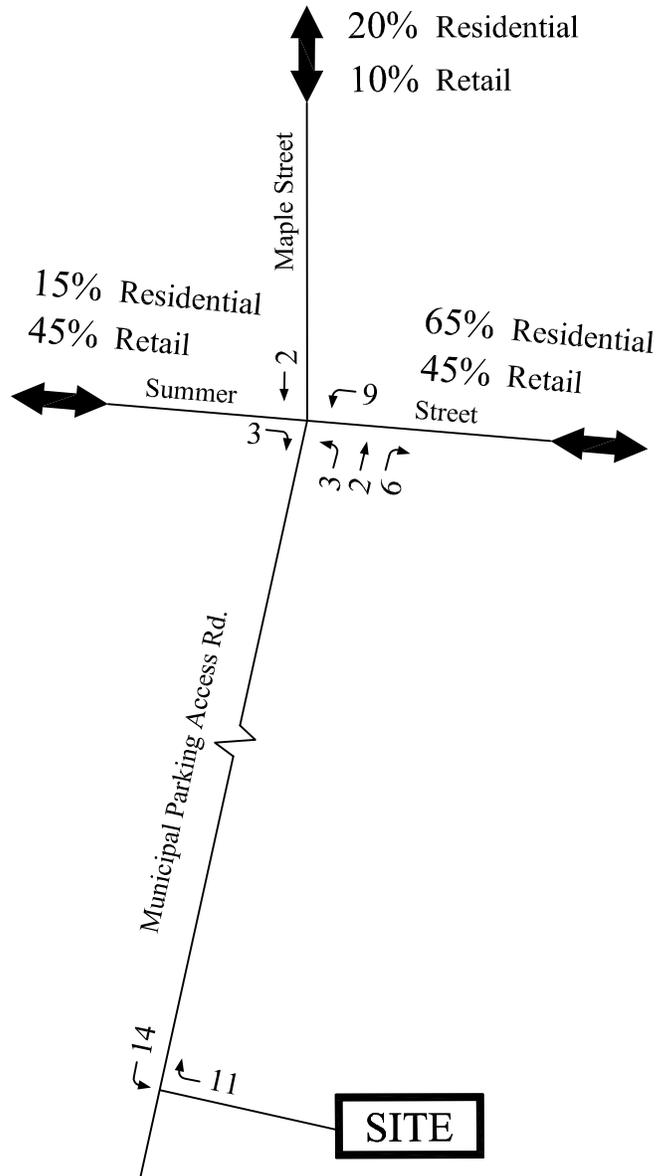
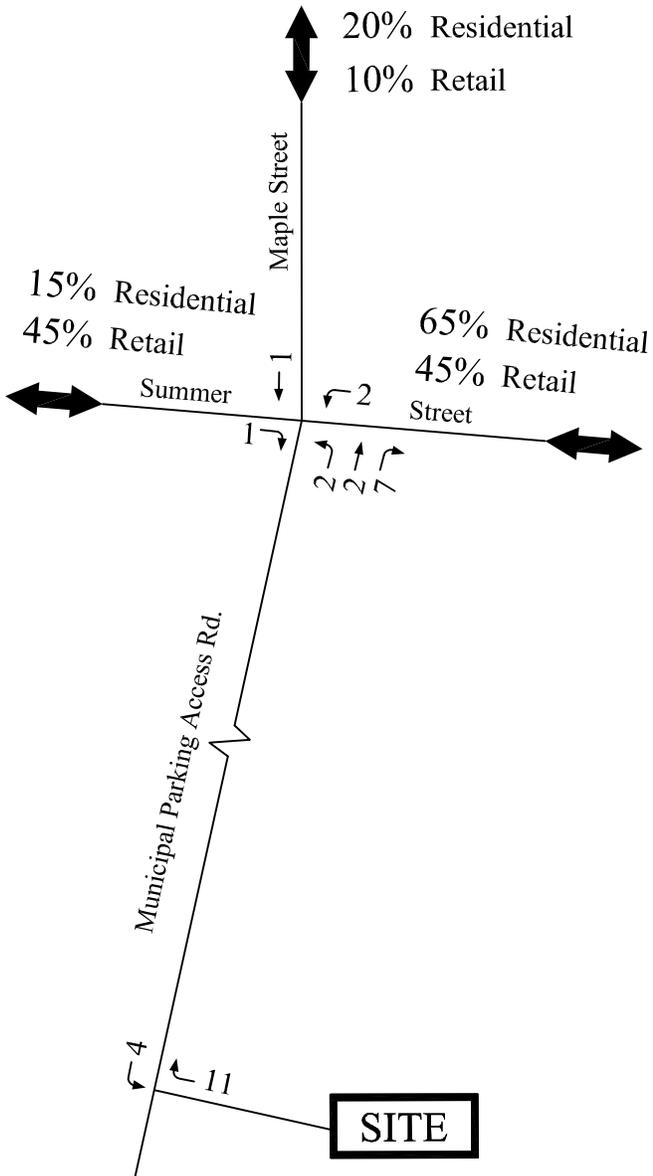
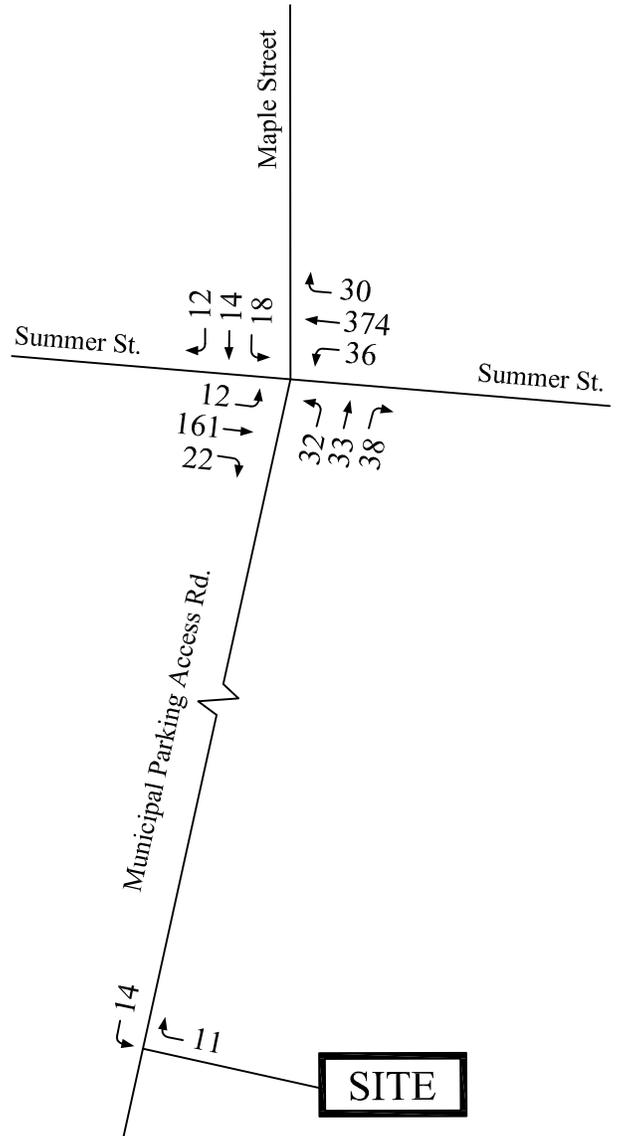
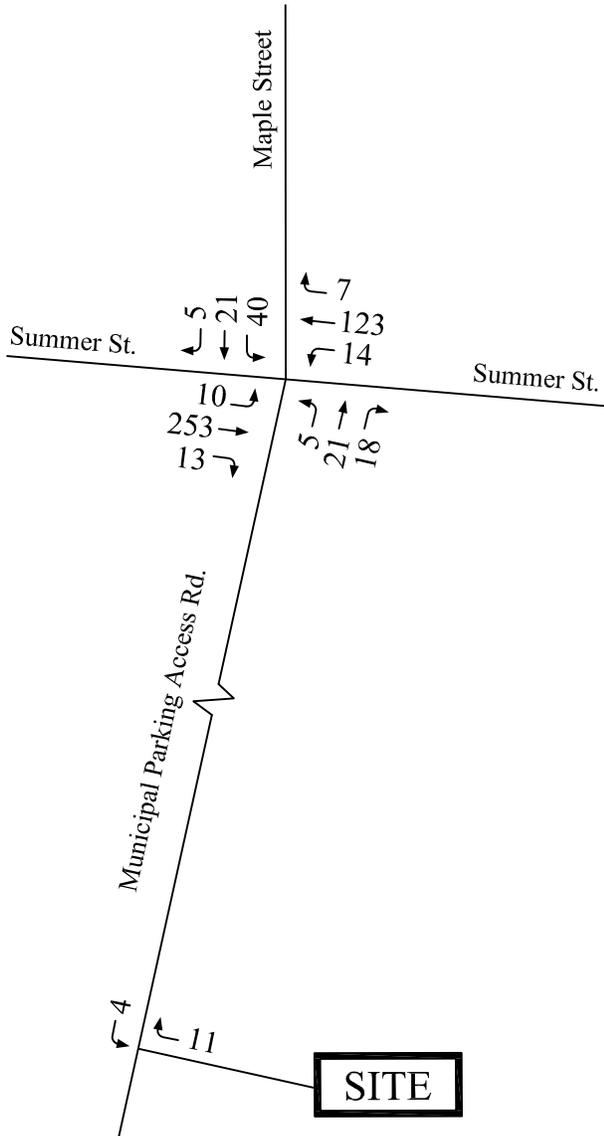


Figure 5  
 2026 Build  
 Peak Hour Traffic Volumes

**Weekday AM Peak Hour**

**Weekday PM Peak Hour**



The adjacent CVS parking lot provides a connection between Main Street and the municipal parking lot at the rear of the site where access to the site parking facilities are proposed. This connection may entice residents of the proposed building (as well as people parking in the municipal lot) to cut through the CVS parking lot to gain access to Main Street. Two measures are recommended to deter people from doing this: (1) a NO RIGHT TURN (R3-1) sign should be installed on the municipal lot (northeast) approach to the CVS lot, and (2), lease agreements with the tenants of the apartment units should include language prohibiting use of the CVS lot for access to/from Main Street with fines specified for violators.

### **Parking**

The project proposes 35 parking spaces with 4 spaces dedicated for the retail business (one space per 500 square feet of retail gross floor area per the Maynard Zoning By-Laws for the Downtown Overlay District) and 31 spaces for the 26 proposed apartment units. While the local zoning regulations require 1.5 spaces per apartment unit for a total of 39 spaces, there is significant evidence that the actual demand for parking for the residential units will be much lower.

As part of this application, the proponent submitted parking demand studies at 10 other apartment developments in Maynard owned and maintained by MacDonald Development, Inc. These studies showed an average peak parking demand of 0.73 spaces per bedroom. Applying this rate to the 32 proposed bedrooms (4 studios, 16 one-bedroom, and 6 two-bedroom units) yields an expected parking demand at the proposed site of 24 spaces, well below the 31 spaces proposed. Nationally, the ITE provides parking demand data for a variety of different land uses including low-rise multifamily housing (Land Use Code 220).<sup>6</sup> These data show an average peak parking demand of 0.80 spaces per bedroom, yielding an expected demand of 26 spaces, still well below the proposed supply of parking. Accordingly, it is expected that an adequate supply of parking will be provided on site.

## **CAPACITY ANALYSIS**

Level-of-service (LOS) analyses were conducted at the intersection of Summer Street and Maple Street under existing and projected volume conditions to determine the effect that the additional site-generated traffic will have on traffic operations. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual*<sup>7</sup> (HCM) and is described in the Appendix. For unsignalized intersections, the 95<sup>th</sup> percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). In this case, the queue length is a function of the capacity of the movement and the movement's degree of saturation. The level-of-service and

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<sup>6</sup> *Parking Generation, 5<sup>th</sup> Edition*; Institute of Transportation Engineers; Washington DC.

<sup>7</sup> *Highway Capacity Manual 2010*; Transportation Research Board; Washington, DC; 2010.

queue results are presented in Table 6 and are discussed below. All analysis worksheets are provided in the Appendix.

As shown in Table 6, the Municipal Parking Access Road approach to Summer Street operates at LOS B under current traffic conditions and is expected to operate at LOS C or better under the No-Build condition while the Maple Street approach to Summer Street operates at LOS C or better under existing conditions and is expected to operate similarly under future conditions. The Summer Street approaches operate at LOS A during all analyzed conditions and time periods. Under the future Build condition, the Municipal Parking Access Road (site driveway) is expected to operate at LOS B with a vehicle queue of one vehicle during the weekday AM peak period, while during the weekday PM peak period, LOS C operations are expected with vehicle queues of approximately one vehicle. Increases in delay due to the additional site traffic are expected to be minimal with approach delays increasing by 0.7 seconds per vehicle or less.

