

Rolling Thunder Lots 2-3

Transportation Memorandum

Prepared for:
Nick Sallecchia
12027 Norma Kate Lane
Peyton, CO 80831

JANUARY 12, 2021

LSC Transportation Consultants
Prepared by: Colleen Guillotte, P.E., PTOE, RSP
Reviewed by: Jeffrey C. Hodsdon, P.E.

LSC #204440



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LSC TRANSPORTATION CONSULTANTS, INC.
2504 East Pikes Peak Avenue, Suite 304
Colorado Springs, CO 80909
(719) 633-2868
FAX (719) 633-5430
E-mail: lsc@lsctrans.com
Website: <http://www.lsctrans.com>

January 12, 2021

Nick Sallecchia
12027 Norma Kate Lane
Peyton, CO 80831

RE: Rolling Thunder Lots 2-3
El Paso County, CO
Transportation Memorandum
LSC #204440
PCD File No. AL208

Dear Mr. Sallecchia,

LSC Transportation Consultants, Inc. has prepared this transportation memorandum for the proposed commercial development of lots 2 and 3 in the Rolling Thunder Business Park located in El Paso County, Colorado. The proposed 7,500-square-foot building will be located on El Paso County parcels 5311101002 and 5311101003. The site is north of the intersection of Maltese Point and Firehouse View. This report presents the estimated vehicle-trip generation for the proposed development. This report has been prepared for submittal to El Paso County.

REPORT CONTENTS

The preparation of this report included the following:

- Inventory of the existing adjacent and nearby roadway system. This includes functional classifications, street widths, lane configurations, intersection traffic control, posted speed limits, pavement markings, intersection and access spacing, roadway and intersection alignments, auxiliary left- and right-turn lanes, intersection sight distances, etc.;
- A review of the proposed site land use and access locations;
- Morning and evening peak-hour traffic volumes at the intersections of Firehouse View/Maltese Point, Firehouse View/Rolling Thunder Way, and Golden Sage Road/Woodmen Road;
- Estimates of short- and long-term background traffic volumes and total traffic (site traffic plus background traffic). Forecasts include buildout of adjacent proposed developments;
- Estimates of the daily and peak-hour trip generation for the proposed land use;
- The estimated directional distribution of site-generated vehicle trips on the study-area roadway system;

- Projections of peak-hour site-generated turning-movement traffic volumes at the study-area intersections;
- Level of service (LOS) analysis at the study-area intersections;
- Evaluation of the short-term and long-term projected intersection volumes to determine the potential need for any new auxiliary right-/left-turn lanes and/or the adequacy of existing lanes at the site access-point intersections and the other study-area intersections; and
- Findings and recommendations.

RECENT TRAFFIC REPORTS

The site was previously studied as part of the *Rolling Thunder Business Park Traffic Impact Analysis*, May 2008, LSC.

The following traffic reports were utilized in the preparation of this report:

- *Falcon Meadows at Bent Grass*, December 2020
- *Black Forest Beverage Company*, May 2020
- *Bent Grass Residential Filing No. 2*, April 2020

PROPOSED LAND USE/SITE ACCESS

Figure 1 shows the site location relative to the adjacent and nearby roadways. The site is a development of two lots located in the previously approved Rolling Thunder Business Park. The two lots are planned to have a 7,500-square-foot commercial building with access onto Maltese Point. From Maltese Point, vehicles can access Rolling Thunder Way via Firehouse View.

Figure 2 shows the site plan and proposed access points. As shown, there are two site access points onto Maltese Point. Both accesses are full-movement. The intersections of Maltese Point/Firehouse View and Rolling Thunder Way/Firehouse View are also full-movement with two-way stop control. No changes to the accesses are proposed as part of this development.

ROAD AND TRAFFIC CONDITIONS

Streets adjacent to the site are identified below, followed by a brief description of each:

Maltese Point is a private local road. The roadway extends approximately 375 feet to the west from Firehouse View Road and 305 feet to the east, ending in a cul-de-sac on both sides.

Firehouse View is a private local road. The roadway extends approximately 275 feet, intersecting Maltese Point to the north and Rolling Thunder Way to the south.

Rolling Thunder Way is a two-lane, Urban Non-Residential Collector that runs east/west between Golden Sage Road and Meridian Road. The posted speed limit along this corridor is 35 miles per hour (mph). There is a striped two-way left-turn lane at the intersection with Firehouse View.

Golden Sage Road is a two-lane, Urban Non-Residential Collector that runs north/south between Rolling Thunder Way and the frontage road to the north of Woodmen Road. Currently, the roadway turns into Rolling Thunder Way on the south end. When the parcel to the west of Golden Sage Road is developed, Rolling Thunder Way will be extended and this will become an unsignalized T-intersection.

Woodmen Road is an east/west Expressway through the northern portion of the City of Colorado Springs and El Paso County. Woodmen Road is a four-lane facility adjacent to the study area. The posted speed limit on Woodmen Road in the vicinity of the site is 55 miles per hour (mph). The intersection with Golden Sage Road is signalized.

Traffic Volumes

The signalized intersection of Golden Sage Road/Woodmen Road was counted in January 2020 and again in December 2020. Traffic counts were conducted in July 2020 at the unsignalized study intersections. The most recent counts at the Golden Sage/Woodmen Road intersection and both unsignalized intersections were conducted during the COVID-19 pandemic, which may have affected traffic volumes. To correct for potentially low traffic volumes, the older count at the Golden Sage Road/Woodmen Road was used for the analysis. Additionally, the through volumes at the Rolling Thunder Way/Firehouse View were increased to balance with traffic volumes at the intersection of Golden Sage Road/Woodmen Road. It is difficult to know if volumes turning in and out of the Rolling Thunder Business Park were also impacted by the pandemic. At the time of the count, the businesses appeared to be open. Therefore, these volumes were left as counted. Figure 3 provides the peak-hour traffic volumes and estimated weekday daily traffic.

TRIP GENERATION ESTIMATE

Estimates of the vehicle trips projected to be generated by the proposed site have been made using the nationally published average trip-generation rates in *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). The land use code 820 Shopping Center was used to calculate site-generated traffic. This average trip estimate based on ITE Land Use 820 is likely conservative because this is probably not a location that will attract a typical "shopping center" mix of tenants.

Table 1 below presents a summary of the estimated site trip generation for the proposed development. A detailed trip-generation estimate for the site, including ITE rates and building square footage, is presented in Table 4 (attached).

Table 1: Estimated Site Vehicle-Trip Generation – Shopping Center

Analysis Period	Weekday		
	In	Out	Total
Morning peak hour (vehicle trips/hour)	12	10	22
Evening peak hour (vehicle trips/hour)	16	16	32
Weekday – 24-hour total (vehicle trips/day)	141	141	282

Based on the ITE estimate for the proposed development, the site would generate approximately 282 vehicle trips on the average weekday, with half entering and half exiting the site. Approximately 12 entering vehicles and 10 exiting vehicles are projected for the weekday morning peak hour and 16 entering vehicles and 16 exiting vehicles are projected for the weekday evening peak hour.

