

# LIBERTY TREE ACADEMY

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## TRAFFIC IMPACT STUDY

**Prepared for:**

**Liberty Tree Academy**

**Prepared by:**



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Sheet added

Provide a statement sheet after the cover sheet or the Table of Contents with the following information:

### Traffic Engineer's Statement

The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.

**On Behalf of:**  
**Liberty Tree Academy**  
**8579 Eastonville Road**  
**Peyton, CO 80831**

\_\_\_\_\_  
[Name, P.E. # \_\_\_\_\_] Date

**Project Number: PPR-18-023**

### Developer's Statement

**May 4, 2018**  
**Revised June 29, 2018**

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

\_\_\_\_\_  
[Name, Title] Date  
[Business Name]  
[Address]

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## Introduction

The Liberty Tree Academy is a proposed private school with an initial kindergarten through 8<sup>th</sup> grade enrollment of 486 student in one building on approximately 4 acres of undeveloped land. For the purposes of this Traffic Impact Study (TIS) the project is assumed to be fully built-out in 2019. In the long-range condition, the school may be expanded to include high school enrollment, but this condition is uncertain and is not included in this TIS. The purpose of this TIS is to assess the effects the site traffic has on the intersection serving the site in 1) the short range condition with 486 students, and 2) the long-range condition, 2040, with the same student enrollment. The remaining site may be developed to include an alternate use, but due to development uncertainty is not included in this TIS.

The proposed site is bounded on the north by Eastonville Road and the eastern property line, on the east by undeveloped property, on the south by a residential property, and on the west by Eastonville Road. Figure 1 depicts the location of the site.

## Project Description

Liberty Tree Academy is proposed as a single two-story building and includes administrative offices, class rooms, gymnasium, warming kitchen, and ancillary rooms. The building area is 39,676 square feet. Adjacent to and south of the building is a fenced play area for younger aged children. Exterior to the building the facility includes a circular one-way drive aisle, with a near side drop off lane. Parking is located along the northwest and north portion of the site. Pedestrians are accommodated with sidewalks and curb ramps. Bicyclists share the drive aisle. (In the future, an attached building with an additional 11, 640 square feet of class rooms is proposed. With this addition the total building area would be 51,316 square feet. This total building area is not included in this TIS).

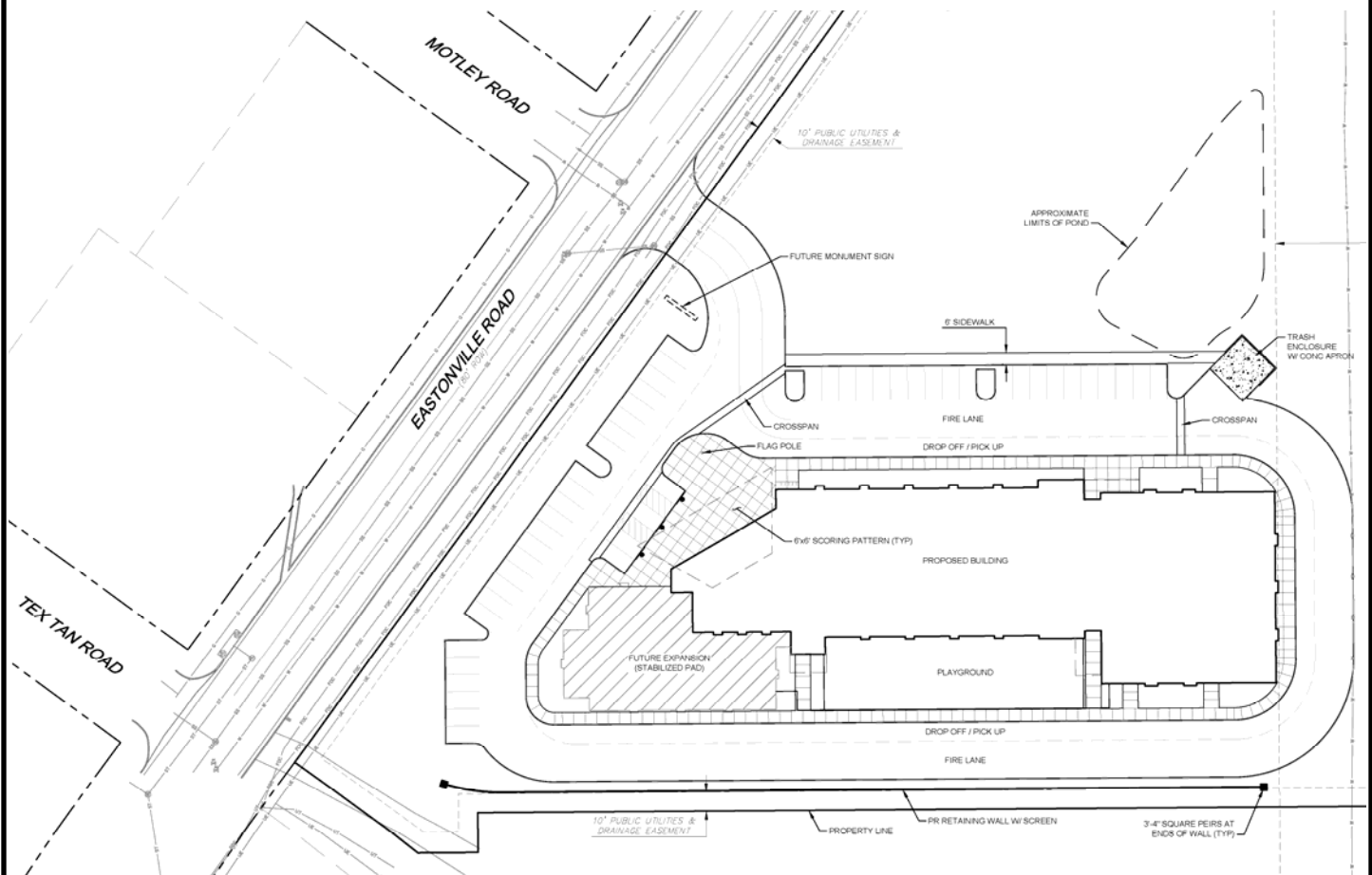
Access to the Site is proposed through one primary location at the existing Eastonville Road/Motley Road intersection. Eastonville Road is planned as an urban minor arterial roadway. Motley Road is a local street. The existing intersection is configured as a “T” which will be modified to a four-leg intersection, with stop control on the side street.00Figure 2 shows the proposed access locations and internal drive aisle and circulation.





**LIBERTY TREE ACADEMY**  
**TRAFFIC IMPACT STUDY**

**Figure 1**  
**VICINITY MAP**



## Existing Traffic Conditions

### Roadway Network

The existing Eastonville Road is classified as an urban minor arterial roadway with a right of way (ROW) width of 80 feet with an ultimate ROW of 100 feet. Motley Road is a local street with a ROW of 60 feet. The existing intersection configuration is described below:

#### Eastonville Road/Motley Road

Eastonville Road and Motley Road are paved roadways with curb and gutter. Motley Road is stop controlled. The existing intersection geometry at the Eastonville Road and Motley Road intersection includes:

- Northbound, striped center two way turn lane, and one through lane, and no right turn lane.
- Southbound, striped center two way turn lane, and one through lane, and one right turn lane.
- Eastbound, shared right/left turn lane.

#### Eastonville Road/Judd Orr Road

Eastonville Road and Meridan/Judd Orr Road are paved roadways with curb and gutter. East of the intersection Judd Orr Road the south curb and gutter discontinues. The intersection is all-way stop controlled. The existing intersection geometry at the Eastonville Road and Meridan/Judd Orr Road intersection includes:

- Northbound, one striped left turn lane, one shared through/right turn lane, and no right turn lane.
- Southbound, one striped left turn lane, one shared through/right turn lane, and no right turn lane.
- Westbound, one striped left turn lane, one through lane, and an exclusive right turn lane.
- Eastbound, one striped left turn lane, one shared through/right turn lane, and no right turn lane.



### ***Eastonville Road/Stapleton Drive***

Eastonville Road and Stapleton Drive are paved roadway without curb and gutter, however the existing eastbound approach has curb and gutter. The intersection is stop controlled on the eastbound and westbound approaches. The existing intersection geometry at the Eastonville Road and Stapleton Drive intersection includes.

- Northbound, shared left/through/right turn lane.
- Southbound, one striped left turn lane, one shared through/right turn lane, and on right turn lane.
- Westbound, one striped left turn lane, one through lane, and an exclusive right turn lane.
- Eastbound, one striped left turn lane, one shared through/right turn lane, and one right turn lane.

### **Traffic Volumes**

Traffic counts were conducted for the intersection of Eastonville Road/Motley Road, Eastonville Road/Judd Orr Road, and Eastonville Road/Stapleton Drive. Figure 3 shows both AM and PM peak hour intersection turning movement counts. Appendix A contains the raw traffic count data. The AM peak hour generally occurs between 7:00 and 8:00 AM. The PM peak hour generally occurs between 4:45 and 5:45 PM.

### **Intersection and Roadway Capacity Analysis**

For unsignalized (side-street stop controlled) intersections, Synchro 9 software was used. The software applies the Transportation Research Board's 2010 *Highway Capacity Manual* (HCM) methodology for unsignalized intersections to determine average control delay per vehicle (measured in seconds) for each stop-controlled movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street stop-controlled intersections, delay is represented as the average delay per vehicle for the worst approach, not the overall intersection. Table 1 summarizes the relationship between delay and level of service.

**Table 1 – Unsignalized Intersection Level of Service Criteria**

<b>Level of Service</b>	<b>Average Total Delay (seconds per vehicle)</b>	<b>Description</b>
A	< 10	Little or no conflicting traffic for minor street approach.
B	>10 to 15	Minor street begins to notice absence of available gaps.
C	>15 to 25	Minor street begins experiencing delay for available gaps.
D	>25 to 35	Minor street starts to experience queuing.
E	>35 to 50	Extensive minor street queuing due to insufficient gaps.
F	> 50	Insufficient gaps to allow minor street traffic to cross safely through the major street traffic stream.