**Table 6**  
**Level-of-Service Analysis Summary**

Location/Peak Hour/Movement	2019 Existing				2026 No-Build				2026 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup>	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
<b>Summer Street at Maple Street/Municipal Parking Access Road</b>												
<i>Weekday AM Peak Hour</i>												
NB All	0.05	11.5	B	5	0.07	12.1	B	5	0.09	12.0	B	8
SB All	0.12	12.8	B	10	0.15	13.7	B	13	0.15	13.9	B	13
EB Left	0.01	7.5	A	0	0.01	7.5	A	0	0.01	7.5	A	0
WB Left	0.01	7.8	A	0	0.01	7.9	A	0	0.01	7.9	A	0
<i>Weekday PM Peak Hour</i>												
NB All	0.19	14.7	B	18	0.24	16.1	C	23	0.27	16.8	C	28
SB All	0.11	15.2	C	10	0.13	16.3	C	10	0.14	17.0	C	13
EB All	0.01	8.2	A	0	0.01	8.3	A	0	0.01	8.3	A	0
WB All	0.02	7.6	A	3	0.02	7.7	A	3	0.03	7.7	A	3

<sup>a</sup> Volume-to-capacity ratio;

<sup>b</sup> Average control delay in seconds per vehicle;

<sup>c</sup> Level of service;

<sup>d</sup> 95th percentile queue in feet, assuming 25 feet per vehicle.

## CONCLUSIONS

Existing and future conditions at the study area intersection have been described and analyzed with respect to traffic operations and the impact of the proposed site redevelopment. Conclusions of this effort and recommendations are presented below.

- Redevelopment of the site proposes to raze the existing Gruber Bros. furniture store located at 115 Main Street to construct a new mixed-use development consisting of 26 apartment units and 1,800 square-feet of ground floor retail space.
- The site currently provides one full access and egress drive on Main Street and a connection to the municipal parking lot and access drive to Summer Street. The existing driveway on Main Street will be removed and the only vehicular access to the site will be via the Municipal Parking Access Road from Summer Street.
- To restrict cut-through traffic through the existing CVS parking lot east of the site, it is recommended that a NO RIGHT TURN sign be installed on the municipal lot (northeast) approach to the CVS lot, and tenant lease agreements include language prohibiting use of the CVS lot for access to/from Main Street with fines specified for violators.
- A pedestrian connection between Main Street and the municipal parking lot and Assabet River Rail Trail is proposed along the Assabet River for public use including the creation of a pedestrian promenade. These amenities will significantly improve public pedestrian accessibility between these points and provide a much safer connection than exists today where pedestrians have to walk within driveways and parking lots, either on this site or on the adjacent CVS lot.
- Based on industry standards, the mixed-use project is expected to generate between 15 and 25 vehicle trips (total entering and exiting) during the critical commuter peak hours. However, based on U.S. Census Bureau data, over 20 percent of the people living in Maynard also work in Maynard and the total site traffic generation is therefore likely to be less.
- Without accounting for residents walking or bike riding to/from work, traffic increases as a result of the project are expected in the range of 3 to 15 vehicles on Summer Street during the weekday AM and PM peak hours. On average, these increases are minimal and represent approximately one additional vehicle every 4 to 20 minutes on the study roadways.
- Ample sight distances exist at the Municipal Parking Access Road intersection with Summer Street exceeding minimum requirements and desirable distances to allow for safe operation.
- The proposed site redevelopment is expected to result in minimal increases in delay and vehicle queues at the study area intersection. All roadway approaches to Summer Street currently operate at desirable to acceptable levels during the weekday AM and PM peak hours. These approaches are expected to continue to operate at acceptable levels under future Build volume

conditions. All Summer Street approaches currently operate, and are expected to continue to operate at desirable levels during the weekday AM and PM peak hours.

- Although the number of on-site parking spaces does not meet the Town of Maynard zoning requirements in the Downtown Overlay District, more than adequate supply of parking will be provided to exceed the anticipated demand based on nationally-accepted standards and parking demand studies conducted at 10 other apartment developments owned and maintained by the applicant.

## **APPENDIX**

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Traffic Count Data  
Seasonal/Historical Adjustment Data  
Crash Rate and Trip Generation Worksheets  
Capacity Analysis Methodology and Worksheets

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## **Traffic Count Data**

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#51 Summer Street  
 between Maple St. and Linden St.  
 City, State: Maynard, MA  
 Client: Ron Muller & Associates / R. Muller



PRECISION  
 D A T A  
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
 Office: 508-875-0100 Fax: 508-875-0118  
 Email: datarequests@pdillc.com

197196 A Volume  
 Site Code: 19035  
 Date Start: 09/25/19  
 Date End: 09/26/19

Start Time	EB		WB		Combin ed		09/25/19 Wed			
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.				
12:00	0	37	8	35	8	72				
12:15	3	39	3	39	6	78				
12:30	4	34	1	39	5	73				
12:45	1	8 30	140	0 12	44	157	1 20 74 297			
01:00	1	28	0	46	1	74				
01:15	1	39	0	50	1	89				
01:30	1	32	2	41	3	73				
01:45	0	3 33	132	1 3	30	167	1 6 63 299			
02:00	0	34	0	44	0	78				
02:15	2	30	0	36	2	66				
02:30	1	25	1	44	2	69				
02:45	0	3 33	122	0 1	47	171	0 4 80 293			
03:00	0	27	1	55	1	82				
03:15	3	43	0	56	3	99				
03:30	1	37	1	57	2	94				
03:45	1	5 29	136	2 4	58	226	3 9 87 362			
04:00	0	38	0	76	0	114				
04:15	2	27	0	67	2	94				
04:30	4	38	2	90	6	128				
04:45	8	14 43	146	2 4	80	313	10 18 123 459			
05:00	16	38	5	83	21	121				
05:15	17	60	6	102	23	162				
05:30	9	38	6	90	15	128				
05:45	26	68 37	173	7 24	93	368	33 92 130 541			
06:00	31	43	3	67	34	110				
06:15	46	32	12	67	58	99				
06:30	53	31	21	64	74	95				
06:45	69	199 60	166	16 52	70	268	85 251 130 434			
07:00	77	28	30	51	107	79				
07:15	66	29	26	49	92	78				
07:30	60	28	28	34	88	62				
07:45	63	266 13	98	26 110	36	170	89 376 49 268			
08:00	65	18	28	29	93	47				
08:15	64	15	21	32	85	47				
08:30	54	12	21	21	75	33				
08:45	68	251 14	59	31 101	39	121	99 352 53 180			
09:00	36	17	24	27	60	44				
09:15	49	14	24	21	73	35				
09:30	40	9	19	23	59	32				
09:45	36	161 10	50	29 96	18	89	65 257 28 139			
10:00	30	8	33	11	63	19				
10:15	33	3	31	16	64	19				
10:30	24	3	36	8	60	11				
10:45	33	120 1	15	28 128	9	44	61 248 10 59			
11:00	32	5	32	6	64	11				
11:15	34	1	25	8	59	9				
11:30	39	2	36	2	75	4				
11:45	33	138 1	9	31 124	7	23	64 262 8 32			
Total	1236	1246	659	2117	1895	3363				
Percent	65.2%	37.1%	34.8%	62.9%						
Day Total		2482		2776		5258				
Peak Vol.	06:45	-	04:30	-	09:45	-	05:00	-	-	-
P.H.F.	0.883	-	0.746	-	0.896	-	0.902	-	0.879	-



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City, State: Maynard, MA  
Client: Ron Muller & Associates / R. Muller

197196 A Volume  
Site Code: 19035  
Date Start: 09/25/19  
Date End: 09/26/19

Start Time	EB		WB		Combin ed		09/26/19 Thu
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	1	20	3	46	4	66	
12:15	4	18	5	32	9	50	
12:30	0	13	1	38	1	51	
12:45	0	5 24	75 3	12 39	155 3	17 63	230
01:00	0	20	1	28	1	48	
01:15	1	14	1	35	2	49	
01:30	1	21	0	38	1	59	
01:45	0	2 21	76 1	3 43	144 1	5 64	220
02:00	0	19	0	51	0	70	
02:15	0	33	0	44	0	77	
02:30	0	26	0	62	0	88	
02:45	0	0 35	113 0	0 45	202 0	0 80	315
03:00	0	49	0	47	0	96	
03:15	2	41	1	50	3	91	
03:30	1	42	0	48	1	90	
03:45	0	3 30	162 0	1 61	206 0	4 91	368
04:00	1	41	0	60	1	101	
04:15	2	39	0	66	2	105	
04:30	3	26	1	61	4	87	
04:45	9	15 41	147 4	5 93	280 13	20 134	427
05:00	11	30	1	85	12	115	
05:15	10	37	3	68	13	105	
05:30	13	35	6	85	19	120	
05:45	18	52 37	139 8	18 85	323 26	70 122	462
06:00	31	24	4	76	35	100	
06:15	52	43	12	68	64	111	
06:30	49	28	11	51	60	79	
06:45	75	207 32	127 17	44 67	262 92	251 99	389
07:00	65	28	18	41	83	69	
07:15	58	22	30	49	88	71	
07:30	62	16	34	31	96	47	
07:45	71	256 19	85 29	111 42	163 100	367 61	248
08:00	60	16	34	36	94	52	
08:15	67	9	30	25	97	34	
08:30	45	11	26	25	71	36	
08:45	45	217 12	48 40	130 28	114 85	347 40	162
09:00	47	14	25	32	72	46	
09:15	43	14	20	16	63	30	
09:30	38	11	30	10	68	21	
09:45	45	173 4	43 28	103 16	74 73	276 20	117
10:00	30	3	31	15	61	18	
10:15	30	9	41	11	71	20	
10:30	29	5	33	10	62	15	
10:45	34	123 4	21 26	131 5	41 60	254 9	62
11:00	29	4	35	5	64	9	
11:15	17	3	31	11	48	14	
11:30	20	1	46	3	66	4	
11:45	26	92 2	10 35	147 4	23 61	239 6	33
Total	1145	1046	705	1987	1850	3033	
Percent	61.9%	34.5%	38.1%	65.5%			
Day Total		2191		2692		4883	
Peak Vol.	06:45 - 260	02:45 - 167	11:00 - 147	04:45 - 331	07:30 - 387	04:45 - 474	- - -
P.H.F.	0.867	0.852	0.799	0.890	0.968	0.884	



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197196 A Class  
Site Code: 19035  
Date Start: 25-Sep-19  
Date End: 26-Sep-19

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/25/19														
9	0	6	1	0	1	0	0	0	0	0	0	0	0	8
01:00	0	1	2	0	0	0	0	0	0	0	0	0	0	3
02:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
03:00	0	2	3	0	0	0	0	0	0	0	0	0	0	5
04:00	0	8	3	0	3	0	0	0	0	0	0	0	0	14
05:00	1	44	13	1	9	0	0	0	0	0	0	0	0	68
06:00	0	142	40	1	16	0	0	0	0	0	0	0	0	199
07:00	1	203	48	1	10	1	0	2	0	0	0	0	0	266
08:00	0	175	49	0	25	1	0	1	0	0	0	0	0	251
09:00	0	119	33	0	8	0	0	1	0	0	0	0	0	161
10:00	0	94	16	0	10	0	0	0	0	0	0	0	0	120
11:00	0	91	39	0	6	1	0	0	1	0	0	0	0	138
12 PM	1	100	30	2	7	0	0	0	0	0	0	0	0	140
13:00	1	99	20	0	9	1	0	1	1	0	0	0	0	132
14:00	1	95	19	0	7	0	0	0	0	0	0	0	0	122
15:00	2	101	23	0	9	1	0	0	0	0	0	0	0	136
16:00	0	115	24	0	6	0	0	1	0	0	0	0	0	146
17:00	0	140	23	0	10	0	0	0	0	0	0	0	0	173
18:00	3	136	21	0	5	0	0	1	0	0	0	0	0	166
19:00	0	73	19	0	6	0	0	0	0	0	0	0	0	98
20:00	1	45	11	0	2	0	0	0	0	0	0	0	0	59
21:00	0	41	8	0	1	0	0	0	0	0	0	0	0	50
22:00	0	12	3	0	0	0	0	0	0	0	0	0	0	15
23:00	0	7	1	0	1	0	0	0	0	0	0	0	0	9
Total	11	1851	450	5	151	5	0	7	2	0	0	0	0	2482
Percent	0.4%	74.6%	18.1%	0.2%	6.1%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	05:00	07:00	08:00	05:00	08:00	07:00		07:00	11:00					07:00
Vol.	1	203	49	1	25	1		2	1					266
PM Peak	18:00	17:00	12:00	12:00	17:00	13:00		13:00	13:00					17:00
Vol.	3	140	30	2	10	1		1	1					173