Traffic counts were completed in July 2020 at the intersection of Firehouse View/Rolling Thunder Way to estimate how much traffic is currently generated by the existing business park. The current counts, along with trip-generation estimates in the *Black Forest Beverage Company Trip Generation Memo* prepared in May 2020 and the trip generation forecast for the proposed development were used to develop a trip-generation forecast for the entire business park. The attached Table 5 provides the estimated trip generation. As shown, with the proposed shopping center and previously proposed brewery, the business park is projected to generate 56 trips during the morning peak hour and 127 trips during the evening peak hour.

The previously approved use of the business park included 94,500 square feet of business park land use, which would include a mix of office, retail, light industrial, and warehouse, as well as a 5,000-square-foot shopping center. The attached Table 6 provides a summary of the site-generated traffic volumes that were projected in the previous Rolling Thunder Business Park traffic study that included all parcels within the business park.

Table 2 provides a comparison to trip-generation estimates for the previously-approved land use for all parcels within the business park and the current trip generation estimates for the business park. As shown, the proposed land use is anticipated to generate less traffic than the previous land use. The business park would generate approximately 498 fewer vehicle trips on the average weekday, with half entering and half exiting the site. Approximately 97 fewer vehicles will enter or exit the site during the morning peak hour and 36 fewer vehicles will enter or exit the site during the evening peak hour.

**Table 2: Rolling Thunder Business Park (All Parcels)
Trip Generation Comparison**

Land Use	Daily	Morning Peak		Evening Peak	
		In	Out	In	Out
Proposed Land Use (Table 5)	1,192	40	16	57	75
Previously Estimated Land Use (Table 6)	1,690	123	30	52	116
Difference	-498	-83	-14	5	-41

BACKGROUND TRAFFIC

Background traffic includes growth that is projected to occur on the study roadways, due to future development in the area. Background volumes do not include projected traffic to be generated by the proposed development. Long-term volumes were estimated by LSC, based on previous work completed in the area by LSC, including *Falcon Meadows at Bent Grass*, *Bent Grass Meadows*, and *Falcon Marketplace*. The 2040 background traffic volumes assume buildout of the area north of Woodmen Road and west of Meridian Road.

It is anticipated that, by the year 2040, the west leg of the intersection of Golden Sage Road/Rolling Thunder Way would likely be constructed and carry traffic. However, this was not included in this analysis. It is expected that the development to the west would need to submit a traffic impact study to address impacts to the study intersections, including Golden Sage Road/Rolling Thunder Way.

TRIP DISTRIBUTION AND ASSIGNMENT

Trip Directional Distribution

Estimation of the directional distribution of site-generated vehicle trips to the study-area roads and intersections is a necessary component in determining the site's traffic impacts. Figure 5 shows the directional distribution estimates for the proposed development. Estimates were based on the following factors: existing traffic counts, existing area development, and the area roadway system. As shown, it has been assumed that 80 percent of site-generated traffic would travel to/from Woodmen Road.

Site-Generated Traffic

Site-generated traffic volumes at the study intersections have been calculated by applying the directional-distribution percentages estimated by LSC to the trip-generation estimates (from Table 4). Figure 5 provides the site-generated traffic for the site.

Short-Term Total Traffic Volumes

Figure 6 shows the sum of the existing traffic volumes (from Figure 3) and the site-generated peak-hour traffic volumes for the development (shown in Figure 5). As mentioned previously, the through volumes at the intersection of Rolling Thunder Way/Firehouse View were increased to balance with volumes at Golden Sage Road/Woodmen Road. This was done to try to correct for the traffic impacts of the COVID-19 pandemic. The resulting volumes represent the projected short-term total traffic following construction of development.

Long-Term Total Traffic Volumes

Figure 7 shows the projected 2040 total traffic volumes, which are the sum of 2040 background traffic volumes (from Figure 4) plus the site-generated traffic volumes (from Figure 5).

LEVEL OF SERVICE ANALYSIS

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection and is indicated on a scale from “A” to “F.” LOS A is indicative of little congestion or delay. LOS F indicates a high level of congestion or delay. Table 3 shows the level of service delay ranges for signalized and unsignalized intersections.

Table 3: Intersection Levels of Service Delay Ranges

Level of Service	Signalized Intersections	Unsignalized Intersections
	Average Control Delay (seconds per vehicle)	Average Control Delay (seconds per vehicle) ⁽¹⁾
A	10.0 sec or less	10.0 sec or less
B	10.1-20.0 sec	10.1-15.0 sec
C	20.1-35.0 sec	15.1-25.0 sec
D	35.1-55.0 sec	25.1-35.0 sec
E	55.1-80.0 sec	35.1-50.0 sec
F	80.1 sec or more	50.1 sec or more

(1) For unsignalized intersections if V/C ratio is greater than 1.0 the level of service is LOS F regardless of the projected average control delay per vehicle.

The study intersections have been analyzed to determine the projected control delay and corresponding levels of service for turning movements. Figure 3 provides the existing levels of service. Figure 4 provides the background levels of service for the long-term scenarios. Figure 6 and Figure 7 provide the levels of service for the short-term and long-term total traffic scenarios, respectively.

Golden Sage Road/Woodmen Road

The signalized intersection of Golden Sage Road/Woodmen Road currently operates at LOS B during the peak hours with all movements operating at LOS D or better. In the short-term total, the levels of service experienced at the intersection are expected to remain unchanged with the addition of the site-generated traffic.

In the long-term background, this intersection is projected to operate at LOS D during the morning peak hour and LOS C during the evening peak hour. All movements are expected to

operate at LOS D or better, with the exception of the eastbound left turn. This movement is expected to operate at LOS E during the morning peak hour. It should be noted that this occurs without the development of the proposed site. With the addition of the site-generated traffic, the level of service experienced at the intersection is expected to remain unchanged.

Golden Sage Road/Woodmen Road

All yielding turning movements at the unsignalized study intersections are projected to operate at LOS C or better during both peak hours in all existing and future scenarios.

AUXILIARY TURN LANES

No additional auxiliary lanes are necessary with this proposed development.

MTCP ROADWAY IMPROVEMENTS

The *2016 El Paso County Major Transportation Corridor Plan* does not show any planned improvements in the study area.

PEDESTRIAN AND BICYCLE ACCOMMODATION

There is currently no sidewalk along Maltese Point or Firehouse View. There is an incomplete segment of sidewalk along the east side of Golden Sage Road, but no sidewalk on the west side. In the *2016 El Paso County Major Transportation Corridor Plan* (MTCP), Woodmen Road is shown as a non-motorized priority corridor with proposed bicycle routes.

COUNTY ROAD IMPROVEMENT FEE PROGRAM

Transportation Impact Fees

No Transportation Impact Fees are required, as the development is part of the Woodmen Road district.

Reimbursable MTCP Improvements

There are no apparent reimbursable improvements programmed in the MTCP in the general vicinity of this site.

FINDINGS AND CONCLUSIONS

Trip Generation

- The development is expected to generate approximately 283 vehicle trips on the average weekday with approximately 22 trips occurring during the morning peak hour and 32 trips during the evening peak hour.

Recommendations

- No additional auxiliary lanes or other improvements are required for the proposed development.