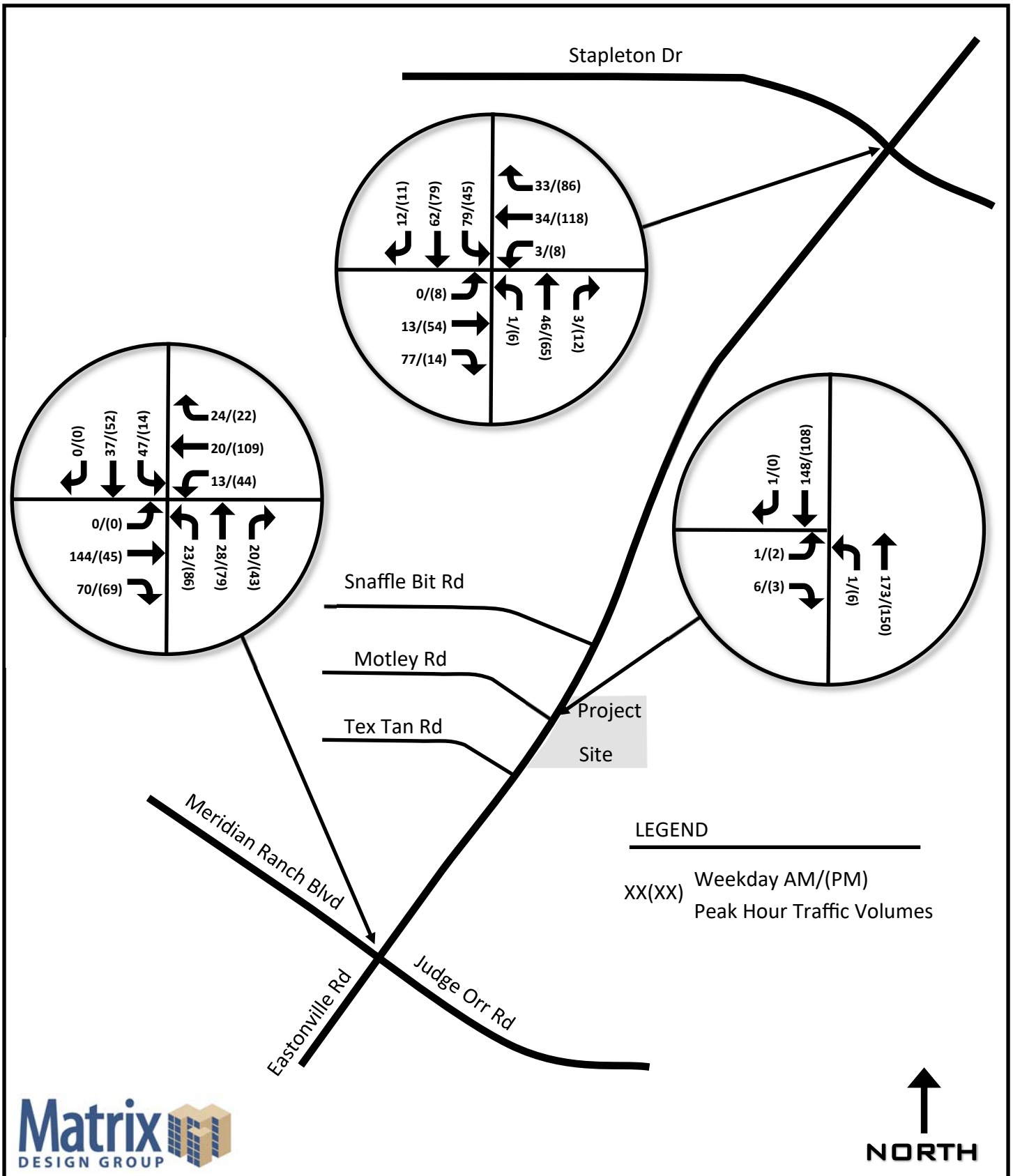
Source: HCM2010 *Highway Capacity Manual* (Transportation Research Board, 2010)



Table 2 presents the existing 2018 intersection levels of service (LOS). As presented, the Eastonville Road/Motley Road, Eastonville Road/Judd Orr Road, and Eastonville Road/Stapleton Drive intersections currently operates well with an overall LOS of B or better in both the AM and PM peak hour.

**Table 2 – 2018 Existing Traffic Level of Service**

Intersection	Control	AM LOS	PM LOS
<b>Eastonville Rd/Motley Rd</b>	Un-signalized		
-Eastbound Left/Right	Stop	A	A
-Northbound Left	Free	A	A
-Southbound Thru	Free	A	A
-Southbound Thru/Right	Free	A	A
<b>Eastonville Rd/Judge Orr Rd</b>	Un-signalized	<b>A</b>	<b>A</b>
-Eastbound Left	Stop	A	A
-Eastbound Thru/Right	Stop	A	A
-Westbound Left	Stop	A	A
-Westbound Thru	Stop	A	A
-Westbound Right	Stop	A	A
-Northbound Left	Stop	A	B
-Northbound Thru/Right	Stop	A	A
-Southbound Left	Stop	A	A
-Southbound Thru/Right	Stop	A	A
<b>Eastonville Rd/Stapleton Dr</b>	Un-signalized		
-Eastbound Left/Thru/Right	Stop	B	B
-Westbound Left	Stop	B	B
-Westbound Thru/Right	Stop	B	B
-Northbound Left/Thru/Right	Free	A	A
-Southbound Left/Thru/Right	Free	A	A



## Future Traffic

### Future Background Traffic

Future background traffic is intended to show how existing volumes are expected to grow over time without the proposed development. The background traffic is established based on the adjacent US 24 highway growth rate since the two facilities are in the vicinity to each other and parallel. Colorado Department of Transportation performs regional forecast modeling and publishes them on their website. In the case of US24 the annual growth rate of 1.5% per year is anticipated and is therefore assumed as the traffic background rate for Eastonville Road.

### Trip Generation

The vehicle trips associated with a private school are calculated using the *ITE Trip Generation Manual, Tenth Edition*. This methodology consists of choosing an independent variable for the land use for a particular time of day. The independent variable correlates to the variation in trip ends and is related to the land use. The value of the independent variable is either multiplied by a weighted average or used in a regression equation to calculate the trips generated by the land use. The *ITE Trip Generation Manual* provides guidance on when to use the weighted average versus the regression equation. In most cases, the regression equations are recommended when there are adequate study data points.

ITE Trip Generation Code 534, Private School (K-8) is used since it most closely represents the Liberty Tree Academy. As a K-8 school sagged start times are not considered. Experience with similar school indicate that a high percentage of students have siblings therefore there is a likelihood of carpooling, so the trip generation established through ITE may be conservative. A school bus program may be implemented if sufficient families are interested in paying for the service. For the purpose of this study bus service is not considered.

**Table 3 – Trip Generation**

	ITE	AM Peak			PM Peak*			Daily		
Land Use	Code	Total	In	Out	Total	In	Out	Total	In	Out
<b>Private School (K-8)</b>	534	442	243	199	126	58	68	1,997	999	998
*PM peak hour of adjacent street traffic.										

### Trip Distribution

The site generated trips are assigned to the roadway network based on existing counts and the external trip distribution assumptions. Since the site access is through the Eastonville Rd/Motley Rd intersection site trips are assigned predominately to/from Eastonville Road with a smaller percentage to/from the west, which serves adjacent residential area. As a north/south minor arterial roadway Eastonville Road is anticipated to accommodate 95% of the total site trips, with 50% to/from the south, and 45% to/from the north. Motley Road is anticipated to accommodate 5% of the site generated trips. Figure 3 and Figure 5 shows the percentage of trips that will be traveling along the roadway network.

Provide the independent variable and units used to determine the Daily, AM & PM Peak trips.

Table revised to show independent variable.

## 2019 Short Range Traffic Analysis

Synchro 9 software is a traffic modeling software that analyzes intersections based on a variety of variable. The variables are used to calibrate/customize the model to better reflect site specific conditions. One variable “Peak Hour Factor (PHF)” assigns traffic to the intersection based on traffic intensity. Since schools typically have a very intense traffic pattern the PHF was modified to reflect arrival and departure time. (PHF was changed from the standard 0.92 to 0.5 which better reflect the school traffic pattern).

In addition to considering the school traffic intensity in the Synchro analysis, information presented in the Municipal School Transportation Assistance (MSTA) was considered. The state of North Carolina prepared this research study and found that the school traffic vehicular queue lengths should be considered since insufficient internal circulation pattern, loading area, and parking can create traffic flow problems. Traffic queue analysis is presented in the following sections.

### Transportation Improvements

The proposed roadway improvements at the Eastonville Road/Motley Road intersection include the addition of a westbound approach with one entering lane and two exiting lane (one shared left/thru lane and one right turn lane). The intersection lane configuration is presented below:

- Northbound – Left Turn Lane, Shared Thru/Right Turn Lane
- Southbound – Left Turn Lane, Shared Thru/Right Turn Lane
- Eastbound – Shared Right/Thu/Left Turn Lane
- Westbound – Shared Thu/Left Turn Lane, Right Turn Lane

No existing sidewalks along Easton Road and vicinity intersecting roadways exists. To serve pedestrian Eastonville Road is proposed to include detached sidewalks and intersection cross walks in its ultimate configuration. Right-Of-Way is being dedicated to accommodate the ultimate typical section, but since there are no receiving pedestrian facilities present no accommodation are proposed other than ROW.

Liberty Tree Academy will supply crossing guards at the Eastonville Rd/Motley Road to help students cross Eastonville Rd. In addition, the site includes accommodation for pedestrians.

### Total Traffic

The existing traffic plus the background growth is added to the proposed 2019 developed traffic volumes to establish 2019 total traffic. Figure 4 shows the 2019 total volumes for both the AM and PM peak periods.

### Level of Service Analysis

To determine how efficiently and effectively the roadway system and intersection accommodates the short-range future traffic volumes, the intersection serving the

development was analyzed using Synchro 9 software. Table 4 presents the results by time period. Appendix C contains the 2019 total traffic analysis output for the appropriate intersection control condition.