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EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/26/19														
9	0	3	1	0	1	0	0	0	0	0	0	0	0	5
01:00	0	1	0	0	1	0	0	0	0	0	0	0	0	2
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
04:00	0	8	4	0	3	0	0	0	0	0	0	0	0	15
05:00	0	33	9	0	10	0	0	0	0	0	0	0	0	52
06:00	0	146	40	3	18	0	0	0	0	0	0	0	0	207
07:00	1	195	44	0	15	0	0	1	0	0	0	0	0	256
08:00	0	162	43	0	12	0	0	0	0	0	0	0	0	217
09:00	0	135	28	0	10	0	0	0	0	0	0	0	0	173
10:00	0	84	25	0	13	1	0	0	0	0	0	0	0	123
11:00	0	62	18	0	10	1	0	1	0	0	0	0	0	92
12 PM	0	49	23	0	3	0	0	0	0	0	0	0	0	75
13:00	0	64	7	0	5	0	0	0	0	0	0	0	0	76
14:00	0	80	29	0	3	0	0	1	0	0	0	0	0	113
15:00	0	127	29	0	6	0	0	0	0	0	0	0	0	162
16:00	0	119	24	0	4	0	0	0	0	0	0	0	0	147
17:00	0	109	23	1	5	1	0	0	0	0	0	0	0	139
18:00	0	103	20	0	4	0	0	0	0	0	0	0	0	127
19:00	0	67	13	2	2	1	0	0	0	0	0	0	0	85
20:00	0	40	5	0	3	0	0	0	0	0	0	0	0	48
21:00	0	35	4	0	4	0	0	0	0	0	0	0	0	43
22:00	0	17	4	0	0	0	0	0	0	0	0	0	0	21
23:00	0	7	3	0	0	0	0	0	0	0	0	0	0	10
Total	1	1648	397	6	132	4	0	3	0	0	0	0	0	2191
Percent	0.0%	75.2%	18.1%	0.3%	6.0%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	07:00	06:00	06:00	10:00		07:00						07:00
Vol.	1	195	44	3	18	1		1						256
PM Peak		15:00	14:00	19:00	15:00	17:00		14:00						15:00
Vol.		127	29	2	6	1		1						162



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WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/25/1														
9	0	11	0	0	1	0	0	0	0	0	0	0	0	12
01:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
04:00	0	1	1	0	2	0	0	0	0	0	0	0	0	4
05:00	1	14	6	0	3	0	0	0	0	0	0	0	0	24
06:00	0	38	9	0	5	0	0	0	0	0	0	0	0	52
07:00	0	81	20	0	8	1	0	0	0	0	0	0	0	110
08:00	0	65	25	0	11	0	0	0	0	0	0	0	0	101
09:00	0	61	27	0	6	0	0	2	0	0	0	0	0	96
10:00	1	83	31	0	13	0	0	0	0	0	0	0	0	128
11:00	0	82	28	0	12	1	0	1	0	0	0	0	0	124
12 PM	0	97	45	1	13	0	0	1	0	0	0	0	0	157
13:00	0	118	33	1	13	1	0	1	0	0	0	0	0	167
14:00	1	120	36	0	12	2	0	0	0	0	0	0	0	171
15:00	2	157	45	1	19	0	0	2	0	0	0	0	0	226
16:00	1	225	63	1	22	0	0	1	0	0	0	0	0	313
17:00	0	270	59	0	38	0	0	1	0	0	0	0	0	368
18:00	1	200	45	1	21	0	0	0	0	0	0	0	0	268
19:00	0	135	23	0	12	0	0	0	0	0	0	0	0	170
20:00	0	96	21	0	4	0	0	0	0	0	0	0	0	121
21:00	1	67	17	0	4	0	0	0	0	0	0	0	0	89
22:00	0	32	9	0	3	0	0	0	0	0	0	0	0	44
23:00	1	17	4	0	1	0	0	0	0	0	0	0	0	23
Total	9	1977	548	5	223	5	0	9	0	0	0	0	0	2776
Percent	0.3%	71.2%	19.7%	0.2%	8.0%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	05:00	10:00	10:00		10:00	07:00		09:00						10:00
Vol.	1	83	31		13	1		2						128
PM Peak	15:00	17:00	16:00	12:00	17:00	14:00		15:00						17:00
Vol.	2	270	63	1	38	2		2						368



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
Office: 508-875-0100 Fax: 508-875-0118  
Email: datarequests@pdillc.com

#51 Summer Street  
between Maple St. and Linden St.  
City, State: Maynard, MA  
Client: Ron Muller & Associates / R. Muller

197196 A Class  
Site Code: 19035  
Date Start: 25-Sep-19  
Date End: 26-Sep-19

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/26/1														
9	0	7	4	0	1	0	0	0	0	0	0	0	0	12
01:00	0	2	0	0	1	0	0	0	0	0	0	0	0	3
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
04:00	1	1	2	0	1	0	0	0	0	0	0	0	0	5
05:00	0	9	4	0	5	0	0	0	0	0	0	0	0	18
06:00	0	36	6	0	2	0	0	0	0	0	0	0	0	44
07:00	0	68	27	0	16	0	0	0	0	0	0	0	0	111
08:00	0	93	27	0	10	0	0	0	0	0	0	0	0	130
09:00	0	68	27	0	7	0	0	1	0	0	0	0	0	103
10:00	0	90	25	1	11	3	0	1	0	0	0	0	0	131
11:00	0	90	37	0	19	0	0	1	0	0	0	0	0	147
12 PM	0	112	30	1	11	1	0	0	0	0	0	0	0	155
13:00	0	96	26	1	19	1	0	1	0	0	0	0	0	144
14:00	0	121	56	0	22	2	0	1	0	0	0	0	0	202
15:00	0	143	40	3	19	1	0	0	0	0	0	0	0	206
16:00	1	197	59	0	22	1	0	0	0	0	0	0	0	280
17:00	1	243	57	1	19	0	0	2	0	0	0	0	0	323
18:00	0	203	35	1	22	1	0	0	0	0	0	0	0	262
19:00	0	123	27	0	13	0	0	0	0	0	0	0	0	163
20:00	0	83	26	0	5	0	0	0	0	0	0	0	0	114
21:00	0	61	11	0	2	0	0	0	0	0	0	0	0	74
22:00	0	29	7	0	5	0	0	0	0	0	0	0	0	41
23:00	0	18	4	0	1	0	0	0	0	0	0	0	0	23
Total	3	1894	537	8	233	10	0	7	0	0	0	0	0	2692
Percent	0.1%	70.4%	19.9%	0.3%	8.7%	0.4%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	04:00	08:00	11:00	10:00	11:00	10:00		09:00						11:00
Vol.	1	93	37	1	19	3		1						147
PM Peak	16:00	17:00	16:00	15:00	14:00	14:00		17:00						17:00
Vol.	1	243	59	3	22	2		2						323

#51 Summer Street  
 between Maple St. and Linden St.  
 City, State: Maynard, MA  
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PRECISION  
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197196 A Speed  
 Site Code: 19035  
 Date Start: 25-Sep-19  
 Date End: 26-Sep-19

EB

Start Time	14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th Perce	Avera (Mean
09/25/19	0	0	0	1	7	0	0	0	0	0	0	0	0	8	33	31
01:00	0	0	0	0	1	0	1	1	0	0	0	0	0	3	46	40
02:00	0	1	0	0	1	1	0	0	0	0	0	0	0	3	36	29
03:00	0	0	1	2	1	1	0	0	0	0	0	0	0	5	35	29
04:00	0	1	1	1	6	5	0	0	0	0	0	0	0	14	36	32
05:00	0	1	6	16	31	12	2	0	0	0	0	0	0	68	35	31
06:00	0	1	5	48	113	31	1	0	0	0	0	0	0	199	34	31
07:00	4	3	9	56	134	57	3	0	0	0	0	0	0	266	35	31
08:00	0	5	20	65	122	36	3	0	0	0	0	0	0	251	34	30
09:00	0	2	11	50	80	16	2	0	0	0	0	0	0	161	33	30
10:00	3	0	9	31	64	13	0	0	0	0	0	0	0	120	33	30
11:00	0	1	7	51	59	18	2	0	0	0	0	0	0	138	33	30
12 PM	0	2	18	43	62	14	1	0	0	0	0	0	0	140	33	30
13:00	0	0	16	41	63	12	0	0	0	0	0	0	0	132	33	30
14:00	1	0	5	28	63	25	0	0	0	0	0	0	0	122	35	31
15:00	0	0	7	47	69	11	2	0	0	0	0	0	0	136	33	30
16:00	0	1	7	47	67	23	1	0	0	0	0	0	0	146	34	31
17:00	0	1	5	64	79	23	1	0	0	0	0	0	0	173	33	30
18:00	1	1	10	69	70	15	0	0	0	0	0	0	0	166	33	30
19:00	0	2	3	43	44	6	0	0	0	0	0	0	0	98	33	30
20:00	0	1	7	18	28	3	2	0	0	0	0	0	0	59	33	30
21:00	0	0	2	19	22	6	1	0	0	0	0	0	0	50	33	30
22:00	0	0	1	2	10	2	0	0	0	0	0	0	0	15	33	31
23:00	0	0	0	3	5	1	0	0	0	0	0	0	0	9	33	31
Total	9	23	150	745	1201	331	22	1	0	0	0	0	0	2482		
%	0.4%	0.9%	6.0%	30.0%	48.4%	13.3%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	08:00	08:00	08:00	07:00	07:00	07:00	01:00						07:00		
Vol.	4	5	20	65	134	57	3	1						266		
PM Peak	14:00	12:00	12:00	18:00	17:00	14:00	15:00							17:00		
Vol.	1	2	18	69	79	25	2							173		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 30 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 37 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 1946  
 Percent in Pace : 78.4%  
 Number of Vehicles > 30 MPH : 1315  
 Percent of Vehicles > 30 MPH : 53.0%



PRECISION  
D A T A  
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#51 Summer Street  
between Maple St. and Linden St.  
City, State: Maynard, MA  
Client: Ron Muller & Associates / R. Muller

197196 A Speed  
Site Code: 19035  
Date Start: 25-Sep-19  
Date End: 26-Sep-19

EB

Start Time	14	15	19	20	24	25	29	30	34	35	39	40	44	45	49	50	54	55	59	60	64	65	69	70	9999	Total	85th Perce	Avera (Mean
09/26/19	0	0	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	40	32	
01:00	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	37	35	
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	31	25	
04:00	0	0	0	3	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	36	32	
05:00	0	1	1	13	21	12	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	37	32	
06:00	0	4	16	55	96	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207	34	30	
07:00	1	7	17	56	123	47	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	35	31	
08:00	3	2	5	51	121	32	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	217	34	31	
09:00	5	4	24	57	57	24	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	173	34	29	
10:00	3	3	16	45	43	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	33	28	
11:00	2	1	7	28	40	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	34	30	
12 PM	0	0	1	26	39	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	33	31	
13:00	1	1	6	27	32	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	33	30	
14:00	0	0	9	28	59	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	34	31	
15:00	2	4	10	41	79	24	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	162	34	30	
16:00	0	2	7	47	72	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147	33	30	
17:00	0	1	8	45	69	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	33	30	
18:00	0	0	3	51	63	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127	33	30	
19:00	0	1	4	39	36	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	32	29	
20:00	0	1	2	15	25	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	33	30	
21:00	0	0	1	18	22	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	32	30	
22:00	0	0	2	7	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	33	30	
23:00	0	0	0	2	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	36	32	
Total	17	33	139	657	1023	297	24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2191			
%	0.8%	1.5%	6.3%	30.0%	46.7%	13.6%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
AM Peak	09:00	07:00	09:00	09:00	07:00	07:00	07:00	09:00																		07:00		
Vol.	5	7	24	57	123	47	5	1																		256		
PM Peak	15:00	15:00	15:00	18:00	15:00	15:00	18:00																			15:00		
Vol.	2	4	10	51	79	24	3																			162		

Stats

15th Percentile : 25 MPH  
 50th Percentile : 30 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 37 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 1680  
 Percent in Pace : 76.7%  
 Number of Vehicles > 30 MPH : 1140  
 Percent of Vehicles > 30 MPH : 52.0%