* * * * *

Please contact me if you have any questions.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E.
Principal

JCH:CRG:jas

Enclosures: Table 4-6
Figures 1-7
Traffic Counts
Level of Service Reports

Tables



Table 4: Detailed Trip Generation – Proposed Site

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates ⁽¹⁾						Total Trips Generated			
			Average Weekday Traffic ⁽³⁾	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out	In	Out
820	Shopping Center	7.5 KSF ⁽²⁾	37.75	1.62	1.38	2.11	2.11	283	12	10	16	16
Notes:												
(1) Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)												
(2) KSF = 1,000 Square Feet												
Source: LSC Transportation Consultants, Inc.												

Table 5: Detailed Trip Generation – Rolling Thunder Business Park (All Parcels)

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates ⁽¹⁾				Total Trips Generated					
			Average Weekday Traffic ⁽³⁾	Morning Peak Hour In	Morning Peak Hour Out	Afternoon Peak Hour In	Afternoon Peak Hour Out	Average Weekday Traffic	Morning Peak Hour In	Morning Peak Hour Out	Afternoon Peak Hour In	Afternoon Peak Hour Out
Proposed Land Use												
820	Shopping Center	7.5 KSF ⁽²⁾	37.75	1.62	1.38	2.11	2.11	283	12	10	16	16
Other Proposed Land Uses Within Rolling Thunder ⁽³⁾												
925	Drinking Place	1.383 KSF	56.09	0.00	0.00	7.50	3.86	78	0	0	10	5
140	Manufacturing	2.27 KSF	3.93	0.48	0.14	0.21	0.46	9	1	0	0	1
492	Health/Fitness Club	1.15 KSF	28.82	0.67	0.64	1.97	1.48	33	1	1	2	2
Subtotal								120	2	1	13	8
Existing Land Use ⁽⁴⁾												
	Count Data	--	-	-	-	-	-	790 ⁽⁵⁾	26	5	28	51
Total								1,193	40	16	57	75
<p>Notes:</p> <p>(1) Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)</p> <p>(2) KSF = 1,000 Square Feet</p> <p>(3) From Black Forest Beverage Company Trip Generation Memo, LSC, May 2020</p> <p>(4) Based on peak hour counts collected in July 2020 at Firehouse View/Rolling Thunder Way</p> <p>(5) Estimated based on peak hour traffic counts</p>												
Source: LSC Transportation Consultants, Inc.												

**Table 6: Rolling Thunder Business Park
Previously Approved Site Generated Traffic (All Parcels)**

Analysis Period	<u>Weekday</u>		Total
	In	Out	
Morning peak hour (vehicle trips/hour)	123	30	153
Evening peak hour (vehicle trips/hour)	52	116	168
Weekday – 24-hour total (vehicle trips/day)	845	845	1,690

Figures





Not to scale

Figure 1
Vicinity

Rolling Thunder Lots 2-3 (LSC# 204440)