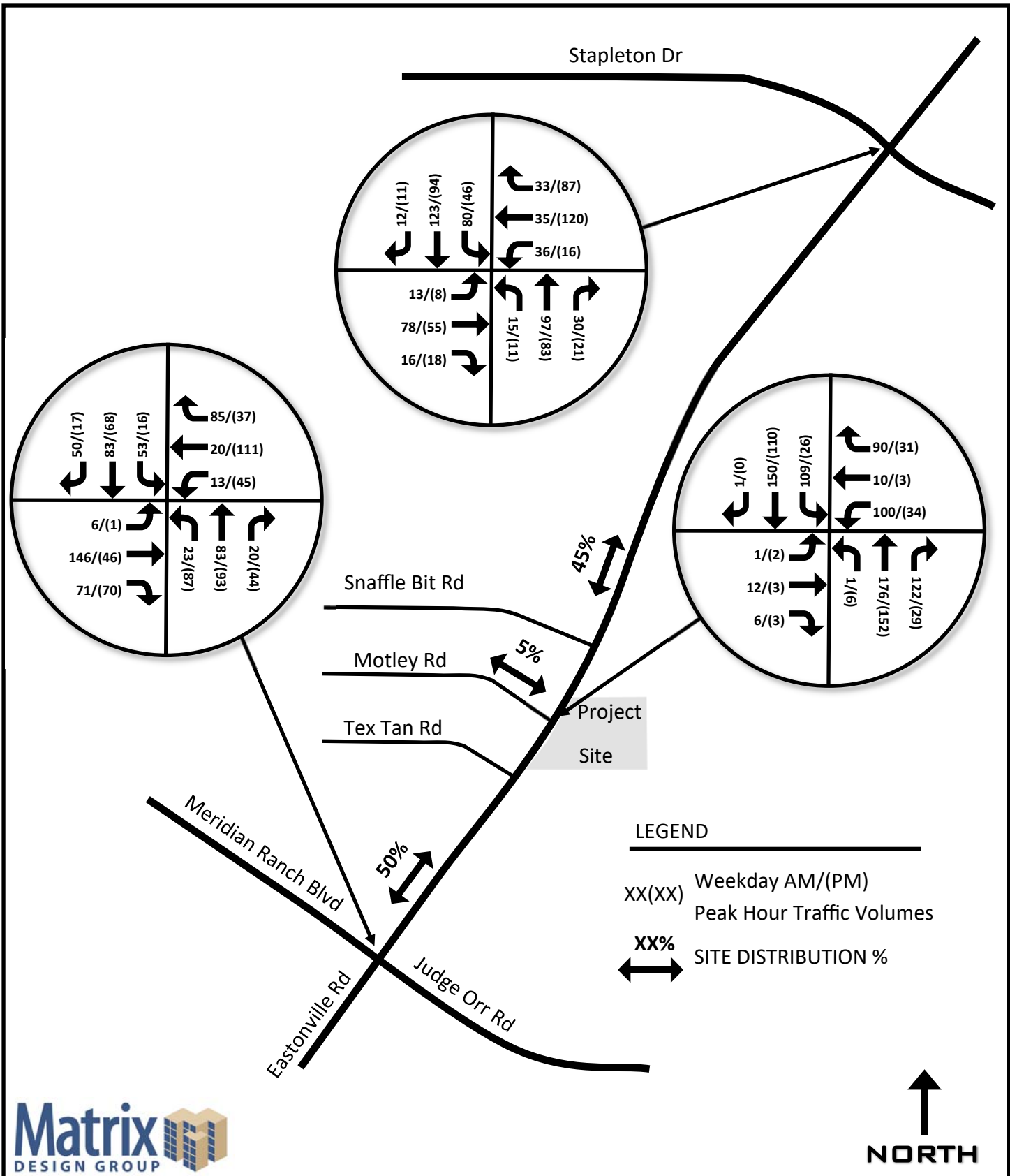
**Table 4 – 2019 Total Traffic Level of Service**

Intersection	Control	AM LOS	AM Queue	PM LOS	PM Queue
<b>Eastonville Rd/Motley Rd</b>	Un-signalized				
-Eastbound Left/Thru/Right	Stop	C	6	B	0
-Westbound Left/Thru	Stop	F	206	B	10
-Westbound Right	Stop	B	20	A	4
-Northbound Left	Free	A	0	A	0
-Northbound Thru/Right	Free	A	0	A	0
-Southbound Left	Free	A	14	A	2
-Southbound Thru/Right	Free	A	0	A	0
<b>Eastonville Rd/Judge Orr Rd</b>	Un-signalized	B		A	
-Eastbound Left	Stop	A	0	A	0
-Eastbound Thru/Right	Stop	B	34	A	14
-Westbound Left	Stop	A	2	A	6
-Westbound Thru	Stop	A	2	B	14
-Westbound Right	Stop	A	5	A	4
-Northbound Left	Stop	A	2	B	12
-Northbound Thru/Right	Stop	B	14	B	18
-Southbound Left	Stop	A	6	A	2
-Southbound Thru/Right	Stop	B	18	A	10
<b>Eastonville Rd/Stapleton Dr</b>	Un-signalized				
-Eastbound Left/Thru/Right	Stop	C	20	B	14
-Westbound Left	Stop	C	8	C	8
-Westbound Thru/Right	Stop	B	8	B	26
-Northbound Left/Thru/Right	Free	A	0	A	4
-Southbound Left/Thru/Right	Free	A	4	A	0

As presented in Table 4, with short range improvements, the overall intersections are expected to perform well and meet established performance standards at 2019 short range condition, except for the westbound left/through lane, which operates at LOS F. When turning movements are anticipated to operate at LOS F, queue length, and delay are also studied. The 2010 *Highway Capacity Manual* (HCM) analysis results show a 95% queue length of 206 feet and a delay of 138.5 seconds. This internal delay and queue length is typical of school traffic and vehicles either divert or experience the delay.

The MSTA offers guidance on internal queue and the Average Queue Length of 1,212 feet is recommended. The Liberty Tree Academy internal 20 feet wide circulatory roadway has an available queue length of 1,380 feet, in addition to 750 feet of loading parking. There are 35 restricted parking stalls that serve administrative/teacher parking, and 10 short term parking stalls that serve parents needing class room or office visits. As recommended in MSTA the visitor parking is located at the end of the circulatory roadway to minimize congestion. Based on these results the proposed site is in general conformance with the guidelines presented in the MSTA.





## 2040 Long Range Traffic Analysis

Similar to the 2019 Short Range Traffic Analysis, since schools typically have a very intense traffic pattern the PHF was modified to reflect arrival and departure time. (PHF was changed from the standard 0.92 to 0.50 which better reflect the school traffic pattern).

In addition, the Municipal School Transportation Assistance (MSTA) was considered regarding traffic vehicular queue lengths, internal circulation pattern, loading area, and parking. Traffic queue analysis is presented in the following sections.

### Transportation Improvements

The proposed roadway improvements include the addition of a westbound approach with one entering lane and two exiting lane (one shared left/thru lane, and one right turn lane). The intersection lane configuration is presented below:

- Northbound – Left Turn Lane, Shared Thru/Right Turn Lane
- Southbound – Left Turn Lane, Shared Thru/Right Turn Lane
- Eastbound – Shared Right/Thru/Left Turn Lane.
- Westbound – Shared Thru/Left Turn Lane, Right Turn Lane

### Total Traffic

The background traffic is established based on the adjacent US 24 highway growth rate since the two facilities are in the vicinity to each other and parallel. The US24 annual growth rate of 1.5% per year is anticipated and is therefore assumed as background for Eastonville Road, Meridian/Judge Orr Road and Stapleton Drive. The site traffic is added on top of the background volumes to get 2040 total traffic. Figure 5 show the 2040 total traffic volumes for both the AM and PM peak hours.

### Level of Service Analysis

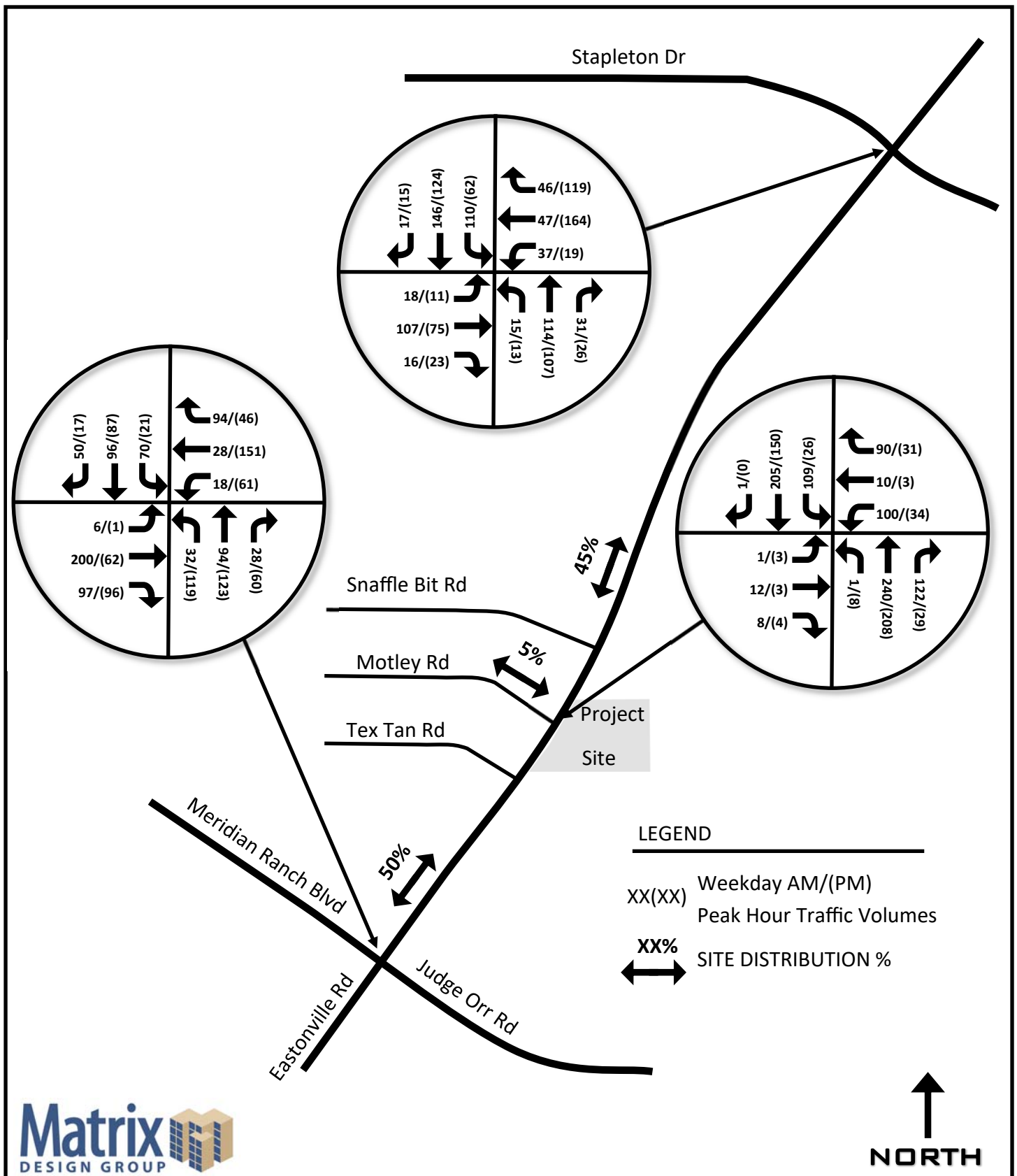
To determine how efficiently and effectively the roadway system and intersection accommodates the future traffic volumes, the intersection serving the development is analyzed using Synchro 9 software. The results are presented as Levels of Service. Table 5 present the results by time period. Appendix D contains the 2040 total traffic analysis output for the appropriate intersection traffic control.