PRECISION  
D A T A  
INDUSTRIES, LLC

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#51 Summer Street  
between Maple St. and Linden St.  
City, State: Maynard, MA  
Client: Ron Muller & Associates / R. Muller

197196 A Speed  
Site Code: 19035  
Date Start: 25-Sep-19  
Date End: 26-Sep-19

WB

Start Time	14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th Perce	Avera (Mean
09/25/19	0	1	3	5	2	1	0	0	0	0	0	0	0	12	31	27
01:00	0	1	0	0	1	1	0	0	0	0	0	0	0	3	36	29
02:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1	28	27
03:00	0	0	0	0	4	0	0	0	0	0	0	0	0	4	33	32
04:00	0	0	0	0	3	1	0	0	0	0	0	0	0	4	36	33
05:00	1	0	1	4	13	5	0	0	0	0	0	0	0	24	35	31
06:00	0	0	2	11	25	12	1	1	0	0	0	0	0	52	36	32
07:00	0	2	3	27	58	19	1	0	0	0	0	0	0	110	34	31
08:00	0	5	1	23	53	15	4	0	0	0	0	0	0	101	35	31
09:00	0	1	9	32	46	8	0	0	0	0	0	0	0	96	33	30
10:00	0	1	5	49	62	9	2	0	0	0	0	0	0	128	33	30
11:00	0	1	7	48	56	12	0	0	0	0	0	0	0	124	33	30
12 PM	0	3	14	55	61	22	2	0	0	0	0	0	0	157	34	30
13:00	0	2	15	46	83	19	2	0	0	0	0	0	0	167	33	30
14:00	0	1	15	46	78	30	1	0	0	0	0	0	0	171	34	31
15:00	1	6	12	63	108	32	4	0	0	0	0	0	0	226	34	30
16:00	2	5	14	102	144	46	0	0	0	0	0	0	0	313	33	30
17:00	1	1	31	148	145	42	0	0	0	0	0	0	0	368	33	30
18:00	0	4	13	88	122	41	0	0	0	0	0	0	0	268	34	30
19:00	0	2	11	62	77	17	1	0	0	0	0	0	0	170	33	30
20:00	0	0	2	51	55	13	0	0	0	0	0	0	0	121	33	30
21:00	0	2	3	25	43	15	1	0	0	0	0	0	0	89	34	31
22:00	0	1	1	12	25	5	0	0	0	0	0	0	0	44	33	31
23:00	0	0	0	6	14	3	0	0	0	0	0	0	0	23	33	31
Total	5	39	162	904	1278	368	19	1	0	0	0	0	0	2776		
%	0.2%	1.4%	5.8%	32.6%	46.0%	13.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	05:00	08:00	09:00	10:00	10:00	07:00	08:00	06:00						10:00		
Vol.	1	5	9	49	62	19	4	1						128		
PM Peak	16:00	15:00	17:00	17:00	17:00	16:00	15:00							17:00		
Vol.	2	6	31	148	145	46	4							368		

Stats  
15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 33 MPH  
95th Percentile : 37 MPH

Mean Speed(Average) : 30 MPH  
10 MPH Pace Speed : 25-34 MPH  
Number in Pace : 2182  
Percent in Pace : 78.6%  
Number of Vehicles > 30 MPH : 1410  
Percent of Vehicles > 30 MPH : 50.8%



PRECISION  
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197196 A Speed  
Site Code: 19035  
Date Start: 25-Sep-19  
Date End: 26-Sep-19

WB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th Perce	Avera (Mean
09/26/19	14	19	24	29	34	39	44	49	54	59	64	69	9999			
19	0	0	2	5	5	0	0	0	0	0	0	0	0	12	32	28
01:00	0	0	0	2	0	0	1	0	0	0	0	0	0	3	41	32
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1	33	32
04:00	0	0	0	1	2	2	0	0	0	0	0	0	0	5	37	33
05:00	0	0	4	3	11	0	0	0	0	0	0	0	0	18	32	29
06:00	0	0	2	7	22	12	1	0	0	0	0	0	0	44	36	32
07:00	0	0	8	29	50	20	3	1	0	0	0	0	0	111	35	31
08:00	1	5	8	47	46	22	1	0	0	0	0	0	0	130	34	30
09:00	2	8	15	30	40	8	0	0	0	0	0	0	0	103	33	28
10:00	0	4	12	60	49	6	0	0	0	0	0	0	0	131	32	29
11:00	0	3	12	54	66	11	1	0	0	0	0	0	0	147	33	29
12 PM	0	2	9	71	54	18	1	0	0	0	0	0	0	155	33	30
13:00	0	1	6	46	65	26	0	0	0	0	0	0	0	144	34	31
14:00	0	1	19	59	95	25	2	1	0	0	0	0	0	202	33	30
15:00	2	3	9	70	91	27	4	0	0	0	0	0	0	206	34	30
16:00	0	5	21	85	132	35	2	0	0	0	0	0	0	280	33	30
17:00	0	5	7	105	172	33	1	0	0	0	0	0	0	323	33	30
18:00	1	6	14	90	130	21	0	0	0	0	0	0	0	262	33	30
19:00	0	4	9	64	67	17	2	0	0	0	0	0	0	163	33	30
20:00	0	1	2	43	57	9	2	0	0	0	0	0	0	114	33	30
21:00	0	1	3	23	39	7	1	0	0	0	0	0	0	74	33	30
22:00	0	1	3	7	23	7	0	0	0	0	0	0	0	41	34	31
23:00	0	1	0	8	12	2	0	0	0	0	0	0	0	23	33	30
Total	6	51	165	909	1229	308	22	2	0	0	0	0	0	2692		
%	0.2%	1.9%	6.1%	33.8%	45.7%	11.4%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	09:00	09:00	10:00	11:00	08:00	07:00	07:00						11:00		
Vol.	2	8	15	60	66	22	3	1						147		
PM Peak	15:00	18:00	16:00	17:00	17:00	16:00	15:00	14:00						17:00		
Vol.	2	6	21	105	172	35	4	1						323		

Stats  
 15th Percentile : 24 MPH  
 50th Percentile : 29 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 37 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 2138  
 Percent in Pace : 79.4%  
 Number of Vehicles > 30 MPH : 1315  
 Percent of Vehicles > 30 MPH : 48.9%

# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 19035 Summer-Maple AM

Site Code : 19035

Start Date : 9/24/2019

Page No : 1

E-W Street: Summer Street

N-S Street: Maple - Municipal Access Rd.

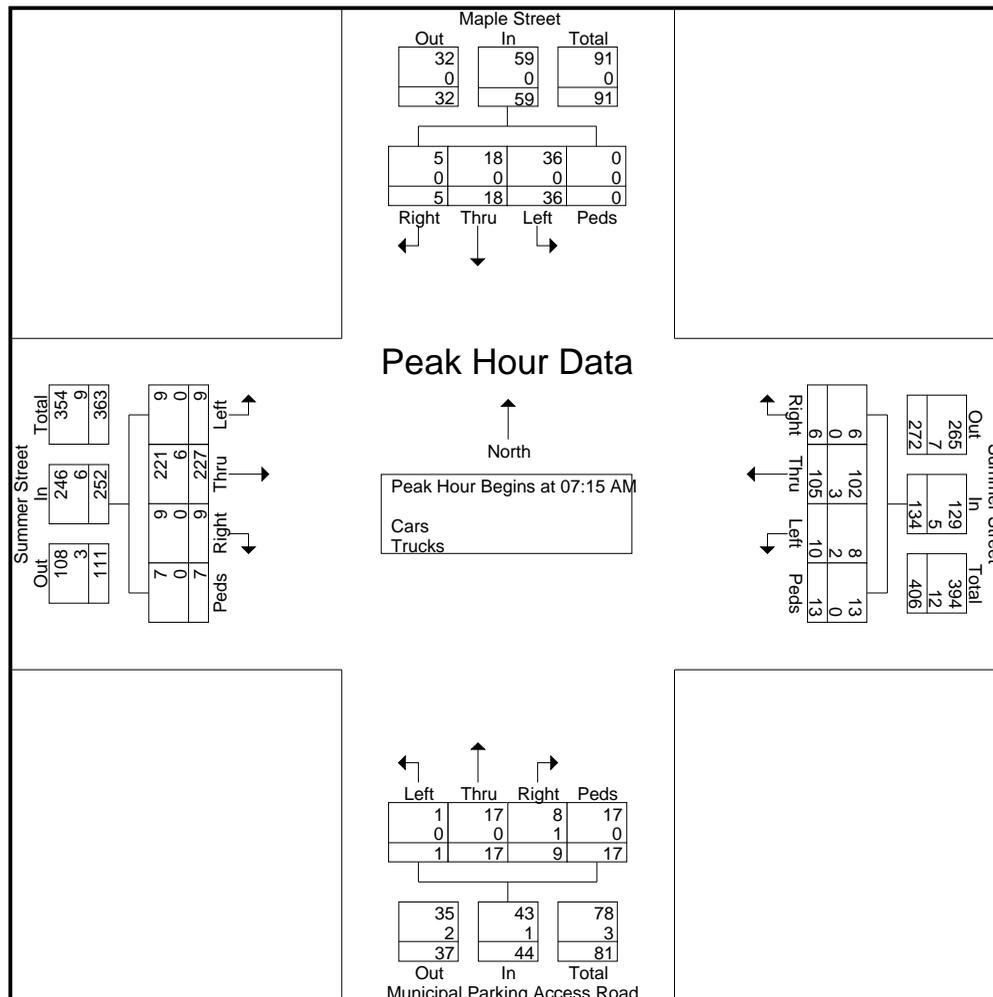
### Groups Printed- Cars - Trucks

Start Time	Maple Street From North					Summer Street From East					Municipal Parking Access Road From South					Summer Street From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	8	3	0	0	11	1	17	1	1	20	1	0	1	0	2	0	58	1	0	59	92
07:15 AM	7	8	2	0	17	1	24	2	1	28	1	2	0	1	4	3	67	0	3	73	122
07:30 AM	12	4	2	0	18	2	24	0	4	30	0	10	4	4	18	2	59	2	2	65	131
07:45 AM	5	3	1	0	9	2	24	3	2	31	0	5	3	4	12	3	40	6	2	51	103
Total	32	18	5	0	55	6	89	6	8	109	2	17	8	9	36	8	224	9	7	248	448
08:00 AM	12	3	0	0	15	5	33	1	6	45	0	0	2	8	10	1	61	1	0	63	133
08:15 AM	3	1	1	1	6	1	28	1	2	32	1	5	1	0	7	2	57	4	3	66	111
08:30 AM	10	2	0	0	12	0	26	2	2	30	0	2	6	2	10	0	43	6	0	49	101
08:45 AM	9	3	0	2	14	6	25	4	9	44	1	1	6	5	13	3	49	2	1	55	126
Total	34	9	1	3	47	12	112	8	19	151	2	8	15	15	40	6	210	13	4	233	471
Grand Total	66	27	6	3	102	18	201	14	27	260	4	25	23	24	76	14	434	22	11	481	919
Apprch %	64.7	26.5	5.9	2.9		6.9	77.3	5.4	10.4		5.3	32.9	30.3	31.6		2.9	90.2	4.6	2.3		
Total %	7.2	2.9	0.7	0.3	11.1	2	21.9	1.5	2.9	28.3	0.4	2.7	2.5	2.6	8.3	1.5	47.2	2.4	1.2	52.3	
Cars	65	26	6	3	100	15	195	13	27	250	4	25	22	24	75	13	425	21	11	470	895
% Cars	98.5	96.3	100	100	98	83.3	97	92.9	100	96.2	100	100	95.7	100	98.7	92.9	97.9	95.5	100	97.7	97.4
Trucks	1	1	0	0	2	3	6	1	0	10	0	0	1	0	1	1	9	1	0	11	24
% Trucks	1.5	3.7	0	0	2	16.7	3	7.1	0	3.8	0	0	4.3	0	1.3	7.1	2.1	4.5	0	2.3	2.6

E-W Street: Summer Street

N-S Street: Maple - Municipal Access Rd.