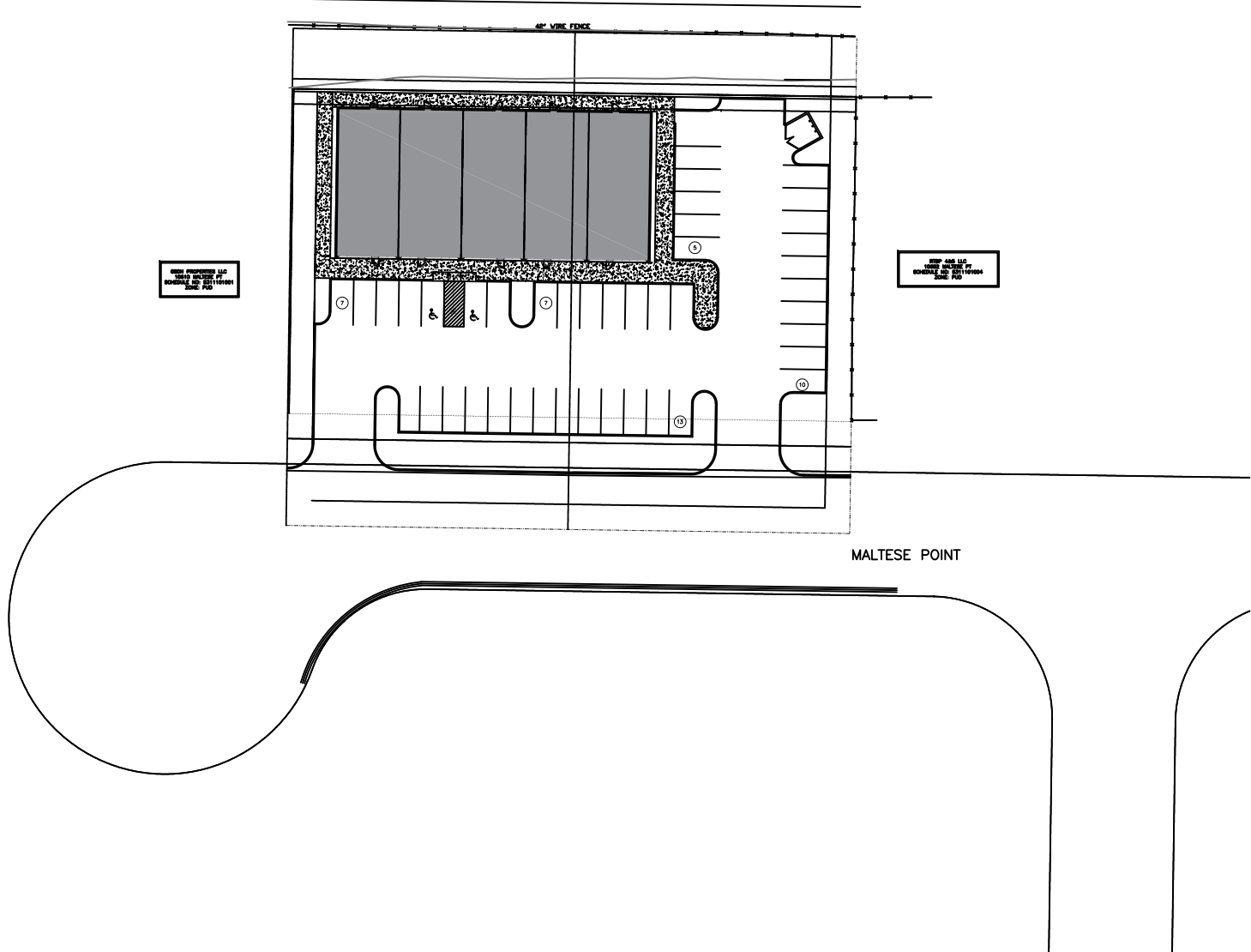
WOODMEN ROAD



Not to scale

WOOD PROPERTIES LLC
10000 WOODMEN RD
BOWLING GREEN, KY 40304

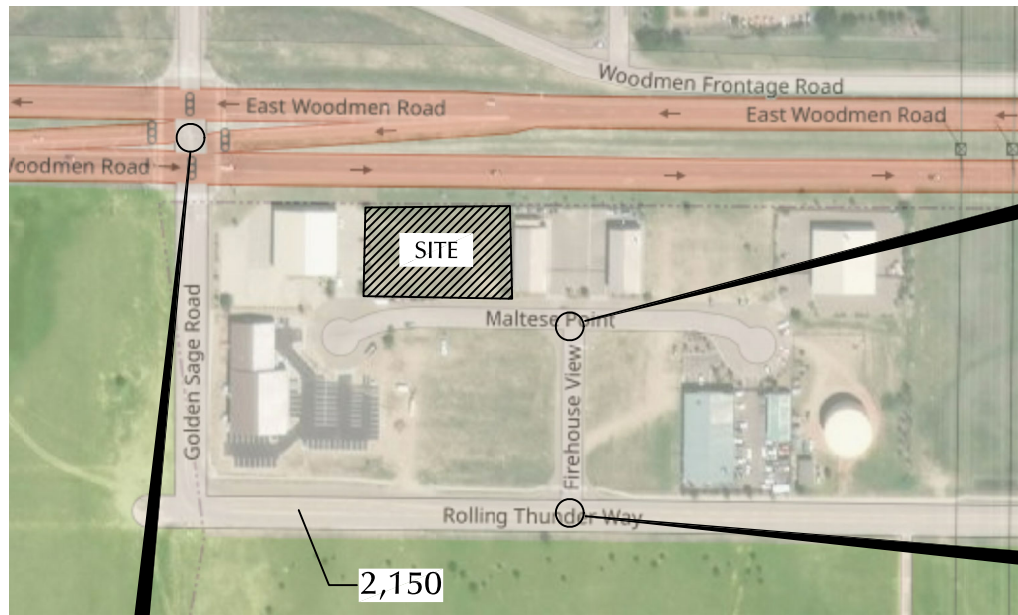
WOOD PROPERTIES LLC
10000 WOODMEN RD
BOWLING GREEN, KY 40304



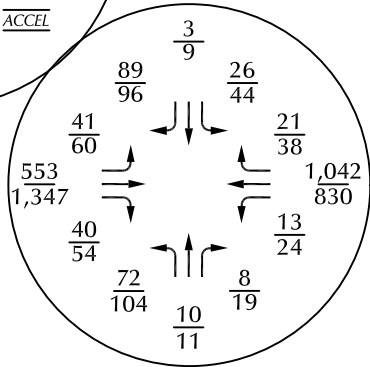
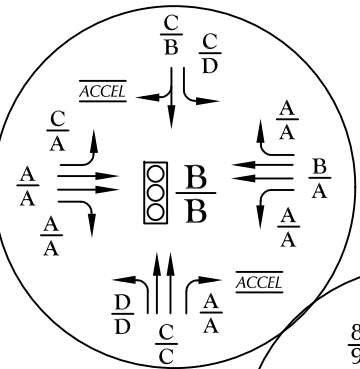
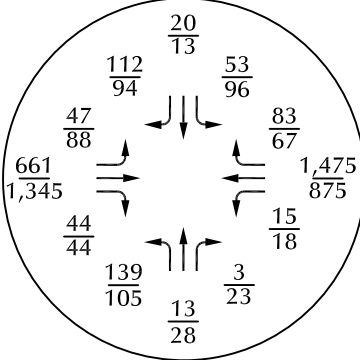
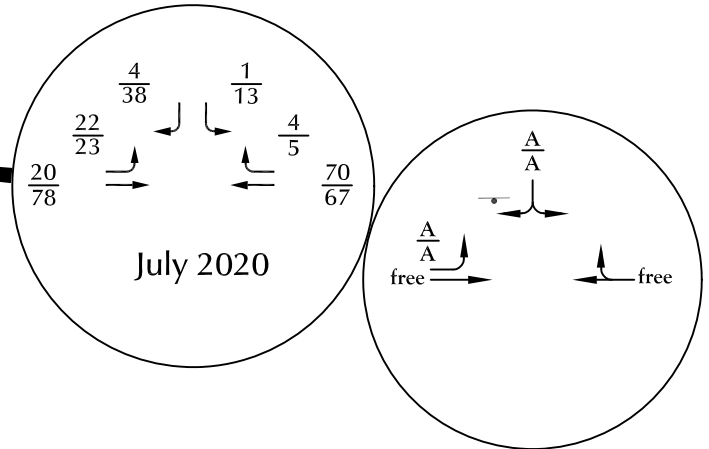
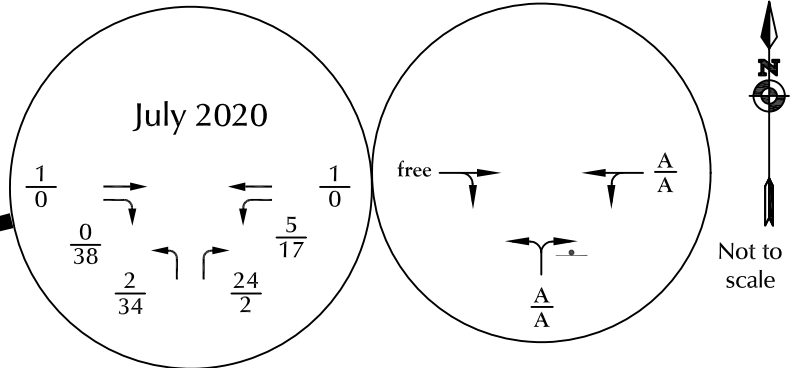
MALTESE POINT

Figure 2
Site Plan

Rolling Thunder Lots 2-3 (LSC# 204440)



2,150



LEGEND:

$\frac{XX}{XX}$ = AM Peak-Hour Traffic (veh/hr)
 $\frac{XX}{XX}$ = PM Peak-Hour Traffic (veh/hr)

XXX = Average Weekday Daily Traffic (vehicles per day)

$\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
 PM Individual Movement Peak-Hour Level of Service