**Table 5 – 2040 Total Traffic TWSC Level of Service**

Intersection	Control	AM LOS	AM Queue	PM LOS	PM Queue
<b>Eastonville Rd/Motley Rd</b>	Un-signalized				
-Eastbound Left/Thru/Right	Stop	C	6	B	2
-Westbound Left/Thru	Stop	<b>F</b>	270	C	12
-Westbound Right	Stop	B	22	B	6
-Northbound Left	Free	A	0	A	0
-Northbound Thru/Right	Free	A	0	A	0
-Southbound Left	Free	A	16	A	2
-Southbound Thru/Right	Free	A	0	0	0
<b>Eastonville Rd/Judge Orr Rd</b>	Un-signalized	<b>B</b>		<b>B</b>	
-Eastbound Left	Stop	A	0	B	0
-Eastbound Thru/Right	Stop	C	66	B	26
-Westbound Left	Stop	B	2	B	8
-Westbound Thru	Stop	A	4	B	24
-Westbound Right	Stop	B	12	A	6
-Northbound Left	Stop	B	4	B	20
-Northbound Thru/Right	Stop	B	18	B	30
-Southbound Left	Stop	B	10	B	2
-Southbound Thru/Right	Stop	B	22	B	16
<b>Eastonville Rd/Stapleton Dr</b>	Un-signalized				
-Eastbound Left/Thru/Right	Stop	C	38	C	20
-Westbound Left	Stop	C	10	B	4
-Westbound Thru/Right	Stop	B	14	C	58
-Northbound Left/Thru/Right	Free	A	0	A	0
-Southbound Left/Thru/Right	Free	A	6	A	2

As presented in Table 5, the overall intersections are expected to perform well and meet established performance standards at 2040 long range condition, except for the westbound left/through lane, which operates at LOS F. The 2010 *Highway Capacity Manual* (HCM) analysis results show a 95% queue length of 270 feet and a delay of 253.2 seconds. This internal delay and queue length is typical of school traffic and vehicles either divert or experience the delay.

Liberty Tree Academy internal circulatory roadway has an available internal queue length of 1,380 feet, in addition to 750 feet of loading parking and parking. As recommended in MSTA the visitor parking is located at the end of the circulatory roadway to minimize congestion. Based on these results the proposed site is in general conformance with the guidelines presented in the MSTA.



## Mitigation Improvements

A couple improvements that can be considered to mitigate the delay include, 1) changing the intersection control from two-way stop to all-way stop or 2) changing the intersection to roundabout control, and 3) additional access north of the school access.

### All Way Stop Control

One way to improve operation at the of Eastonville Rd/Motely Rd intersection is to change of traffic control from a two way stop control (TWSC) to an all way stop control (AWSC). This can be accomplished without further ROW or major improvements to the roadway. A disadvantage to this option is the increase in delay to Eastonville Road corridor. Since future school expansion and north lot development is uncertain this mitigation is not recommended.

### Roundabout

Another mitigation option is changing the intersection to a roundabout. This alternative improves overall intersection delay, however has some challenges in implementation. These challenges include 1) less pedestrian friendly due to the free flow traffic condition, 2) Increase ROW need, and 3) increase construction costs associated with removal and replacement of a portion of the existing intersection.

### Alternative Access

An alternative access north of the school access is a consideration as a defined development plan is prepared for the school addition and remain parcel. It is uncertain whether the school will be expanded to include K-8 or high school. The development plan on the north property is also uncertain. Once the development plans are prepared another access may be beneficial.

## Findings and Recommendations

Based on the traffic operational analysis, the following finding and recommendations are presented.

- For the purpose of the TIS the Liberty Tree Academy development is will accommodate 486 K-8 students with build-out in 2019. A future expansion is proposed, but specific use is uncertain so analysis is not
- At 2040 build-out, the project is expected to generate 44126 trips in the PM peak hour, and 1,997 trips ADT.

Provide recommendations regarding school zone speed limit along Eastonville. Is it warranted to provide a reduced speed limit in the school zone? If it is, then update the striping and signage plan accordingly.

Many jurisdictions find it beneficial to advise road users that they are approaching a school and designate school zones that have a legal standing that fines for speeding and other traffic violations are increased. This safety enhancement is currently in place as a school located approximately 1 mile south on Eastonville Road. To reinforce safe travel speed and to increase safety a similar utilization is proposed at the Liberty Tree Access.



- It is anticipated that the proposed development will make the following improvements to the Eastonville Rd/Motley Rd intersection at 2019 build-out:
  - Northbound – Left Turn Lane, Shared Thru/Right Turn Lane
  - Southbound – Left Turn Lane, Shared Thru/Right Turn Lane
  - Eastbound – Shared Right/Thru/Left Turn Lane, stop controlled
  - Westbound – Shared Thru/Left Turn Lane, Right Turn Lane
  - Two Way Stop Control
- With the Eastonville Rd/Motley Rd intersection improvements in the 2019 Short Range total traffic condition and the 2040 Long Range total traffic condition, the intersection impeding movements are expected to operate at LOS C or better with one exception. The westbound shared left/through lane experiences internal traffic queue and delay typical of school traffic patterns. In accordance with MSTA the site traffic queue can be accommodated internal to the site drive aisle.
- Queue and delay experienced by the site exiting traffic can be mitigated, by implementing an all-way stop intersection control improved operation, but overall corridor delay is increased. Roundabout mitigation also improves overall intersection operation but introduces pedestrian safety concerns, ROW acquisition, and additional cost. Due to the school expansion and north property uncertainty, improvements without these details may not address the comprehensive traffic condition.
- Analysis indicates that the Eastonville Rd/Judge Orr Rd and the Eastonville Rd/Stapleton Dr intersections are expected to operate at LOS C or better in the near range and long-range total traffic conditions without intersection improvements.

## Conclusion

The Traffic Impact Study results indicate in the 2019 Short Range condition and the 2040 Long Range condition with the Liberty Tree Academy, K-8, traffic and the Eastonville Rd/Motley Rd intersection improvements operates well with one except. The westbound shared left/through lane experiences internal queue and delay typical of school traffic patterns. The site queue can be accommodated internal within the site drive aisles. Due to introducing delay to the Eastonville Rd corridor associated with all-way stop control and the impacts of a roundabout these mitigation options should be studied in greater detail. In the near term the project, as proposed, does not adversely impact the existing and proposed intersection operation or roadway corridor.

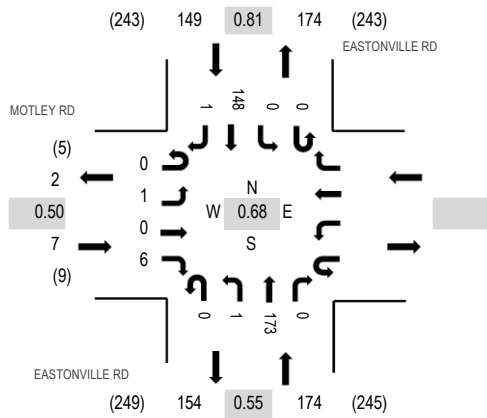
## **Appendix A: Existing Traffic Counts**



(303) 216-2439  
www.alltrafficdata.net

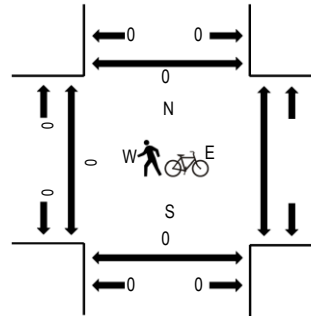
Location: 1 EASTONVILLE RD & MOTLEY RD AM  
Date and Start Time: Wednesday, April 11, 2018  
Peak Hour: 07:00 AM - 08:00 AM  
Peak 15-Minutes: 07:00 AM - 07:15 AM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	MOTLEY RD Eastbound				Westbound				EASTONVILLE RD Northbound				EASTONVILLE RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	0	0					0	0	79	0	0	0	42	0	121	330	0	0	0	0
7:15 AM	0	0	0	2					0	0	68	0	0	0	45	1	116	249	0	0	0	0
7:30 AM	0	0	0	4					0	1	13	0	0	0	38	0	56	205	0	0	0	0
7:45 AM	0	1	0	0					0	0	13	0	0	0	23	0	37	177	0	0	0	0
8:00 AM	0	0	0	1					0	1	10	0	0	0	27	1	40	167	0	0	0	0
8:15 AM	0	0	0	0					0	1	33	0	0	0	38	0	72		0	0	0	0
8:30 AM	0	0	0	1					0	0	13	0	0	0	14	0	28		0	0	0	0
8:45 AM	0	0	0	0					0	0	13	0	0	0	14	0	27		0	0	0	0
Count Total	0	1	0	8					0	3	242	0	0	0	241	2	497		0	0	0	0
Peak Hour	0	1	0	6					0	1	173	0	0	0	148	1	330		0	0	0	0