Start Time	Maple Street From North					Summer Street From East					Municipal Parking Access Road From South					Summer Street From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	7	8	2	0	17	1	24	2	1	28	1	2	0	1	4	3	67	0	3	73	122
07:30 AM	12	4	2	0	18	2	24	0	4	30	0	10	4	4	18	2	59	2	2	65	131
07:45 AM	5	3	1	0	9	2	24	3	2	31	0	5	3	4	12	3	40	6	2	51	103
08:00 AM	12	3	0	0	15	5	33	1	6	45	0	0	2	8	10	1	61	1	0	63	133
Total Volume	36	18	5	0	59	10	105	6	13	134	1	17	9	17	44	9	227	9	7	252	489
% App. Total	61	30.5	8.5	0		7.5	78.4	4.5	9.7		2.3	38.6	20.5	38.6		3.6	90.1	3.6	2.8		
PHF	.750	.563	.625	.000	.819	.500	.795	.500	.542	.744	.250	.425	.563	.531	.611	.750	.847	.375	.583	.863	.919
Cars	36	18	5	0	59	8	102	6	13	129	1	17	8	17	43	9	221	9	7	246	477
% Cars	100	100	100	0	100	80.0	97.1	100	100	96.3	100	100	88.9	100	97.7	100	97.4	100	100	97.6	97.5
Trucks	0	0	0	0	0	2	3	0	0	5	0	0	1	0	1	0	6	0	0	6	12
% Trucks	0	0	0	0	0	20.0	2.9	0	0	3.7	0	0	11.1	0	2.3	0	2.6	0	0	2.4	2.5



# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 19035 Summer-Maple PM

Site Code : 19035

Start Date : 9/24/2019

Page No : 1

E-W Street: Summer Street

N-S Street: Maple - Municipal Access Rd.

### Groups Printed- Cars - Trucks

Start Time	Maple Street From North					Summer Street From East					Municipal Parking Access Road From South					Summer Street From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	3	1	1	4	9	7	65	5	3	80	5	5	4	3	17	3	43	5	0	51	157
04:15 PM	7	2	0	3	12	4	93	4	5	106	2	2	3	5	12	1	22	3	0	26	156
04:30 PM	4	2	3	2	11	5	82	8	5	100	4	2	7	2	15	1	31	2	4	38	164
04:45 PM	4	3	5	4	16	5	67	5	8	85	6	3	5	6	20	3	30	5	1	39	160
Total	18	8	9	13	48	21	307	22	21	371	17	12	19	16	64	8	126	15	5	154	637
05:00 PM	4	1	3	3	11	2	85	6	4	97	5	7	7	4	23	2	40	2	4	48	179
05:15 PM	3	1	2	1	7	8	93	8	11	120	6	8	8	5	27	3	33	4	4	44	198
05:30 PM	6	6	1	2	15	8	98	9	2	117	6	11	8	4	29	3	42	3	2	50	211
05:45 PM	4	2	3	0	9	3	62	3	3	71	5	9	7	4	25	2	28	5	0	35	140
Total	17	10	9	6	42	21	338	26	20	405	22	35	30	17	104	10	143	14	10	177	728
Grand Total	35	18	18	19	90	42	645	48	41	776	39	47	49	33	168	18	269	29	15	331	1365
Apprch %	38.9	20	20	21.1		5.4	83.1	6.2	5.3		23.2	28	29.2	19.6		5.4	81.3	8.8	4.5		
Total %	2.6	1.3	1.3	1.4	6.6	3.1	47.3	3.5	3	56.8	2.9	3.4	3.6	2.4	12.3	1.3	19.7	2.1	1.1	24.2	
Cars	35	18	18	19	90	42	639	47	41	769	39	47	49	33	168	17	265	29	15	326	1353
% Cars	100	100	100	100	100	100	99.1	97.9	100	99.1	100	100	100	100	100	94.4	98.5	100	100	98.5	99.1
Trucks	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	1	4	0	0	5	12
% Trucks	0	0	0	0	0	0	0.9	2.1	0	0.9	0	0	0	0	0	5.6	1.5	0	0	1.5	0.9

# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 19035 Summer-Maple PM

Site Code : 19035

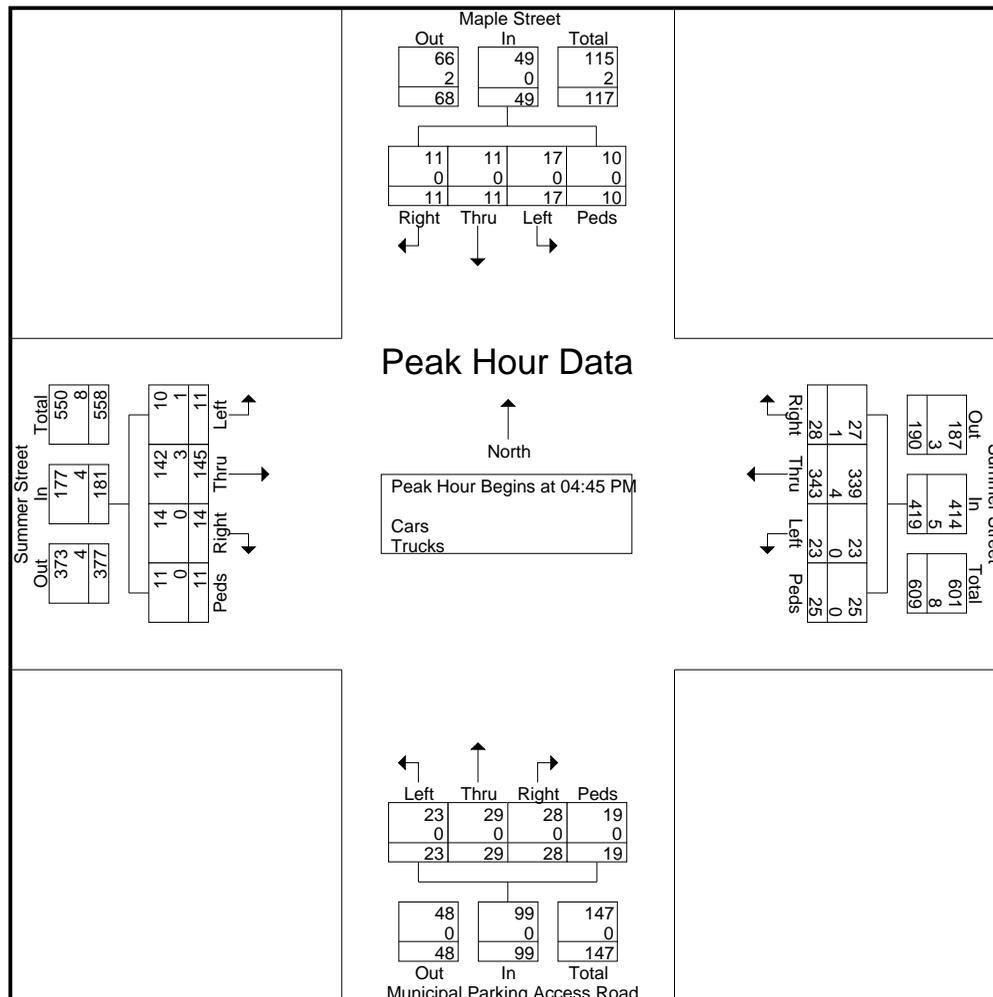
Start Date : 9/24/2019

Page No : 2

E-W Street: Summer Street

N-S Street: Maple - Municipal Access Rd.

Start Time	Maple Street From North					Summer Street From East					Municipal Parking Access Road From South					Summer Street From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	4	3	5	4	16	5	67	5	8	85	6	3	5	6	20	3	30	5	1	39	160
05:00 PM	4	1	3	3	11	2	85	6	4	97	5	7	7	4	23	2	40	2	4	48	179
05:15 PM	3	1	2	1	7	8	93	8	11	120	6	8	8	5	27	3	33	4	4	44	198
05:30 PM	6	6	1	2	15	8	98	9	2	117	6	11	8	4	29	3	42	3	2	50	211
Total Volume	17	11	11	10	49	23	343	28	25	419	23	29	28	19	99	11	145	14	11	181	748
% App. Total	34.7	22.4	22.4	20.4		5.5	81.9	6.7	6		23.2	29.3	28.3	19.2		6.1	80.1	7.7	6.1		
PHF	.708	.458	.550	.625	.766	.719	.875	.778	.568	.873	.958	.659	.875	.792	.853	.917	.863	.700	.688	.905	.886
Cars	17	11	11	10	49	23	339	27	25	414	23	29	28	19	99	10	142	14	11	177	739
% Cars	100	100	100	100	100	100	98.8	96.4	100	98.8	100	100	100	100	100	90.9	97.9	100	100	97.8	98.8
Trucks	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	1	3	0	0	4	9
% Trucks	0	0	0	0	0	0	1.2	3.6	0	1.2	0	0	0	0	0	9.1	2.1	0	0	2.2	1.2



## **Seasonal/Historical Adjustment Data**

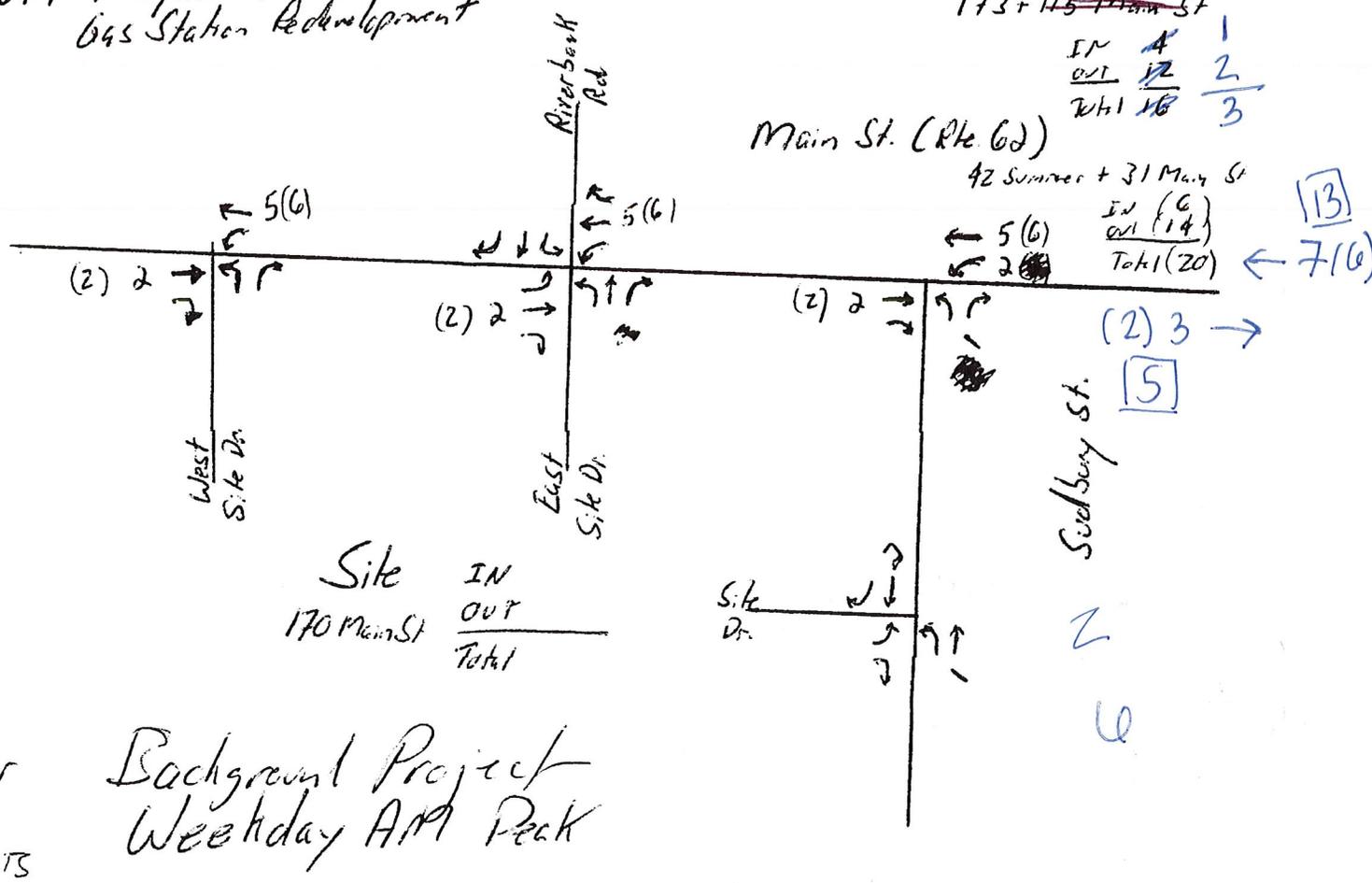
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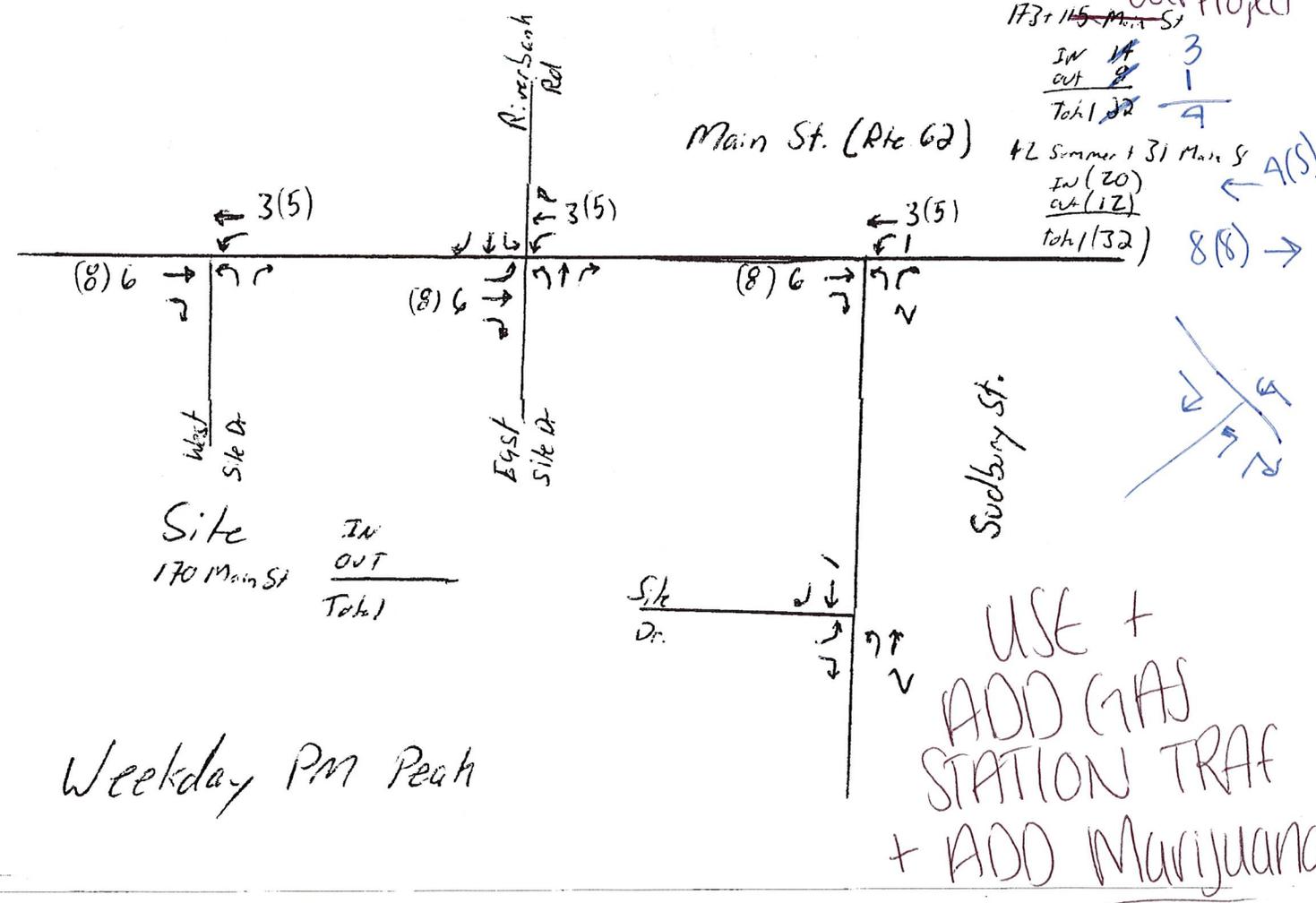