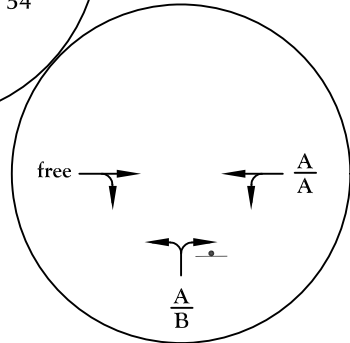
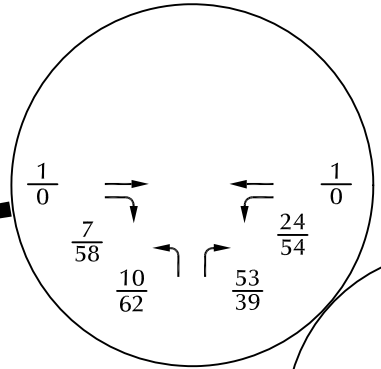
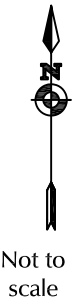
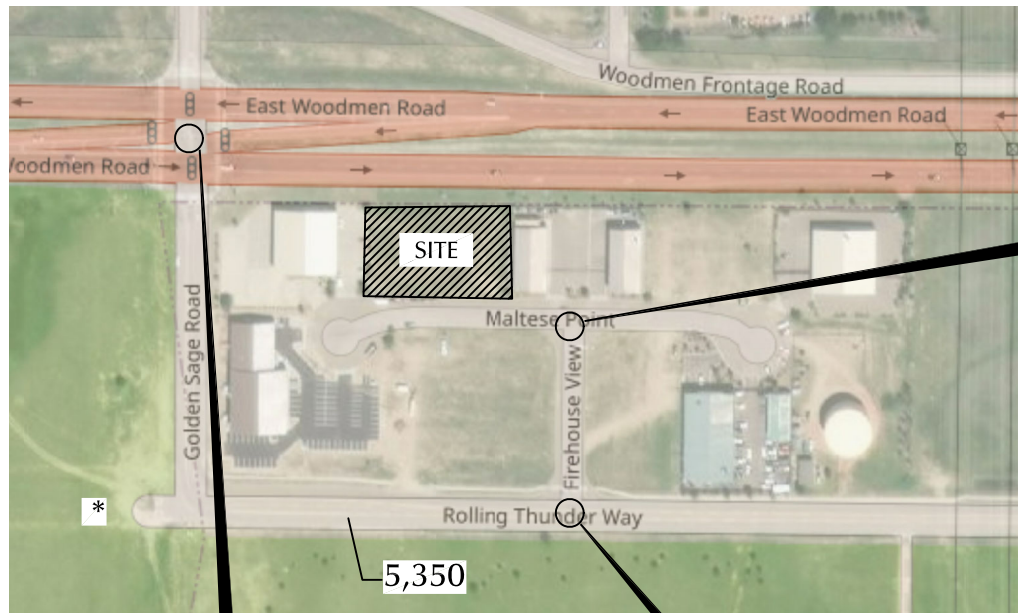
$\frac{C}{D}$ = AM Entire Intersection Peak-Hour Level of Service
 PM Entire Intersection Peak-Hour Level of Service


⊥ = Stop Sign

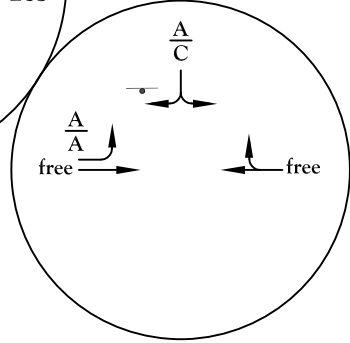
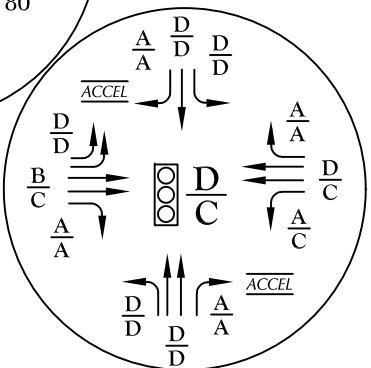
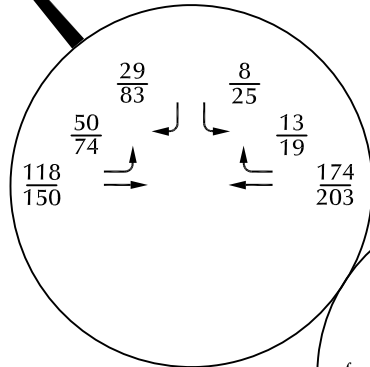
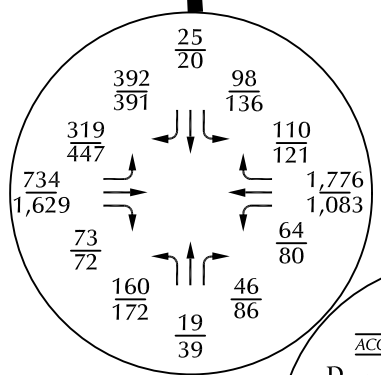
*December 2020 counts were lower than the January 2020 counts due to the impact of the COVID-19 pandemic on traffic. The January 2020 counts were used for the analysis to be conservative.

Figure 3
Existing Traffic Conditions
 Rolling Thunder Lots 2-3 (LSC# 204440)





LEGEND:
 $\frac{XX}{XX}$ = AM Peak-Hour Traffic (veh/hr)
 $\frac{XX}{XX}$ = PM Peak-Hour Traffic (veh/hr)
XXX = Average Weekday Daily Traffic (vehicles per day)
 $\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
 $\frac{A}{B}$ = PM Individual Movement Peak-Hour Level of Service
 = Stop Sign



*Future traffic by 2040 is likely on this leg – however not included in this analysis. The development to the west would likely need to submit a TIS report to address impacts to the study area intersections.

Figure 4
Long-Term Background Traffic Conditions

Rolling Thunder Lots 2-3 (LSC# 204440)