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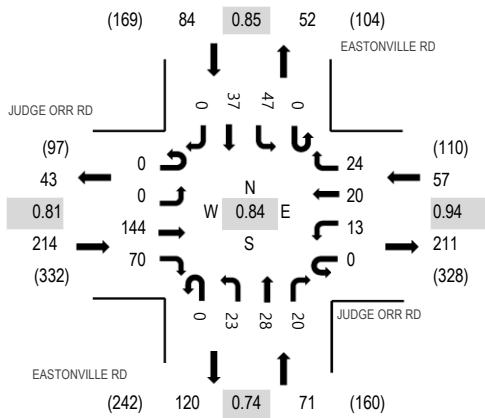
Location: 1 EASTONVILLE RD & JUDGE ORR RD AM

Date and Start Time: Tuesday, June 19, 2018

Peak Hour: 07:00 AM - 08:00 AM

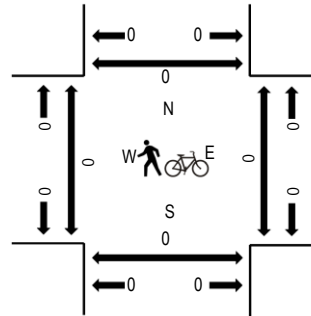
Peak 15-Minutes: 07:15 AM - 07:30 AM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	JUDGE ORR RD Eastbound				JUDGE ORR RD Westbound				EASTONVILLE RD Northbound				EASTONVILLE RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	40	16	0	3	3	6	0	5	1	6	0	18	9	0	107	426	0	0	0	0
7:15 AM	0	0	44	22	0	4	1	11	0	7	5	5	0	17	11	0	127	392	0	0	0	0
7:30 AM	0	0	33	10	0	4	7	2	0	3	5	4	0	9	13	0	90	344	0	0	0	0
7:45 AM	0	0	27	22	0	2	9	5	0	8	17	5	0	3	4	0	102	349	0	0	0	0
8:00 AM	0	1	16	9	0	5	6	4	0	4	5	6	0	9	8	0	73	345	0	0	0	0
8:15 AM	0	1	16	11	0	3	3	2	0	2	12	4	0	9	15	1	79		0	0	0	0
8:30 AM	0	0	17	16	0	5	8	2	0	11	8	7	0	6	14	1	95		0	0	0	1
8:45 AM	0	0	18	13	0	4	8	3	0	10	14	6	0	3	19	0	98		0	0	0	0
Count Total	0	2	211	119	0	30	45	35	0	50	67	43	0	74	93	2	771		0	0	0	1
Peak Hour	0	0	144	70	0	13	20	24	0	23	28	20	0	47	37	0	426		0	0	0	0



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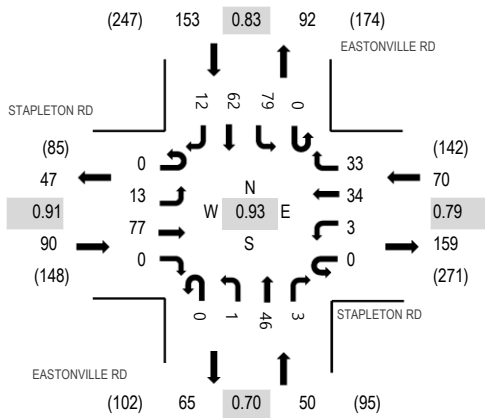
Location: 2 EASTONVILLE RD & STAPLETON RD AM

Date and Start Time: Tuesday, June 19, 2018

Peak Hour: 07:15 AM - 08:15 AM

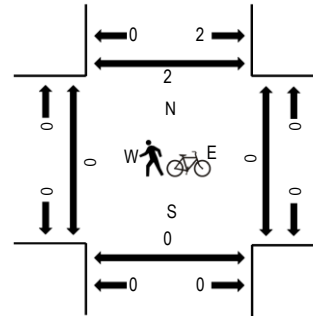
Peak 15-Minutes: 08:00 AM - 08:15 AM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	STAPLETON RD Eastbound				STAPLETON RD Westbound				EASTONVILLE RD Northbound				EASTONVILLE RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	1	24	0	0	1	5	16	0	3	9	0	0	25	10	1	95	360	0	0	0	0
7:15 AM	0	2	19	0	0	1	8	5	0	0	12	1	0	28	15	1	92	363	0	0	0	0
7:30 AM	0	2	23	0	0	0	9	7	0	0	4	2	0	26	14	6	93	334	0	0	0	0
7:45 AM	0	4	16	0	0	0	9	8	0	0	20	0	0	11	12	0	80	298	0	0	0	0
8:00 AM	0	5	19	0	0	2	8	13	0	1	10	0	0	14	21	5	98	272	0	0	0	2
8:15 AM	0	3	5	0	0	0	7	9	0	2	12	1	0	13	8	3	63		0	0	0	0
8:30 AM	0	0	13	0	0	1	6	10	0	1	8	1	0	9	7	1	57		0	0	0	0
8:45 AM	0	0	12	0	0	2	9	6	0	0	8	0	0	9	8	0	54		0	0	0	0
Count Total	0	17	131	0	0	7	61	74	0	7	83	5	0	135	95	17	632		0	0	0	2
Peak Hour	0	13	77	0	0	3	34	33	0	1	46	3	0	79	62	12	363		0	0	0	2

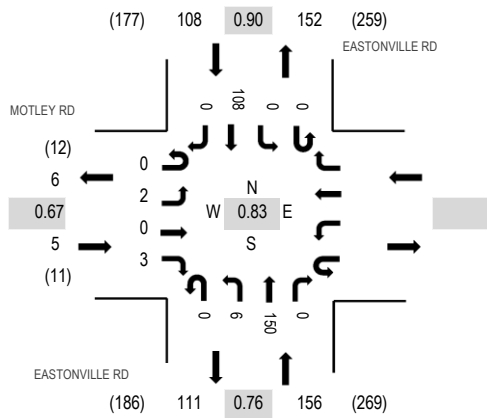




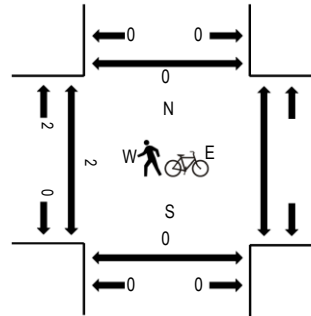
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**Location:** 1 EASTONVILLE RD & MOTLEY RD PM  
**Date and Start Time:** Wednesday, April 11, 2018  
**Peak Hour:** 04:45 PM - 05:45 PM  
**Peak 15-Minutes:** 05:30 PM - 05:45 PM

### Peak Hour - All Vehicles



### Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

### Traffic Counts

Interval Start Time	MOTLEY RD								EASTONVILLE RD				EASTONVILLE RD				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
4:00 PM	0	0	0	1					0	1	18	0	0	0	17	0	37	204	0		0	0
4:15 PM	0	0	0	3					0	0	31	0	0	0	11	0	45	232	0		0	0
4:30 PM	0	0	0	1					0	5	27	0	0	0	21	0	54	242	0		0	0
4:45 PM	0	0	0	2					0	1	37	0	0	0	28	0	68	269	0		0	0
5:00 PM	0	1	0	1					0	2	31	0	0	0	30	0	65	253	2		0	0
5:15 PM	0	1	0	0					0	3	31	0	0	0	20	0	55		0		0	0
5:30 PM	0	0	0	0					0	0	51	0	0	0	30	0	81		0		0	0
5:45 PM	0	0	0	1					0	0	31	0	0	0	20	0	52		0		0	0
Count Total	0	2	0	9					0	12	257	0	0	0	177	0	457		2		0	0
Peak Hour	0	2	0	3					0	6	150	0	0	0	108	0	269		2		0	0



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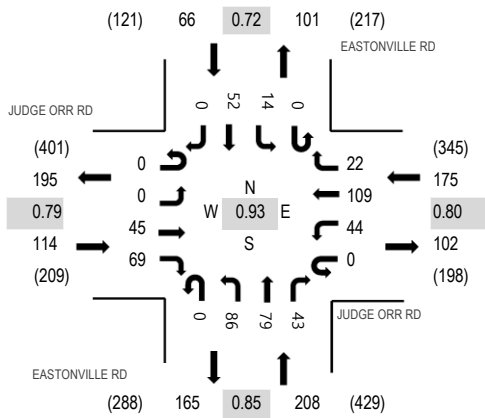
Location: 1 EASTONVILLE RD & JUDGE ORR RD PM

Date and Start Time: Tuesday, June 19, 2018

Peak Hour: 04:00 PM - 05:00 PM

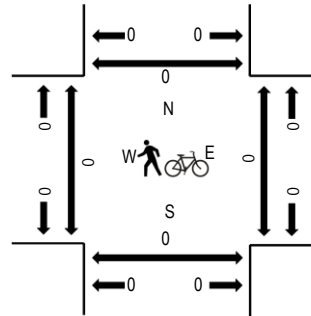
Peak 15-Minutes: 04:00 PM - 04:15 PM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	JUDGE ORR RD Eastbound				JUDGE ORR RD Westbound				EASTONVILLE RD Northbound				EASTONVILLE RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	11	25	0	10	25	5	0	18	18	16	0	9	14	0	151	563	0	0	0	0
4:15 PM	0	0	14	12	0	11	26	1	0	18	22	10	0	2	15	0	131	563	0	0	0	0
4:30 PM	0	0	5	17	0	13	33	7	0	24	21	9	0	3	12	0	144	561	0	0	0	0
4:45 PM	0	0	15	15	0	10	25	9	0	26	18	8	0	0	11	0	137	544	0	0	0	0
5:00 PM	0	1	7	15	0	8	39	14	0	18	22	17	0	4	6	0	151	541	0	0	0	0
5:15 PM	0	0	6	17	0	4	28	6	0	24	14	13	0	5	11	1	129		0	0	0	0
5:30 PM	0	0	6	20	0	6	22	7	0	23	16	9	0	5	13	0	127		0	0	0	0
5:45 PM	0	0	9	14	0	2	21	13	0	29	23	13	0	2	7	1	134		0	0	0	0
Count Total	0	1	73	135	0	64	219	62	0	180	154	95	0	30	89	2	1,104		0	0	0	0
Peak Hour	0	0	45	69	0	44	109	22	0	86	79	43	0	14	52	0	563		0	0	0	0