19014 - Maynard, 1714  
 645 Station Redevelopment

OUT PROJECT  
~~173 + 115 Main St~~  
 IN 4  
 OUT 12  
 Total 16



OUT PROJECT  
~~173 + 115 Main St~~  
 IN 14  
 OUT 8  
 Total 22



173 MAIN

IN 1  
OUT 2

WOULD USE FLORIDA  
+ MAIN + MISS SITE  
DRIVE

42+31 MAIN

IN 6  
OUT 14

45% of  
TRIPS FROM  
NORTH

MAIN

173 MAIN

IN 3  
OUT 1

WOULD USE FLORIDA  
+ MAIN + MISS SITE DR

42+31 MAIN

IN 20  
OUT 9

45% of TRIPS  
FROM NORTH

MAIN

FLORIDA

FLORIDA

NASON

SITE

SUMMER

MAPLE

101

SITE

MAPLE

2

1

NASON

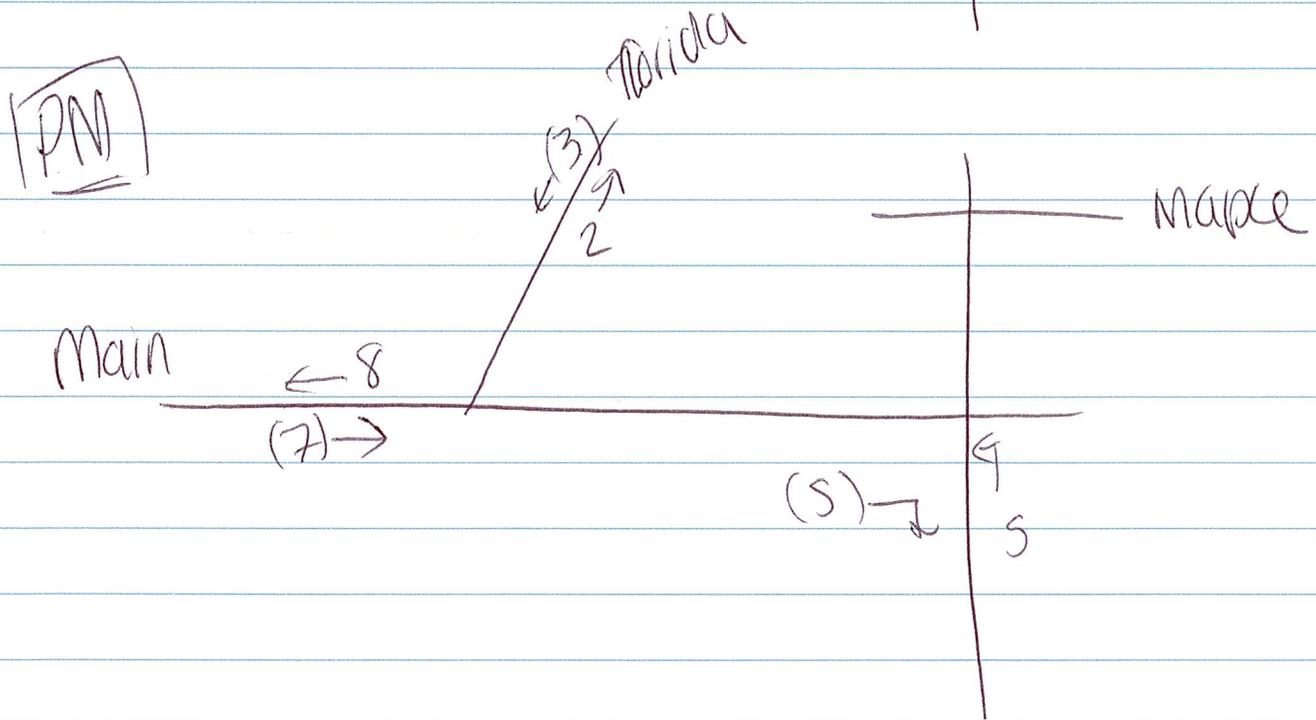
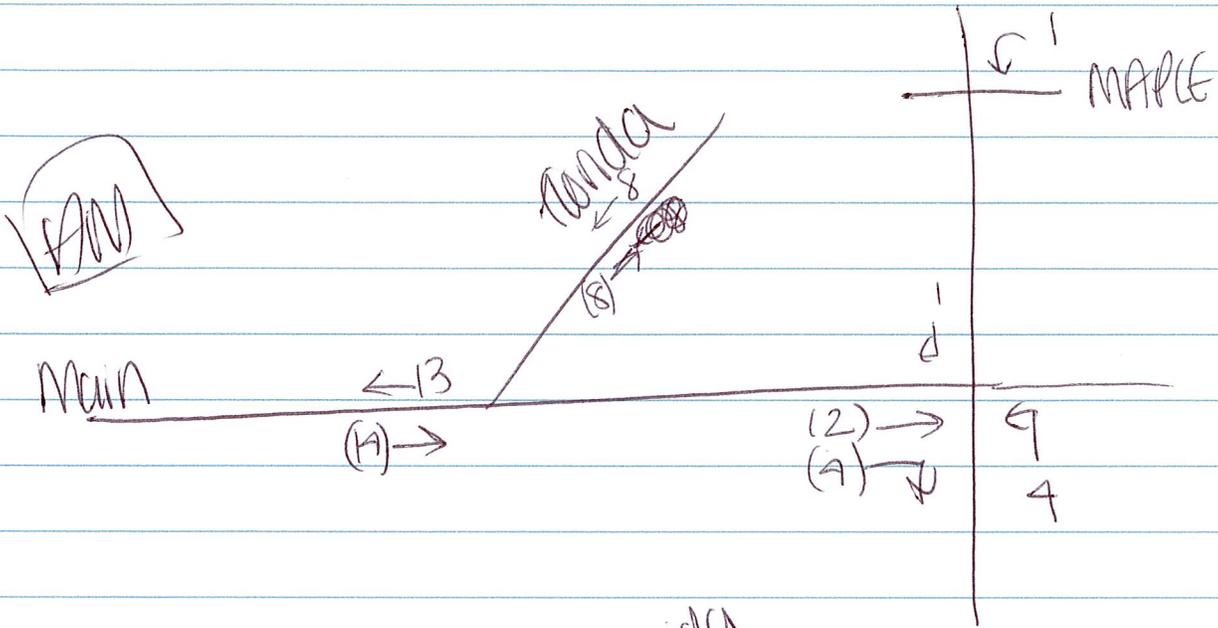
SUMMER