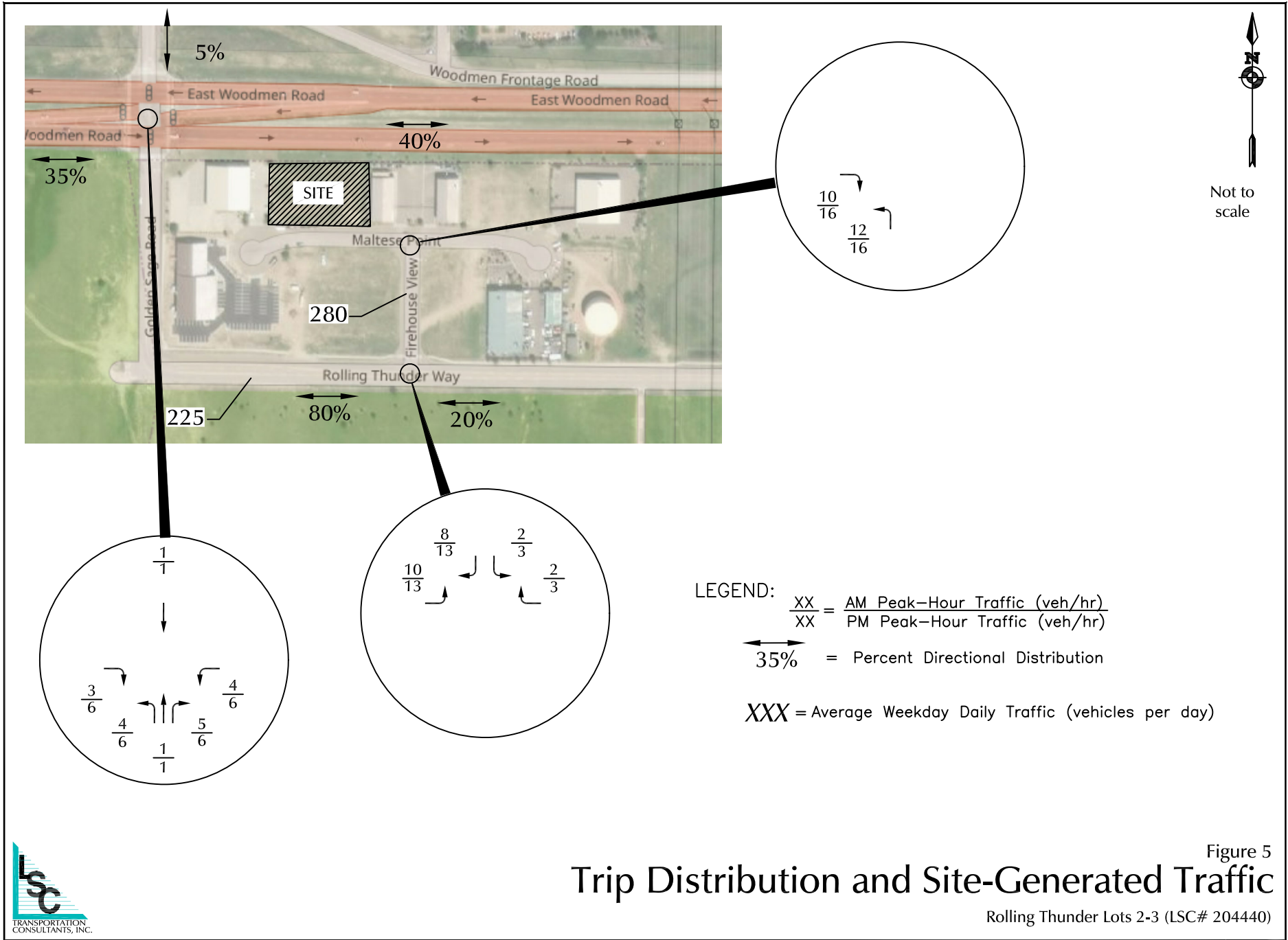
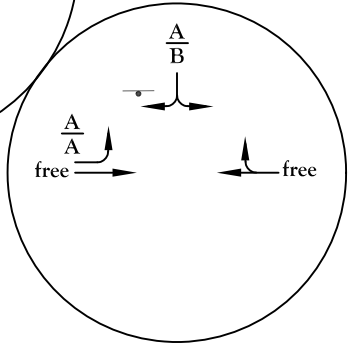
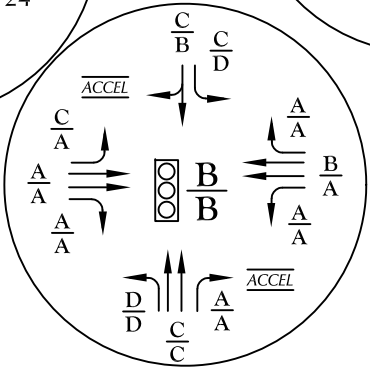
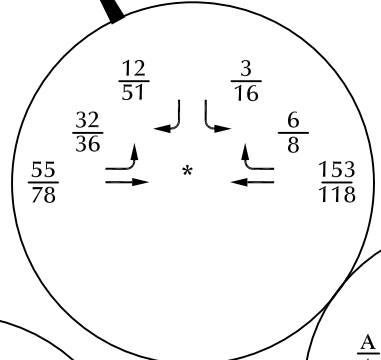
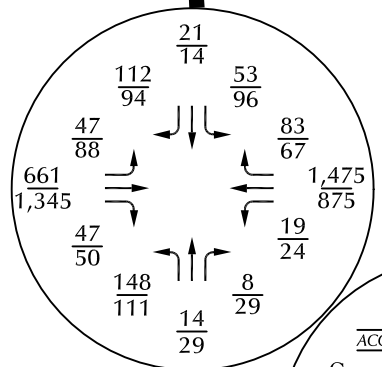
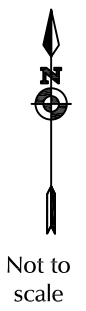
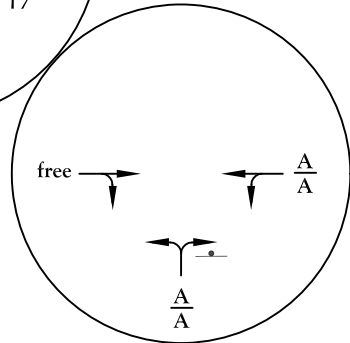
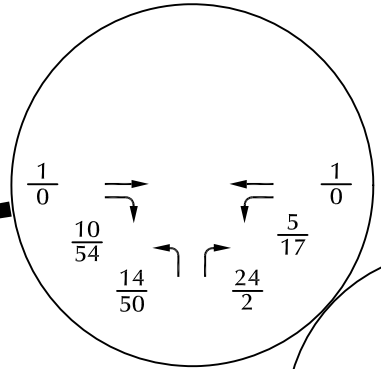
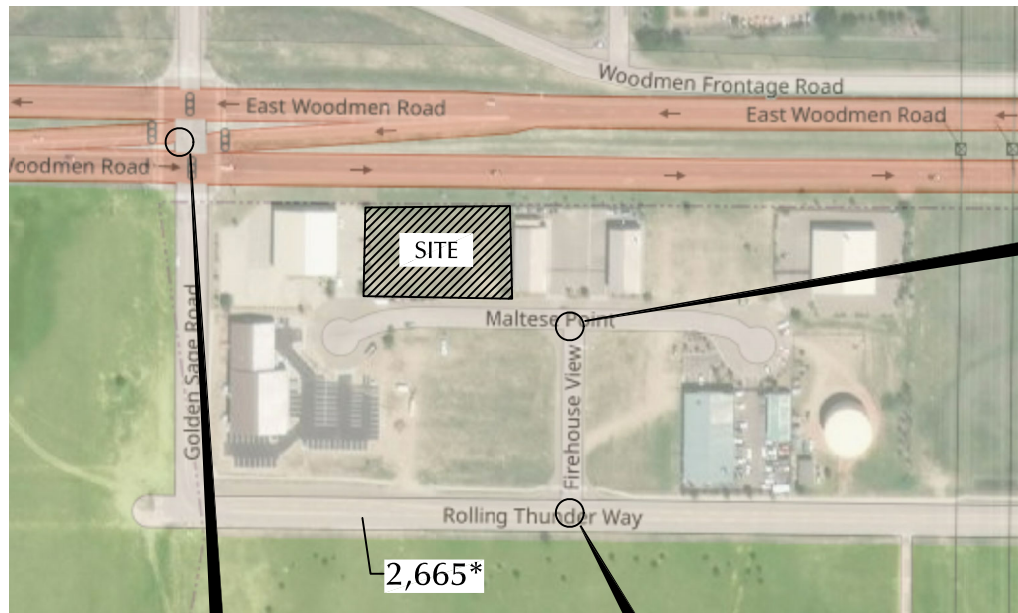


Figure 5
 Trip Distribution and Site-Generated Traffic

Rolling Thunder Lots 2-3 (LSC# 204440)





LEGEND:

$\frac{XX}{XX}$ = AM Peak-Hour Traffic (veh/hr)
 $\frac{XX}{XX}$ = PM Peak-Hour Traffic (veh/hr)

XXX = Average Weekday Daily Traffic (vehicles per day)