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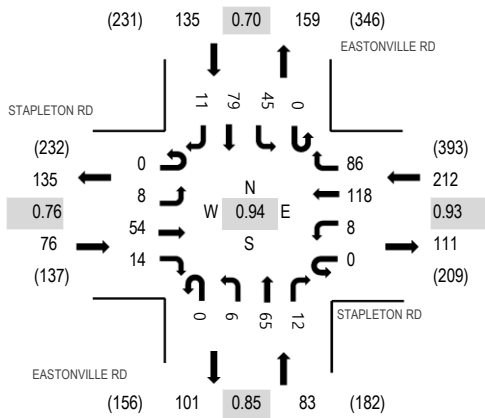
**Location:** 2 EASTONVILLE RD & STAPLETON RD PM

**Date and Start Time:** Tuesday, June 19, 2018

**Peak Hour:** 05:00 PM - 06:00 PM

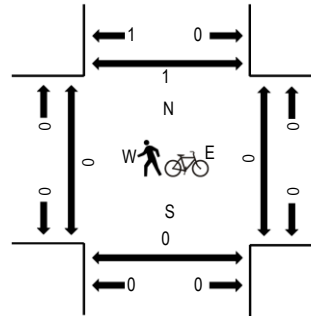
**Peak 15-Minutes:** 05:00 PM - 05:15 PM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk







### Traffic Counts

Interval Start Time	STAPLETON RD Eastbound				STAPLETON RD Westbound				EASTONVILLE RD Northbound				EASTONVILLE RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	3	11	0	0	1	14	20	0	0	28	1	0	12	14	4	108	437	0	0	0	0
4:15 PM	0	3	12	2	0	2	20	21	0	1	19	1	0	6	6	3	96	463	0	0	0	0
4:30 PM	0	2	12	2	0	3	26	20	0	7	19	2	0	15	10	1	119	497	0	0	0	0
4:45 PM	0	4	8	2	0	4	18	32	0	3	16	2	0	16	9	0	114	505	0	0	0	0
5:00 PM	0	2	11	1	0	3	31	17	0	2	15	4	0	15	25	8	134	506	0	0	0	0
5:15 PM	0	2	11	3	0	1	32	26	0	2	21	2	0	11	18	1	130		0	0	0	0
5:30 PM	0	1	19	1	0	1	28	27	0	0	17	5	0	11	15	2	127		0	0	0	0
5:45 PM	0	3	13	9	0	3	27	16	0	2	12	1	0	8	21	0	115		0	0	0	0
Count Total	0	20	97	20	0	18	196	179	0	17	147	18	0	94	118	19	943		0	0	0	0
Peak Hour	0	8	54	14	0	8	118	86	0	6	65	12	0	45	79	11	506		0	0	0	0

**Appendix B:**  
**2018 Level of Service Output**  
**Existing Traffic**

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	6	1	173	148	1
Future Vol, veh/h	1	6	1	173	148	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	7	1	188	161	1

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	351	161	162
Stage 1	161	-	-
Stage 2	190	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	646	884	1417
Stage 1	868	-	-
Stage 2	842	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	646	884	1417
Mov Cap-2 Maneuver	646	-	-
Stage 1	868	-	-
Stage 2	841	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1417	-	840	-	-
HCM Lane V/C Ratio	0.001	-	0.009	-	-
HCM Control Delay (s)	7.5	-	9.3	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-



Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	0	114	70	13	20	24	23	28	20	47	37	0
Future Vol, veh/h	0	114	70	13	20	24	23	28	20	47	37	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	124	76	14	22	26	25	30	22	51	40	0
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0

Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	3	2	2	2
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	2	2	2	3
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	2	2	3	2
HCM Control Delay	9.5	8.2	8.5	8.9
HCM LOS	A	A	A	A

Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	0%	100%	0%
Vol Thru, %	0%	58%	0%	100%	0%	100%	62%	0%	100%
Vol Right, %	0%	42%	0%	0%	100%	0%	38%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	23	48	13	20	24	0	184	47	37
LT Vol	23	0	13	0	0	0	0	47	0
Through Vol	0	28	0	20	0	0	114	0	37
RT Vol	0	20	0	0	24	0	70	0	0
Lane Flow Rate	25	52	14	22	26	0	200	51	40
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.041	0.075	0.023	0.033	0.034	0	0.273	0.084	0.06
Departure Headway (Hd)	5.954	5.159	5.943	5.44	4.737	5.174	4.906	5.912	5.41
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	600	692	601	656	753	0	732	605	660
Service Time	3.704	2.908	3.693	3.19	2.486	2.909	2.642	3.661	3.159
HCM Lane V/C Ratio	0.042	0.075	0.023	0.034	0.035	0	0.273	0.084	0.061
HCM Control Delay	9	8.3	8.8	8.4	7.7	7.9	9.5	9.2	8.5
HCM Lane LOS	A	A	A	A	A	N	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1	0.1	0.1	0	1.1	0.3	0.2

Intersection												
Int Delay, s/veh	6.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	13	77	0	3	34	33	1	46	3	79	62	12
Future Vol, veh/h	13	77	0	3	34	33	1	46	3	79	62	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	14	84	0	3	37	36	1	50	3	86	67	13
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	336	301	74	342	306	52	80	0	0	53	0	0
Stage 1	246	246	-	54	54	-	-	-	-	-	-	-
Stage 2	90	55	-	288	252	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	618	612	988	612	608	1016	1518	-	-	1553	-	-
Stage 1	758	703	-	958	850	-	-	-	-	-	-	-
Stage 2	917	849	-	720	698	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	541	576	988	520	572	1016	1518	-	-	1553	-	-
Mov Cap-2 Maneuver	541	576	-	520	572	-	-	-	-	-	-	-
Stage 1	757	662	-	957	849	-	-	-	-	-	-	-
Stage 2	845	848	-	592	658	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	12.6		10.6		0.1		3.8					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1518	-	-	571 520 729	1553	-	-					
HCM Lane V/C Ratio	0.001	-	-	0.171 0.006 0.1	0.055	-	-					
HCM Control Delay (s)	7.4	0	-	12.6 12 10.5	7.5	0	-					
HCM Lane LOS	A	A	-	B B B	A A	-	-					
HCM 95th %tile Q(veh)	0	-	-	0.6 0 0.3	0.2	-	-					

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↔	↑	↑	
Traffic Vol, veh/h	2	3	6	150	108	0
Future Vol, veh/h	2	3	6	150	108	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	7	163	117	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	293	117	117	0	-	0
Stage 1	117	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	698	935	1471	-	-	-
Stage 1	908	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	695	935	1471	-	-	-
Mov Cap-2 Maneuver	695	-	-	-	-	-
Stage 1	908	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.4	0.3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1471	-	822	-	-	
HCM Lane V/C Ratio	0.004	-	0.007	-	-	
HCM Control Delay (s)	7.5	-	9.4	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection												
Intersection Delay, s/veh	9.6											
Intersection LOS	A											

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	0	45	69	44	109	22	86	79	43	14	52	0
Future Vol, veh/h	0	45	69	44	109	22	86	79	43	14	52	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	49	75	48	118	24	93	86	47	15	57	0
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0

Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	3	2	2	2
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	2	2	2	3
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	2	2	3	2
HCM Control Delay	9.5	9.5	9.7	9.4
HCM LOS	A	A	A	A

Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	0%	100%	0%
Vol Thru, %	0%	65%	0%	100%	0%	100%	39%	0%	100%
Vol Right, %	0%	35%	0%	0%	100%	0%	61%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	86	122	44	109	22	0	114	14	52
LT Vol	86	0	44	0	0	0	0	14	0
Through Vol	0	79	0	109	0	0	45	0	52
RT Vol	0	43	0	0	22	0	69	0	0
Lane Flow Rate	93	133	48	118	24	0	124	15	57
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.158	0.197	0.082	0.187	0.033	0	0.19	0.028	0.095
Departure Headway (Hd)	6.203	5.452	6.28	5.777	5.072	5.938	5.51	6.54	6.036
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	581	662	574	624	710	0	656	550	596
Service Time	3.903	3.152	3.98	3.477	2.772	3.638	3.21	4.248	3.744
HCM Lane V/C Ratio	0.16	0.201	0.084	0.189	0.034	0	0.189	0.027	0.096
HCM Control Delay	10.1	9.5	9.5	9.8	7.9	8.6	9.5	9.4	9.4
HCM Lane LOS	B	A	A	A	A	N	A	A	A
HCM 95th-tile Q	0.6	0.7	0.3	0.7	0.1	0	0.7	0.1	0.3

Intersection												
Int Delay, s/veh	7.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	8	54	14	8	118	86	6	65	12	45	79	11
Future Vol, veh/h	8	54	14	8	118	86	6	65	12	45	79	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	9	59	15	9	128	93	7	71	13	49	86	12
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	391	287	92	317	286	77	98	0	0	84	0	0
Stage 1	190	190	-	90	90	-	-	-	-	-	-	-
Stage 2	201	97	-	227	196	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	568	623	965	636	623	984	1495	-	-	1513	-	-
Stage 1	812	743	-	917	820	-	-	-	-	-	-	-
Stage 2	801	815	-	776	739	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	417	599	965	562	599	984	1495	-	-	1513	-	-
Mov Cap-2 Maneuver	417	599	-	562	599	-	-	-	-	-	-	-
Stage 1	808	718	-	912	816	-	-	-	-	-	-	-
Stage 2	608	811	-	677	714	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	11.8		12.3		0.5		2.5					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1495	-	-	614	562	717	1513	-	-			
HCM Lane V/C Ratio	0.004	-	-	0.135	0.015	0.309	0.032	-	-			
HCM Control Delay (s)	7.4	0	-	11.8	11.5	12.3	7.5	0	-			
HCM Lane LOS	A	A	-	B	B	B	A	A	-			
HCM 95th %tile Q(veh)	0	-	-	0.5	0	1.3	0.1	-	-			