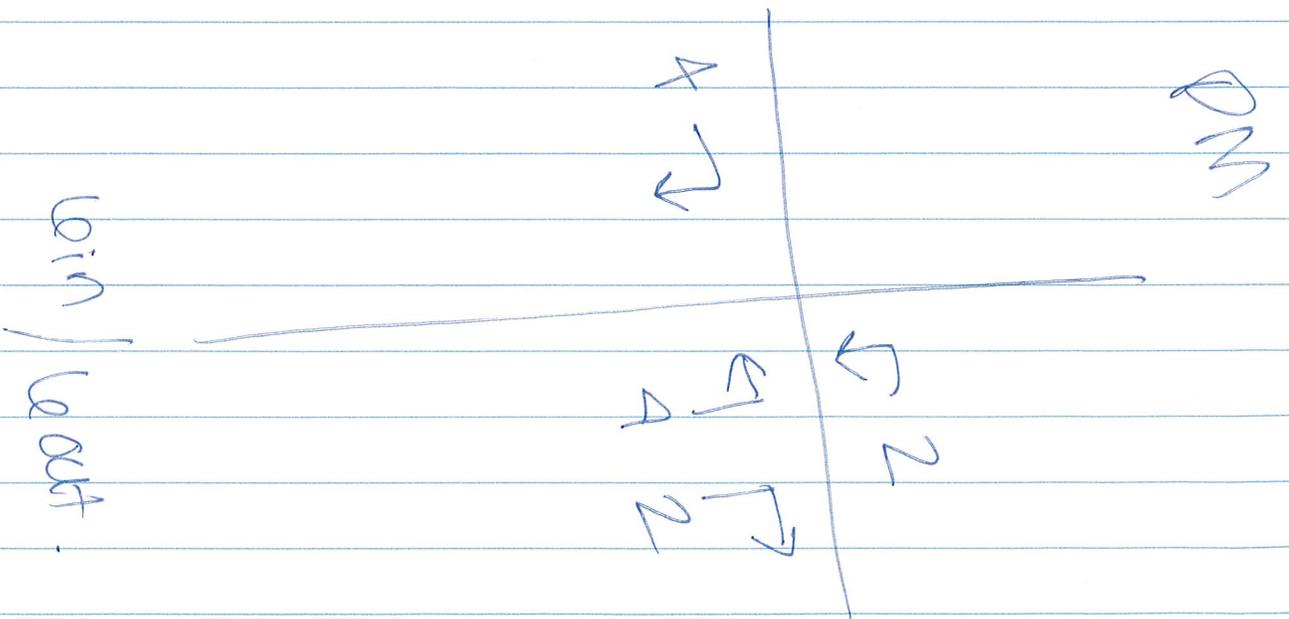
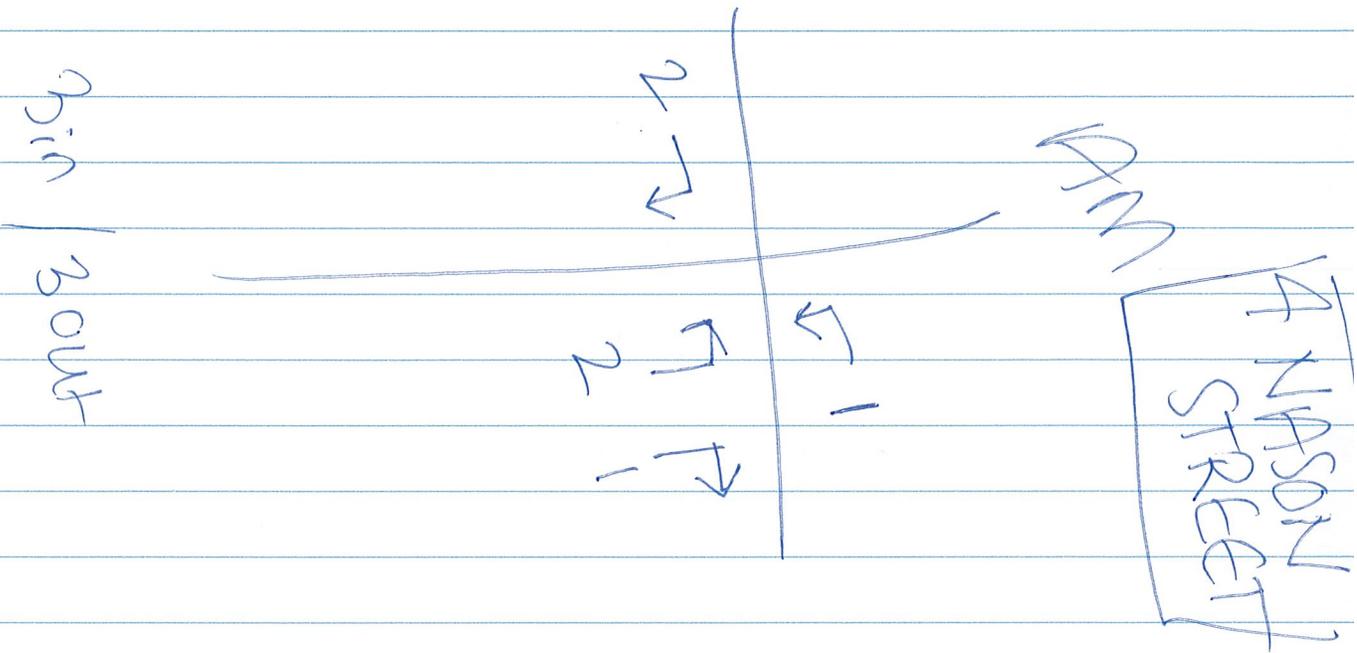
PNM

PNM

MISCELLANEOUS BACKGROUND  
TRAFFIC

# 170 MAIN ST





LUC 220 - Multifamily Housing (La-Rose)

5 units

AM IN 1  
OUT 2  
Total 3

PM IN 3  
OUT 1  
Total 4

26 units

AM IN 3  
OUT 10  
Total 13

PM IN 11  
OUT 7  
Total 18

Aug Rels for LUC 020 Shopping Center  
and LUC 814 Variety Store (Highway)

AM IN 1  
OUT 1  
Total 2

PM IN 3  
OUT 2  
Total 5

---

***Institute of Transportation Engineers (ITE); 10th Edition***  
**Land Use Code (LUC) 882 - Marijuana Dispensary**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area  
Independent Variable (X): 1.900 ksf

**AVERAGE WEEKDAY DAILY (730 - 3410 sf)**

$$T = 252.70 * (X)$$

$$T = 480.13$$

$$T = 480 \quad \text{vehicle trips}$$

with 50% ( 240 vpd) entering and 50% ( 240 vpd) exiting.

**WEEKDAY AM PEAK HOUR OF ADJACENT STREET TRAFFIC (730 - 3410 sf)**

$$T = 10.44 * (X)$$

$$T = 19.84$$

$$T = 20 \quad \text{vehicle trips}$$

with 56% ( 11 vph) entering and 44% ( 9 vph) exiting.

**WEEKDAY PM PEAK HOUR OF ADJACENT STREET TRAFFIC (680 - 3410 sf)**

$$T = 21.83 * (X)$$

$$T = 41.48$$

$$T = 41 \quad \text{vehicle trips}$$

with 50% ( 21 vph) entering and 50% ( 20 vph) exiting.

**SATURDAY DAILY (730 - 3410 sf)**

$$T = 259.31 * (X)$$

$$T = 492.69$$

$$T = 490 \quad \text{vehicle trips}$$

with 50% ( 245 vpd) entering and 50% ( 245 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR (730 - 3410 sf)**

$$T = 36.43 * (X)$$

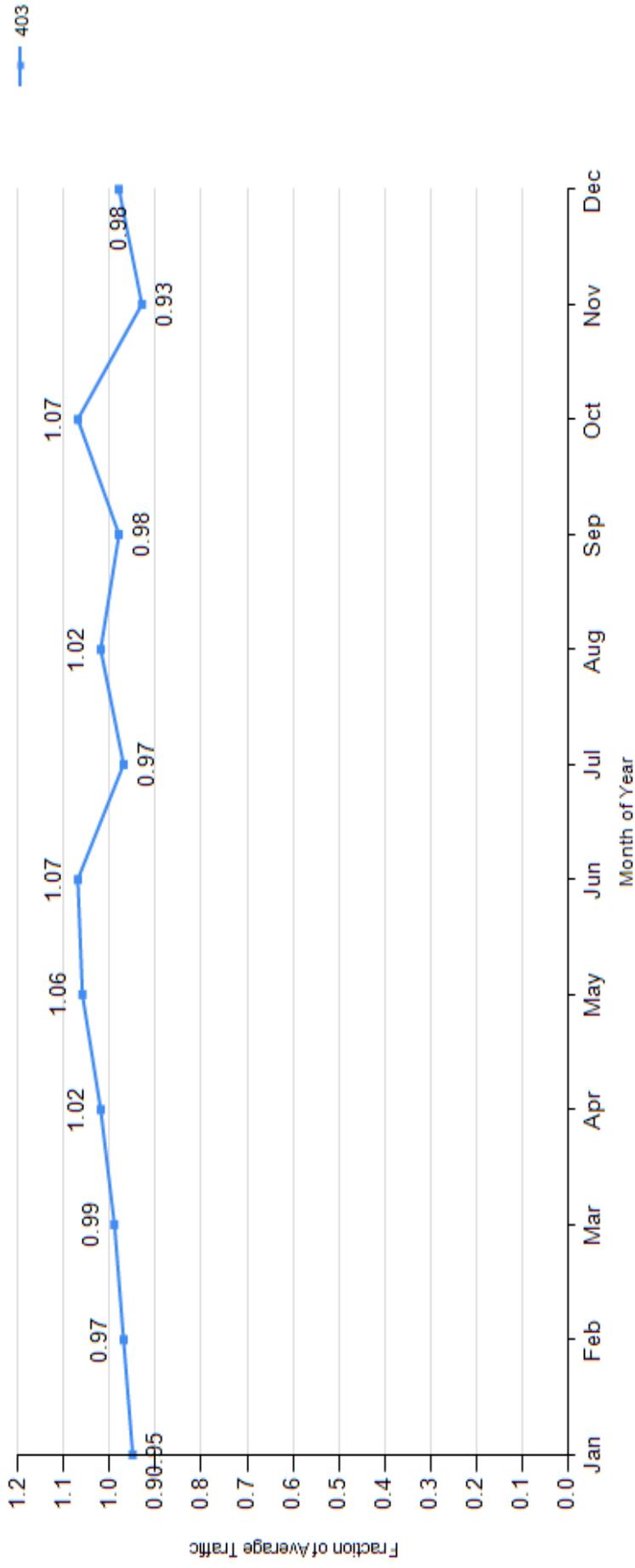
$$T = 69.22$$

$$T = 69 \quad \text{vehicle trips}$$

with 52% ( 36 vph) entering and 48% ( 33 vph) exiting.

*enter/exit split assumed to be the same as LUC 820 (Shopping Center)*

Traffic Pattern by Month for 1/1/2018 - 12/31/2018



MassDOT Transportation Data Management System

STATION 403 - CONCORD - RTE 2 - EAST OF ROTARY

YEAR #	YEAR	AADT	Traffic Growth Calculations									
			Year 1-2	Year 2-3	Year 3-4	Year 4-5	Year 5-6	Year 1-3	Year 2-4	Year 3-5	Year 4-6	Year 5-7
1	2009	44,145	-1.25%	-0.36%	0.42%	-1.54%	Year 5-6					
2	2010	43,592	-0.81%	0.03%	-0.56%	Year 4-6	Year 5-7				0.30%	
3	2011	43,434	-0.40%	-0.49%	Year 3-6	Year 4-7	Year 5-8				1.70%	
4	2012	43,615	-0.68%	Year 2-6	Year 3-7	Year 4-8	Year 5-9					
5	2013	42,945	Year 1-6	Year 2-7	Year 3-8	Year 4-9	Year 5-10				1.25%	
6	2014		Year 1-7	Year 2-8	Year 3-9	Year 4-10						
7	2015	43,202	Year 1-8	Year 2-9	Year 3-10	0.72%						
8	2016	45,131	Year 1-9	Year 2-10	0.58%							
9	2017		Year 1-10	0.37%								
10	2018	45,632										
			Year 6-7	Year 7-8	Year 8-9	Year 9-10						
			Year 6-8	Year 7-9	Year 8-10	0.56%						
			Year 6-9	Year 7-10	1.87%							
			Year 6-10									

2009-2018 Annual Average Traffic Growth Rate: 0.30%



## **Crash Rate/ Trip Generation Worksheets**

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**Institute of Transportation Engineers (ITE); 10th Edition**  
**Land Use Code (LUC) 220 - Apartment**

Average Vehicle Trips Ends vs: Dwelling Units  
 Independent Variable (X): 26

**AVERAGE WEEKDAY DAILY (8-585 Units)**

$T = 7.56 * (X) - 40.86$   
 $T = 155.70$   
 $T = 160$  vehicle trips  
 with 50% ( 80 vpd) entering and 50% ( 80 vpd) exiting.

**WEEKDAY AM PEAK HOUR OF ADJACENT STREET TRAFFIC (8-689 Units)**

$\ln T = 0.95 \ln (X) - 0.51$   
 $\ln T = 2.59$   
 $T = 13.33$   
 $T = 13$  vehicle trips  
 with 23% ( 3 vph) entering and 77% ( 10 vph) exiting.

**WEEKDAY PM PEAK HOUR OF ADJACENT STREET TRAFFIC (8-689 Units)**

$\ln T = 0.89 \ln (X) - 0.02$   
 $\ln T = 2.88$   
 $T = 17.81$   
 $T = 18$  vehicle trips  
 with 63% ( 11 vph) entering and 37% ( 7 vph) exiting.

**SATURDAY DAILY (48-147 Units)**

$T = 14.01 * (X) - 521.69$   
 $T = -157.43$   
 $T = -160$  vehicle trips  
 with 50% ( -80 vpd) entering and 50% ( -80 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR (48-147 Units)**

$T = 1.08 * (X) - 33.24$   
 $T = -5.16$   
 $T = -5$  vehicle trips  
 with 50% ( -3 vph) entering and 50% ( -2 vph) exiting.

**Weekday Daily Average Rate**

$T = 7.32 * (X)$   
 $T = 190.32$   
 $T = 190$  vehicle trips  
 with 95 vpd entering and 95 vpd exiting.

**Weekday AM Peak Hour Average Rate**

$T = 0.46 * (X)$   
 $T = 11.96$   
 $T = 12$  vehicle trips  
 with 3 vph entering and 9 vph exiting.

**Weekday PM Peak Hour Average Rate**

$T = 0.56 * (X)$   
 $T = 14.56$   
 $T = 15$  vehicle trips  
 with 9 vph entering and 6 vph exiting.

**Saturday Daily Average Rate**

$T = 8.14 * (X)$   
 $T = 211.64$   
 $T = 210$  vehicle trips  
 with 105 vpd entering and 105 vpd exiting.

**Saturday Midday Peak Hour Average Rate**

$T = 0.70 * (X)$   
 $T = 18.20$   
 $T = 18$  vehicle trips  
 with 9 vph entering and 9 vph exiting.