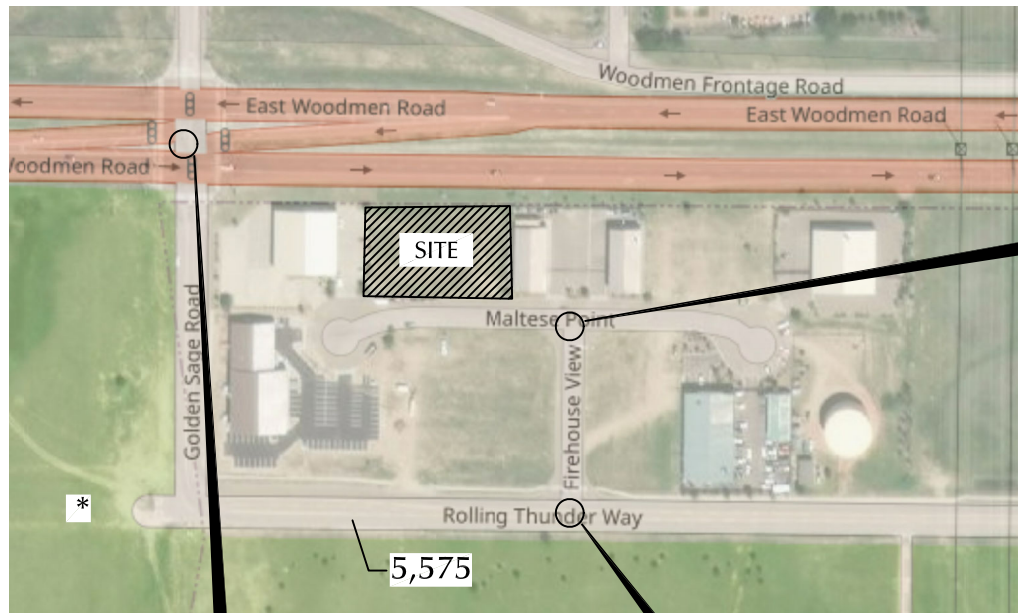
$\frac{A}{B}$ = $\frac{\text{AM Individual Movement Peak-Hour Level of Service}}{\text{PM Individual Movement Peak-Hour Level of Service}}$

⊥ = Stop Sign

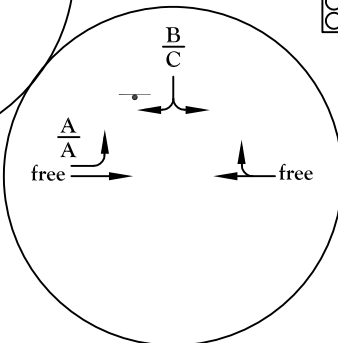
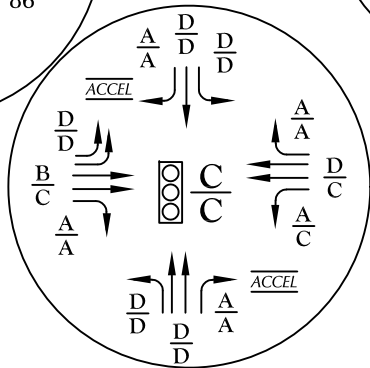
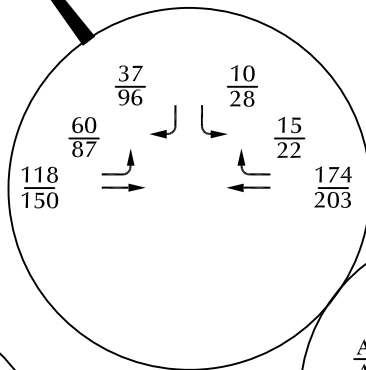
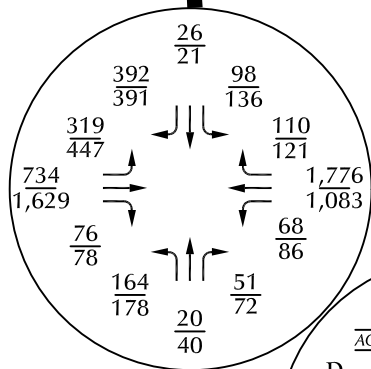
*Through volumes have been adjusted to account for lower traffic volumes during the COVID-19 pandemic.



Figure 6
Short-Term Total Traffic Conditions
 Rolling Thunder Lots 2-3 (LSC# 204440)



Not to scale



LEGEND:

$\frac{XX}{XX}$ = AM Peak-Hour Traffic (veh/hr)
 PM Peak-Hour Traffic (veh/hr)

XXX = Average Weekday Daily Traffic (vehicles per day)

$\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
 PM Individual Movement Peak-Hour Level of Service

= Traffic Signal | = Stop Sign

*Future traffic by 2040 is likely on this leg – however not included in this analysis. The development to the west would likely need to submit a TIS report to address impacts to the study area intersections.

Figure 7
 Long-Term Total Traffic Conditions

Rolling Thunder Lots 2-3 (LSC# 204440)

Traffic Counts



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File Name : Firehouse View - Rolling Thunder Wy AM
 Site Code : 00204440
 Start Date : 7/1/2020
 Page No : 1

Groups Printed- Unshifted

Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
06:30 AM	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	1	4	0	0	5	24
06:45 AM	0	0	0	0	0	0	12	1	0	13	0	0	0	0	0	0	1	0	0	1	14
Total	0	0	0	0	0	0	31	1	0	32	0	0	0	0	0	1	5	0	0	6	38
07:00 AM	0	0	0	0	0	0	21	3	0	24	0	0	0	0	0	5	3	0	0	8	32
07:15 AM	1	0	1	0	2	0	18	0	0	18	0	0	0	0	0	4	8	0	0	12	32
07:30 AM	0	0	2	0	2	0	19	0	0	19	0	0	0	0	0	8	3	0	1	12	33
07:45 AM	0	0	1	0	1	0	12	1	0	13	0	0	0	0	0	5	6	0	0	11	25
Total	1	0	4	0	5	0	70	4	0	74	0	0	0	0	0	22	20	0	1	43	122
08:00 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	7
08:15 AM	0	0	3	0	3	0	18	1	0	19	0	0	0	0	0	4	10	0	0	14	36
Grand Total	2	0	7	0	9	0	124	6	0	130	0	0	0	0	0	27	36	0	1	64	203
Apprch %	22.2	0	77.8	0		0	95.4	4.6	0		0	0	0	0		42.2	56.2	0	1.6		
Total %	1	0	3.4	0	4.4	0	61.1	3	0	64	0	0	0	0	0	13.3	17.7	0	0.5	31.5	