**Appendix C:**  
**2019 Level of Service Output**  
**Total Traffic**

HCM 2010 TWSC  
1: Motley Rd/Liberty Tree & Eastonville Rd

Liberty Tree Academy 2019  
Total Traffic TWSC AM

Intersection												
Int Delay, s/veh	28.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔		↔	↔	
Traffic Vol, veh/h	1	12	6	100	10	90	1	176	122	109	150	1
Future Vol, veh/h	1	12	6	100	10	90	1	176	122	109	150	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	50	50	50	92	92	50	50	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	13	7	200	20	180	1	191	244	218	163	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	925	1037	164	924	915	313	164	0	0	435	0	0
Stage 1	600	600	-	315	315	-	-	-	-	-	-	-
Stage 2	325	437	-	609	600	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	250	231	881	250	273	727	1414	-	-	1125	-	-
Stage 1	488	490	-	696	656	-	-	-	-	-	-	-
Stage 2	687	579	-	482	490	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	149	186	881	200	220	727	1414	-	-	1125	-	-
Mov Cap-2 Maneuver	149	186	-	200	220	-	-	-	-	-	-	-
Stage 1	488	395	-	696	656	-	-	-	-	-	-	-
Stage 2	501	579	-	373	395	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	21.2		81.4		0		5.1	
HCM LOS	C		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1414	-	-	243 202 727	1125	-	-
HCM Lane V/C Ratio	0.001	-	-	0.085 1.089 0.248	0.194	-	-
HCM Control Delay (s)	7.5	-	-	21.2 138.5 11.6	9	-	-
HCM Lane LOS	A	-	-	C F B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3 10.3 1	0.7	-	-

Intersection												
Intersection Delay, s/veh	10.5											
Intersection LOS	B											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	6	146	71	13	20	85	23	83	20	53	83	50
Future Vol, veh/h	6	146	71	13	20	85	23	83	20	53	83	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	159	77	14	22	92	25	90	22	58	90	54
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Approach	SE			NW			NE			SW		
Opposing Approach	NW			SE			SW			NE		
Opposing Lanes	3			2			2			2		
Conflicting Approach Left	SW			NE			SE			NW		
Conflicting Lanes Left	2			2			2			3		
Conflicting Approach Right	NE			SW			NW			SE		
Conflicting Lanes Right	2			2			3			2		
HCM Control Delay	11.8			9.3			10.1			10.1		
HCM LOS	B			A			B			B		
Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2			
Vol Left, %	100%	0%	100%	0%	0%	100%	0%	100%	0%			
Vol Thru, %	0%	81%	0%	100%	0%	0%	67%	0%	62%			
Vol Right, %	0%	19%	0%	0%	100%	0%	33%	0%	38%			
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop			
Traffic Vol by Lane	23	103	13	20	85	6	217	53	133			
LT Vol	23	0	13	0	0	6	0	53	0			
Through Vol	0	83	0	20	0	0	146	0	83			
RT Vol	0	20	0	0	85	0	71	0	50			
Lane Flow Rate	25	112	14	22	92	7	236	58	145			
Geometry Grp	8	8	8	8	8	8	8	8	8			
Degree of Util (X)	0.046	0.188	0.026	0.038	0.142	0.012	0.375	0.105	0.232			
Departure Headway (Hd)	6.682	6.041	6.738	6.232	5.524	6.459	5.722	6.535	5.767			
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Cap	536	593	531	574	649	554	630	549	623			
Service Time	4.422	3.781	4.48	3.974	3.266	4.195	3.458	4.271	3.503			
HCM Lane V/C Ratio	0.047	0.189	0.026	0.038	0.142	0.013	0.375	0.106	0.233			
HCM Control Delay	9.7	10.2	9.7	9.2	9.2	9.3	11.9	10	10.2			
HCM Lane LOS	A	B	A	A	A	A	B	A	B			
HCM 95th-tile Q	0.1	0.7	0.1	0.1	0.5	0	1.7	0.3	0.9			



Intersection												
Int Delay, s/veh	6.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	13	78	16	36	35	33	15	97	30	80	123	12
Future Vol, veh/h	13	78	16	36	35	33	15	97	30	80	123	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	14	85	17	39	38	36	16	105	33	87	134	13
Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	505	485	140	519	475	122	147	0	0	138	0	0
Stage 1	314	314	-	154	154	-	-	-	-	-	-	-
Stage 2	191	171	-	365	321	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	478	482	908	467	488	929	1435	-	-	1446	-	-
Stage 1	697	656	-	848	770	-	-	-	-	-	-	-
Stage 2	811	757	-	654	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	405	445	908	369	450	929	1435	-	-	1446	-	-
Mov Cap-2 Maneuver	405	445	-	369	450	-	-	-	-	-	-	-
Stage 1	689	613	-	838	761	-	-	-	-	-	-	-
Stage 2	732	748	-	516	609	-	-	-	-	-	-	-
Approach	EB		WB		NB			SB				
HCM Control Delay, s	15		13.2		0.8			2.8				
HCM LOS	C		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1435	-	-	476	369	600	1446	-	-			
HCM Lane V/C Ratio	0.011	-	-	0.244	0.106	0.123	0.06	-	-			
HCM Control Delay (s)	7.5	0	-	15	15.9	11.8	7.6	0	-			
HCM Lane LOS	A	A	-	C	C	B	A	A	-			
HCM 95th %tile Q(veh)	0	-	-	1	0.4	0.4	0.2	-	-			

HCM 2010 TWSC  
1: Motley Rd/Liberty Tree & Eastonville Rd

Liberty Tree Academy 2019  
Total Traffic TWSC PM

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔		↔	↔	
Traffic Vol, veh/h	2	3	3	34	3	31	6	152	29	26	110	0
Future Vol, veh/h	2	3	3	34	3	31	6	152	29	26	110	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	50	50	50	92	92	50	50	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	3	3	68	6	62	7	165	58	52	120	0
Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	434	460	120	434	431	194	120	0	0	223	0	0
Stage 1	224	224	-	207	207	-	-	-	-	-	-	-
Stage 2	210	236	-	227	224	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	532	498	931	532	517	847	1468	-	-	1346	-	-
Stage 1	779	718	-	795	731	-	-	-	-	-	-	-
Stage 2	792	710	-	776	718	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	472	476	931	510	495	847	1468	-	-	1346	-	-
Mov Cap-2 Maneuver	472	476	-	510	495	-	-	-	-	-	-	-
Stage 1	775	690	-	791	728	-	-	-	-	-	-	-
Stage 2	725	707	-	740	690	-	-	-	-	-	-	-
Approach	EB		WB		NB			SB				
HCM Control Delay, s	11.3		11.6		0.2			2.4				
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1468	-	-	581 509 847	1346	-	-					
HCM Lane V/C Ratio	0.004	-	-	0.015 0.145 0.073	0.039	-	-					
HCM Control Delay (s)	7.5	-	-	11.3 13.3 9.6	7.8	-	-					
HCM Lane LOS	A	-	-	B B A	A	-	-					
HCM 95th %tile Q(veh)	0	-	-	0 0.5 0.2	0.1	-	-					

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	1	46	70	45	111	37	87	93	44	16	68	17
Future Vol, veh/h	1	46	70	45	111	37	87	93	44	16	68	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	50	76	49	121	40	95	101	48	17	74	18
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0

Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	3	2	2	2
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	2	2	2	3
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	2	2	3	2
HCM Control Delay	9.9	9.7	10.2	9.8
HCM LOS	A	A	B	A

Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	100%	0%	100%	0%
Vol Thru, %	0%	68%	0%	100%	0%	0%	40%	0%	80%
Vol Right, %	0%	32%	0%	0%	100%	0%	60%	0%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	137	45	111	37	1	116	16	85
LT Vol	87	0	45	0	0	1	0	16	0
Through Vol	0	93	0	111	0	0	46	0	68
RT Vol	0	44	0	0	37	0	70	0	17
Lane Flow Rate	95	149	49	121	40	1	126	17	92
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.167	0.233	0.088	0.2	0.059	0.002	0.201	0.032	0.154
Departure Headway (Hd)	6.361	5.632	6.483	5.978	5.272	6.683	5.75	6.664	6.02
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	566	639	554	601	680	536	624	538	596
Service Time	4.085	3.357	4.209	3.705	2.998	4.413	3.48	4.396	3.751
HCM Lane V/C Ratio	0.168	0.233	0.088	0.201	0.059	0.002	0.202	0.032	0.154
HCM Control Delay	10.4	10.1	9.8	10.2	8.3	9.4	9.9	9.6	9.8
HCM Lane LOS	B	B	A	B	A	A	A	A	A
HCM 95th-tile Q	0.6	0.9	0.3	0.7	0.2	0	0.7	0.1	0.5

Intersection												
Int Delay, s/veh	7.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔			↔			↔	
Traffic Vol, veh/h	1	46	70	45	111	37	87	93	44	16	68	17
Future Vol, veh/h	1	46	70	45	111	37	87	93	44	16	68	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	1	50	76	49	121	40	95	101	48	17	74	18

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	513	456	83	495	441	125	92	0	0	149	0	0
Stage 1	118	118	-	314	314	-	-	-	-	-	-	-
Stage 2	395	338	-	181	127	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	472	501	976	485	510	926	1503	-	-	1432	-	-
Stage 1	887	798	-	697	656	-	-	-	-	-	-	-
Stage 2	630	641	-	821	791	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	340	460	976	385	469	926	1503	-	-	1432	-	-
Mov Cap-2 Maneuver	340	460	-	385	469	-	-	-	-	-	-	-
Stage 1	826	788	-	649	611	-	-	-	-	-	-	-
Stage 2	450	597	-	700	781	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.6		14.9		2.9		1.2	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1503	-	-	670 385 535	1432	-	-
HCM Lane V/C Ratio	0.063	-	-	0.19 0.127 0.301	0.012	-	-
HCM Control Delay (s)	7.6	0	-	11.6 15.7 14.6	7.5	0	-
HCM Lane LOS	A	A	-	B C B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7 0.4 1.3	0	-	-

**Appendix D:**  
**2040 Level of Service Output**  
**Total Traffic TWSC**

HCM 2010 TWSC  
1: Motley Rd/Liberty Tree & Eastonville Rd

Liberty Tree Academy 2040  
Total Traffic TWSC AM

Intersection												
Int Delay, s/veh	44.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔		↔		↔	
Traffic Vol, veh/h	1	12	8	100	10	90	1	240	122	109	205	1
Future Vol, veh/h	1	12	8	100	10	90	1	240	122	109	205	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	50	50	50	92	92	50	50	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	13	9	200	20	180	1	261	244	218	223	1
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1054	1166	223	1055	1045	383	224	0	0	505	0	0
Stage 1	659	659	-	385	385	-	-	-	-	-	-	-
Stage 2	395	507	-	670	660	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	204	194	817	204	229	664	1345	-	-	1060	-	-
Stage 1	453	461	-	638	611	-	-	-	-	-	-	-
Stage 2	630	539	-	446	460	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	115	154	817	~ 159	182	664	1345	-	-	1060	-	-
Mov Cap-2 Maneuver	115	154	-	~ 159	182	-	-	-	-	-	-	-
Stage 1	453	366	-	638	611	-	-	-	-	-	-	-
Stage 2	444	539	-	338	365	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23.4		144.8		0		4.6					
HCM LOS	C		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1345	-	-	218	161	664	1060	-	-			
HCM Lane V/C Ratio	0.001	-	-	0.105	1.366	0.271	0.206	-	-			
HCM Control Delay (s)	7.7	-	-	23.4	253.2	12.4	9.3	-	-			
HCM Lane LOS	A	-	-	C	F	B	A	-	-			
HCM 95th %tile Q(veh)	0	-	-	0.3	13.5	1.1	0.8	-	-			
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