**Institute of Transportation Engineers (ITE); 10th Edition**  
**Land Use Code (LUC) 820 - Shopping Center**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area  
 Independent Variable (X): 1.800 ksf

**AVERAGE WEEKDAY DAILY**

$Ln T = 0.68 Ln (X) + 5.57$   
 $Ln T = 5.97$   
 $T = 391.51$   
 $T = 390$  vehicle trips  
 with 50% ( 195 vpd) entering and 50% ( 195 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.50 * (X) + 151.78$   
 $T = 152.68$   
 $T = 153$  vehicle trips  
 with 62% ( 95 vph) entering and 38% ( 58 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$Ln T = 0.74 Ln (X) + 2.89$   
 $Ln T = 3.33$   
 $T = 27.94$   
 $T = 28$  vehicle trips  
 with 48% ( 13 vph) entering and 52% ( 15 vph) exiting.

**SATURDAY DAILY**

$Ln T = 0.62 Ln (X) + 6.24$   
 $Ln T = 6.60$   
 $T = 735.10$   
 $T = 740$  vehicle trips  
 with 50% ( 370 vpd) entering and 50% ( 370 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$Ln T = 0.79 Ln (X) + 2.79$   
 $Ln T = 3.25$   
 $T = 25.79$   
 $T = 26$  vehicle trips  
 with 52% ( 14 vph) entering and 48% ( 12 vph) exiting.

**SUNDAY DAILY**

$T = 21.10 * (X)$   
 $T = 37.98$   
 $T = 40$  vehicle trips  
 with 50% ( 20 vpd) entering and 50% ( 20 vpd) exiting.

**SUNDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 2.79 * (X)$   
 $T = 5.02$   
 $T = 5$  vehicle trips  
 with 49% ( 2 vpd) entering and 51% ( 3 vpd) exiting.

**WEEKDAY DAILY - Average Rate**

$T = 37.75 * (X)$   
 $T = 67.95$   
 $T = 70$  vehicle trips  
 with 35 vph entering and 35 vph exiting.

**WEEKDAY AM PEAK HOUR - Average Rate**

$T = 0.94 * (X)$   
 $T = 1.69$   
 $T = 2$  vehicle trips  
 with 1 vph entering and 1 vph exiting.

**WEEKDAY PM PEAK HOUR - Average Rate**

$T = 3.81 * (X)$   
 $T = 6.86$   
 $T = 7$  vehicle trips  
 with 3 vph entering and 4 vph exiting.

**SATURDAY DAILY - Average Rate**

$T = 46.12 * (X)$   
 $T = 83.02$   
 $T = 80$  vehicle trips  
 with 40 vph entering and 40 vph exiting.

**SATURDAY MIDDAY PEAK HOUR - Average Rate**

$T = 4.50 * (X)$   
 $T = 8.10$   
 $T = 8$  vehicle trips  
 with 4 vph entering and 4 vph exiting.



## **Capacity Analysis Methodology and Worksheets**

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## **General**

A primary result of capacity analysis is the assignment of levels of service to traffic facilities under various traffic flow conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM); Transportation Research Board; Washington, D.C.; 2010. The concept of level of service (LOS) 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 LOS A representing the best operating conditions and LOS F the worst. 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. A description of the operating condition under each level of service is provided below:

- LOS A describes conditions with little to no delay to motorists.
- LOS B represents a desirable level with relatively low delay to motorists.
- LOS C describes conditions with average delays to motorists.
- LOS D describes operations where the influence of congestion becomes more noticeable. Delays are still within an acceptable range.
- LOS E represents operating conditions with high delay values. This level is considered by many agencies to be the limit of acceptable delay.
- LOS F is considered to be unacceptable to most drivers with high delay values that often occur, when arrival flow rates exceed the capacity of the intersection.

## **Unsignalized Intersections**

Levels of service for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control (STOP, YIELD, or all-way STOP control). The definition of level of service for unsignalized intersections is a function of average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The level-of-service criteria for unsignalized intersections are shown in Table A-1.

**Signalized Intersections**

Levels of service for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometries on average *control* delay. Control delay includes queue move-up time and stopped delay. Table A-1 summarizes the relationship between level of service and average control delay.

**Table A-1**  
**Level-of-Service Criteria for Intersections**

<u>Level of Service</u>	<u>Unsignalized Criteria Average Control Delay In Seconds Per Vehicle</u>	<u>Signalized Criteria Average Control Delay In Seconds Per Vehicle</u>
A	≤ 10	≤ 10
B	10.1 to 15.0	10.1 to 20.0
C	15.1 to 25.0	20.1 to 35.0
D	25.1 to 35.0	35.1 to 55.0
E	35.1 to 50.0	55.1 to 80.0
F	>50	>80

For signalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups, to individual intersection approaches, or to the entire intersection. For unsignalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups or to individual intersection approaches.

Mixed-Use Redevelopment  
 3: Municipal Parking Access Road/Maple Street & Summer Street

2019 Existing Conditions  
 Timing Plan: AM

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	232	9	10	107	6	1	17	9	37	18	5
Future Vol, veh/h	9	232	9	10	107	6	1	17	9	37	18	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	252	10	11	116	7	1	18	10	40	20	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	123	0	0	262	0	0	431	422	257	433	424	120
Stage 1	-	-	-	-	-	-	277	277	-	142	142	-
Stage 2	-	-	-	-	-	-	154	145	-	291	282	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1464	-	-	1302	-	-	535	523	782	533	522	931
Stage 1	-	-	-	-	-	-	729	681	-	861	779	-
Stage 2	-	-	-	-	-	-	848	777	-	717	678	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1464	-	-	1302	-	-	510	514	782	505	513	931
Mov Cap-2 Maneuver	-	-	-	-	-	-	510	514	-	505	513	-
Stage 1	-	-	-	-	-	-	723	676	-	854	772	-
Stage 2	-	-	-	-	-	-	814	770	-	683	673	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.6			11.5			12.8		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	580	1464	-	-	1302	-	-	528
HCM Lane V/C Ratio	0.051	0.007	-	-	0.008	-	-	0.124
HCM Control Delay (s)	11.5	7.5	0	-	7.8	0	-	12.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.4

Mixed-Use Redevelopment  
 3: Municipal Parking Access Road/Maple Street & Summer Street

2019 Existing Conditions  
 Timing Plan: PM

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	148	14	23	350	29	23	30	29	17	11	11
Future Vol, veh/h	11	148	14	23	350	29	23	30	29	17	11	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	161	15	25	380	32	25	33	32	18	12	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	412	0	0	176	0	0	651	655	169	671	646	396
Stage 1	-	-	-	-	-	-	193	193	-	446	446	-
Stage 2	-	-	-	-	-	-	458	462	-	225	200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1147	-	-	1400	-	-	382	386	875	370	390	653
Stage 1	-	-	-	-	-	-	809	741	-	591	574	-
Stage 2	-	-	-	-	-	-	583	565	-	778	736	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1147	-	-	1400	-	-	356	372	875	324	376	653
Mov Cap-2 Maneuver	-	-	-	-	-	-	356	372	-	324	376	-
Stage 1	-	-	-	-	-	-	799	732	-	584	561	-
Stage 2	-	-	-	-	-	-	547	552	-	708	727	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.4			14.7			15.2		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	460	1147	-	-	1400	-	-	396
HCM Lane V/C Ratio	0.194	0.01	-	-	0.018	-	-	0.107
HCM Control Delay (s)	14.7	8.2	0	-	7.6	0	-	15.2
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	0.4

Mixed-Use Redevelopment  
 3: Municipal Parking Access Road/Maple Street & Summer Street

2026 No-Build Conditions  
 Timing Plan: AM

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	253	12	12	123	7	3	19	11	40	20	5
Future Vol, veh/h	10	253	12	12	123	7	3	19	11	40	20	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	275	13	13	134	8	3	21	12	43	22	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	142	0	0	288	0	0	482	472	282	484	474	138
Stage 1	-	-	-	-	-	-	304	304	-	164	164	-
Stage 2	-	-	-	-	-	-	178	168	-	320	310	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1441	-	-	1274	-	-	495	490	757	493	489	910
Stage 1	-	-	-	-	-	-	705	663	-	838	762	-
Stage 2	-	-	-	-	-	-	824	759	-	692	659	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1441	-	-	1274	-	-	468	480	757	462	479	910
Mov Cap-2 Maneuver	-	-	-	-	-	-	468	480	-	462	479	-
Stage 1	-	-	-	-	-	-	699	657	-	830	754	-
Stage 2	-	-	-	-	-	-	787	751	-	654	653	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.7			12.1			13.7		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	545	1441	-	-	1274	-	-	486
HCM Lane V/C Ratio	0.066	0.008	-	-	0.01	-	-	0.145
HCM Control Delay (s)	12.1	7.5	0	-	7.9	0	-	13.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.5

Mixed-Use Redevelopment  
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 Timing Plan: PM

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	161	19	27	374	30	29	31	32	18	12	12
Future Vol, veh/h	12	161	19	27	374	30	29	31	32	18	12	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	175	21	29	407	33	32	34	35	20	13	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	440	0	0	196	0	0	707	710	186	728	704	424
Stage 1	-	-	-	-	-	-	212	212	-	482	482	-
Stage 2	-	-	-	-	-	-	495	498	-	246	222	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1120	-	-	1377	-	-	350	359	856	339	361	630
Stage 1	-	-	-	-	-	-	790	727	-	565	553	-
Stage 2	-	-	-	-	-	-	556	544	-	758	720	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1120	-	-	1377	-	-	323	344	856	292	346	630
Mov Cap-2 Maneuver	-	-	-	-	-	-	323	344	-	292	346	-
Stage 1	-	-	-	-	-	-	780	718	-	558	538	-
Stage 2	-	-	-	-	-	-	516	529	-	684	711	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.5			16.1			16.3		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	423	1120	-	-	1377	-	-	364
HCM Lane V/C Ratio	0.236	0.012	-	-	0.021	-	-	0.125
HCM Control Delay (s)	16.1	8.3	0	-	7.7	0	-	16.3
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.4

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 Timing Plan: AM

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	253	13	14	123	7	5	21	18	40	21	5
Future Vol, veh/h	10	253	13	14	123	7	5	21	18	40	21	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	275	14	15	134	8	5	23	20	43	23	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	142	0	0	289	0	0	486	476	282	494	479	138
Stage 1	-	-	-	-	-	-	304	304	-	168	168	-
Stage 2	-	-	-	-	-	-	182	172	-	326	311	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1441	-	-	1273	-	-	492	488	757	486	486	910
Stage 1	-	-	-	-	-	-	705	663	-	834	759	-
Stage 2	-	-	-	-	-	-	820	756	-	687	658	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1441	-	-	1273	-	-	463	477	757	449	475	910
Mov Cap-2 Maneuver	-	-	-	-	-	-	463	477	-	449	475	-
Stage 1	-	-	-	-	-	-	699	657	-	826	749	-
Stage 2	-	-	-	-	-	-	780	746	-	640	652	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.8			12			13.9		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	560	1441	-	-	1273	-	-	476
HCM Lane V/C Ratio	0.085	0.008	-	-	0.012	-	-	0.151
HCM Control Delay (s)	12	7.5	0	-	7.9	0	-	13.9
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.5

Mixed-Use Redevelopment  
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2026 Build Conditions  
 Timing Plan: PM

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	161	22	36	374	30	32	33	38	18	14	12
Future Vol, veh/h	12	161	22	36	374	30	32	33	38	18	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	175	24	39	407	33	35	36	41	20	15	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	440	0	0	199	0	0	729	731	187	754	727	424
Stage 1	-	-	-	-	-	-	213	213	-	502	502	-
Stage 2	-	-	-	-	-	-	516	518	-	252	225	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1120	-	-	1373	-	-	338	349	855	326	351	630
Stage 1	-	-	-	-	-	-	789	726	-	552	542	-
Stage 2	-	-	-	-	-	-	542	533	-	752	718	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1120	-	-	1373	-	-	307	331	855	274	333	630
Mov Cap-2 Maneuver	-	-	-	-	-	-	307	331	-	274	333	-
Stage 1	-	-	-	-	-	-	779	717	-	545	521	-
Stage 2	-	-	-	-	-	-	496	513	-	671	709	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.6			16.8			17		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	415	1120	-	-	1373	-	-	347
HCM Lane V/C Ratio	0.27	0.012	-	-	0.028	-	-	0.138
HCM Control Delay (s)	16.8	8.3	0	-	7.7	0	-	17
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.1	0	-	-	0.1	-	-	0.5