Intersection												
Intersection Delay, s/veh	12.8											
Intersection LOS	B											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	6	200	97	18	28	94	32	94	28	70	96	50
Future Vol, veh/h	6	200	97	18	28	94	32	94	28	70	96	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	217	105	20	30	102	35	102	30	76	104	54
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Approach	SE			NW			NE			SW		
Opposing Approach	NW			SE			SW			NE		
Opposing Lanes	3			2			2			2		
Conflicting Approach Left	SW			NE			SE			NW		
Conflicting Lanes Left	2			2			2			3		
Conflicting Approach Right	NE			SW			NW			SE		
Conflicting Lanes Right	2			2			3			2		
HCM Control Delay	15.9			10.1			11.2			11.4		
HCM LOS	C			B			B			B		
Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2			
Vol Left, %	100%	0%	100%	0%	0%	100%	0%	100%	0%			
Vol Thru, %	0%	77%	0%	100%	0%	0%	67%	0%	66%			
Vol Right, %	0%	23%	0%	0%	100%	0%	33%	0%	34%			
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop			
Traffic Vol by Lane	32	122	18	28	94	6	297	70	146			
LT Vol	32	0	18	0	0	6	0	70	0			
Through Vol	0	94	0	28	0	0	200	0	96			
RT Vol	0	28	0	0	94	0	97	0	50			
Lane Flow Rate	35	133	20	30	102	7	323	76	159			
Geometry Grp	8	8	8	8	8	8	8	8	8			
Degree of Util (X)	0.07	0.242	0.04	0.057	0.172	0.012	0.546	0.149	0.279			
Departure Headway (Hd)	7.229	6.561	7.287	6.779	6.067	6.829	6.09	7.067	6.32			
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Cap	493	544	489	525	588	522	591	505	565			
Service Time	5.008	4.34	5.068	4.56	3.848	4.596	3.857	4.84	4.093			
HCM Lane V/C Ratio	0.071	0.244	0.041	0.057	0.173	0.013	0.547	0.15	0.281			
HCM Control Delay	10.6	11.4	10.4	10	10.1	9.7	16	11.1	11.5			
HCM Lane LOS	B	B	B	A	B	A	C	B	B			
HCM 95th-tile Q	0.2	0.9	0.1	0.2	0.6	0	3.3	0.5	1.1			

Intersection												
Int Delay, s/veh	8.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	18	107	16	37	47	46	15	114	31	110	146	17
Future Vol, veh/h	18	107	16	37	47	46	15	114	31	110	146	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	20	116	17	40	51	50	16	124	34	120	159	18

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	631	597	168	647	589	141	177	0	0	158	0	0
Stage 1	407	407	-	173	173	-	-	-	-	-	-	-
Stage 2	224	190	-	474	416	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	394	416	876	384	421	907	1399	-	-	1422	-	-
Stage 1	621	597	-	829	756	-	-	-	-	-	-	-
Stage 2	779	743	-	571	592	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	307	372	876	263	376	907	1399	-	-	1422	-	-
Mov Cap-2 Maneuver	307	372	-	263	376	-	-	-	-	-	-	-
Stage 1	613	541	-	818	746	-	-	-	-	-	-	-
Stage 2	677	733	-	398	536	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	20.3		15.6		0.7		3.1	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	387 263 529	1422	-	-
HCM Lane V/C Ratio	0.012	-	-	0.396 0.153 0.191	0.084	-	-
HCM Control Delay (s)	7.6	0	-	20.3 21.1 13.4	7.8	0	-
HCM Lane LOS	A	A	-	C C B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.9 0.5 0.7	0.3	-	-



HCM 2010 TWSC  
1: Motley Rd/Liberty Tree & Eastonville Rd

Liberty Tree Academy 2040  
Total Traffic TWSC 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	3	3	4	34	3	31	8	208	29	26	150	0
Future Vol, veh/h	3	3	4	34	3	31	8	208	29	26	150	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	0	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	50	50	50	92	92	50	50	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	3	4	68	6	62	9	226	58	52	163	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	542	568	163	543	539	255	163	0	0	284	0	0
Stage 1	267	267	-	272	272	-	-	-	-	-	-	-
Stage 2	275	301	-	271	267	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	451	432	882	451	449	784	1416	-	-	1278	-	-
Stage 1	738	688	-	734	685	-	-	-	-	-	-	-
Stage 2	731	665	-	735	688	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	396	412	882	430	428	784	1416	-	-	1278	-	-
Mov Cap-2 Maneuver	396	412	-	430	428	-	-	-	-	-	-	-
Stage 1	733	660	-	729	681	-	-	-	-	-	-	-
Stage 2	663	661	-	698	660	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.1		12.8		0.2		1.9	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1416	-	-	516 430 784	1278	-	-
HCM Lane V/C Ratio	0.006	-	-	0.021 0.172 0.079	0.041	-	-
HCM Control Delay (s)	7.6	-	-	12.1 15.1 10	7.9	-	-
HCM Lane LOS	A	-	-	B C B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.6 0.3	0.1	-	-

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↱		↰	↱	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	1	62	96	61	151	46	119	123	60	21	87	17
Future Vol, veh/h	1	62	96	61	151	46	119	123	60	21	87	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	67	104	66	164	50	129	134	65	23	95	18
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	0

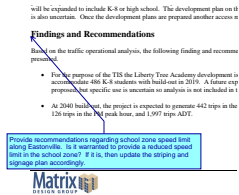
Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	3	2	2	2
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	2	2	2	3
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	2	2	3	2
HCM Control Delay	12	11.3	12.1	11.2
HCM LOS	B	B	B	B

Lane	NELn1	NELn2	NWLn1	NWLn2	NWLn3	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	100%	0%	100%	0%
Vol Thru, %	0%	67%	0%	100%	0%	0%	39%	0%	84%
Vol Right, %	0%	33%	0%	0%	100%	0%	61%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	119	183	61	151	46	1	158	21	104
LT Vol	119	0	61	0	0	1	0	21	0
Through Vol	0	123	0	151	0	0	62	0	87
RT Vol	0	60	0	0	46	0	96	0	17
Lane Flow Rate	129	199	66	164	50	1	172	23	113
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.248	0.341	0.13	0.299	0.081	0.002	0.305	0.047	0.212
Departure Headway (Hd)	6.909	6.174	7.07	6.563	5.853	7.336	6.395	7.369	6.747
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	517	581	505	545	609	486	558	484	529
Service Time	4.676	3.94	4.841	4.334	3.624	5.113	4.171	5.149	4.527
HCM Lane V/C Ratio	0.25	0.343	0.131	0.301	0.082	0.002	0.308	0.048	0.214
HCM Control Delay	12	12.1	10.9	12.1	9.1	10.1	12	10.5	11.4
HCM Lane LOS	B	B	B	B	A	B	B	B	B
HCM 95th-tile Q	1	1.5	0.4	1.2	0.3	0	1.3	0.1	0.8

Intersection												
Int Delay, s/veh	9.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	11	75	23	19	164	119	13	107	26	62	124	15
Future Vol, veh/h	11	75	23	19	164	119	13	107	26	62	124	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
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	82	25	21	178	129	14	116	28	67	135	16
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	591	451	143	490	445	130	151	0	0	145	0	0
Stage 1	278	278	-	159	159	-	-	-	-	-	-	-
Stage 2	313	173	-	331	286	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	419	504	905	489	508	920	1430	-	-	1437	-	-
Stage 1	728	680	-	843	766	-	-	-	-	-	-	-
Stage 2	698	756	-	682	675	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	244	473	905	394	477	920	1430	-	-	1437	-	-
Mov Cap-2 Maneuver	244	473	-	394	477	-	-	-	-	-	-	-
Stage 1	720	645	-	834	758	-	-	-	-	-	-	-
Stage 2	454	748	-	550	641	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	15.1		17		0.7		2.4					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1430	-	-	476	394	598	1437	-	-			
HCM Lane V/C Ratio	0.01	-	-	0.249	0.052	0.514	0.047	-	-			
HCM Control Delay (s)	7.5	0	-	15.1	14.6	17.2	7.6	0	-			
HCM Lane LOS	A	A	-	C	B	C	A	A	-			
HCM 95th %tile Q(veh)	0	-	-	1	0.2	2.9	0.1	-	-			

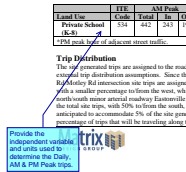
# Markup Summary

dsdslaforce (3)



**Subject:** Callout  
**Page Label:** 18  
**Author:** dsdslaforce  
**Date:** 7/24/2018 2:07:40 PM  
**Color:** ■

Provide recommendations regarding school zone speed limit along Eastonville. Is it warranted to provide a reduced speed limit in the school zone? If it is, then update the striping and signage plan accordingly.



**Subject:** Callout  
**Page Label:** 11  
**Author:** dsdslaforce  
**Date:** 7/24/2018 2:09:43 PM  
**Color:** ■

Provide the independent variable and units used to determine the Daily, AM & PM Peak trips.



**Subject:** Text Box  
**Page Label:** 1  
**Author:** dsdslaforce  
**Date:** 7/24/2018 2:12:17 PM  
**Color:** ■

Provide a statement sheet after the cover sheet or the Table of Contents with the following information:

Traffic Engineer's Statement

The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.

\_\_\_\_\_  
[Name, P.E. # \_\_\_\_\_]Date

Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

\_\_\_\_\_  
[Name, Title]Date  
[Business Name]  
[Address]