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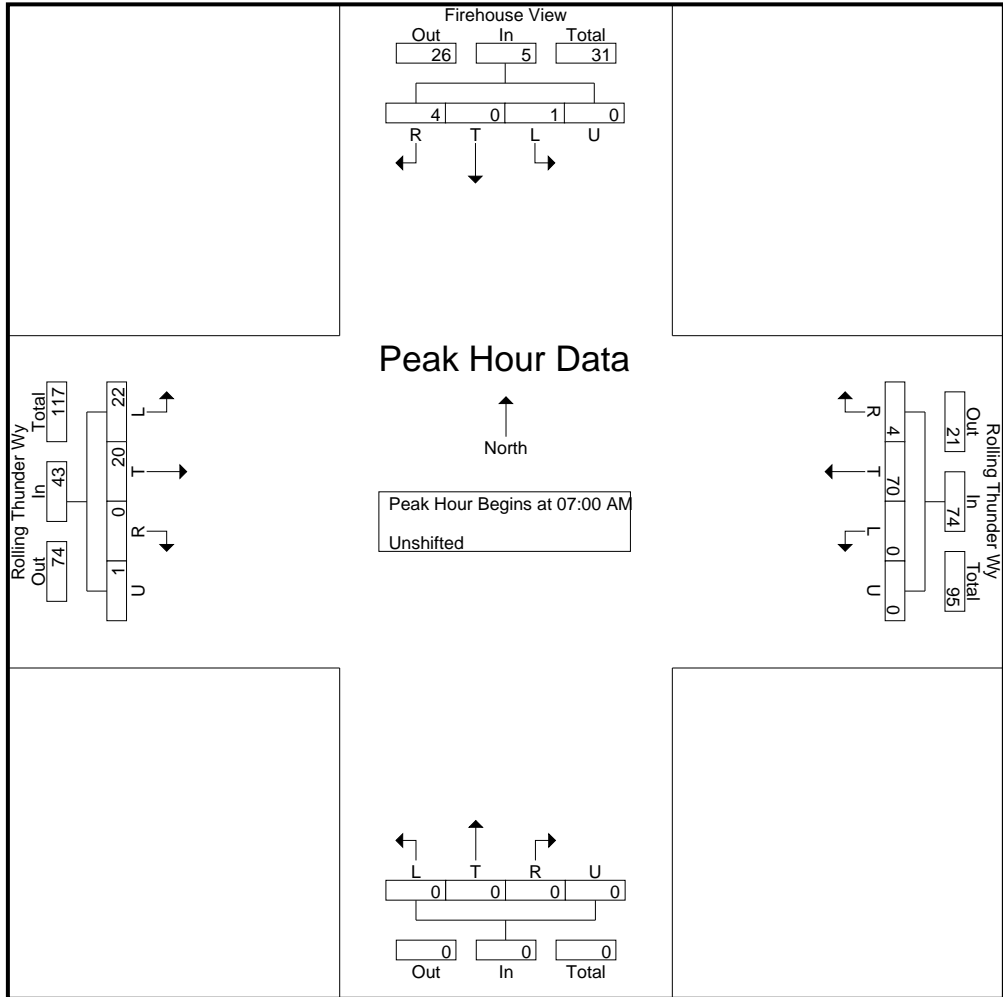
File Name : Firehouse View - Rolling Thunder Wy AM
 Site Code : 00204440
 Start Date : 7/1/2020
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Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
Peak Hour Analysis From 6:30:00 AM to 8:15:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 7:00:00 AM																					
7:00:00 AM	0	0	0	0	0	0	21	3	0	24	0	0	0	0	0	5	3	0	0	8	32
7:15:00 AM	1	0	1	0	2	0	18	0	0	18	0	0	0	0	0	4	8	0	0	12	32
7:30:00 AM	0	0	2	0	2	0	19	0	0	19	0	0	0	0	0	8	3	0	1	12	33
7:45:00 AM	0	0	1	0	1	0	12	1	0	13	0	0	0	0	0	5	6	0	0	11	25
Total Volume	1	0	4	0	5	0	70	4	0	74	0	0	0	0	0	22	20	0	1	43	122
% App. Total	20	0	80	0		0	94.6	5.4	0		0	0	0	0		51.2	46.5	0	2.3		
PHF	.250	.000	.500	.000	.625	.000	.833	.333	.000	.771	.000	.000	.000	.000	.000	.688	.625	.000	.250	.896	.924

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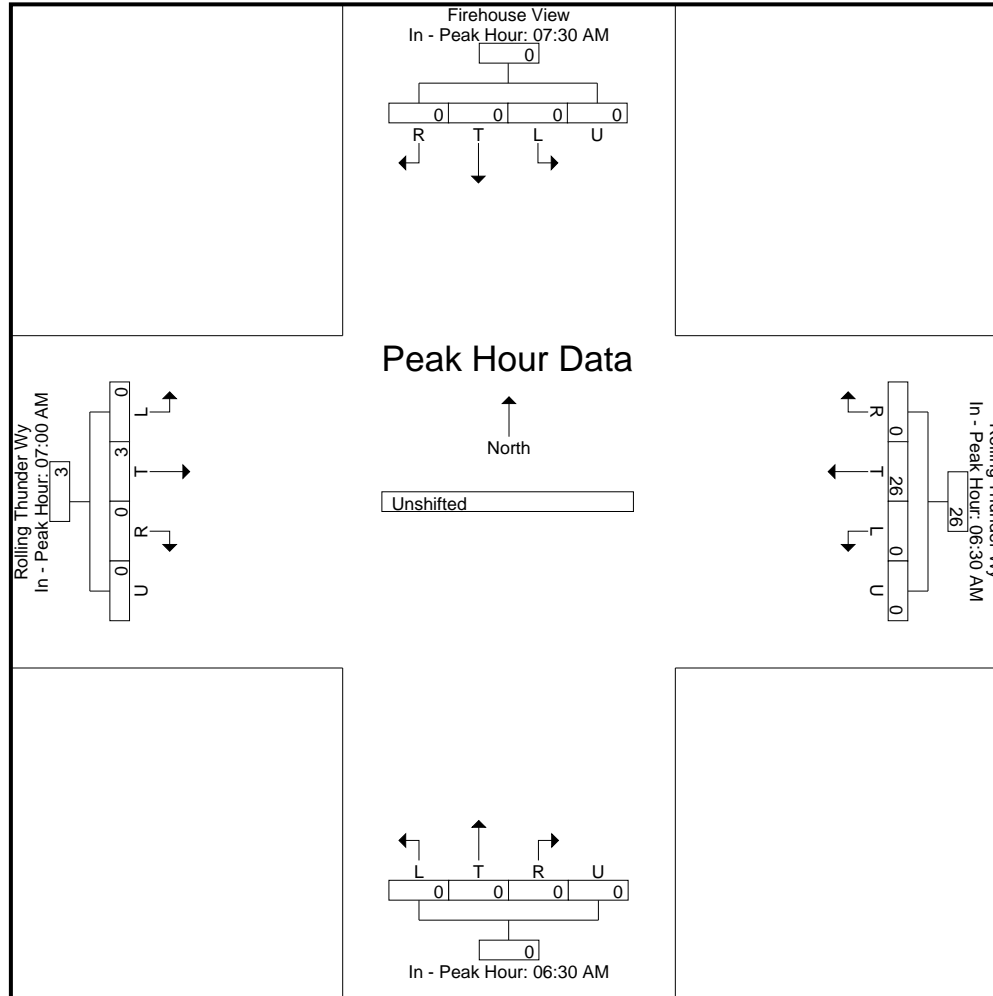
File Name : Firehouse View - Rolling Thunder Wy AM
 Site Code : 00204440
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Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
Peak Hour Analysis From 6:30:00 AM to 8:15:00 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	7:30:00 AM					6:30:00 AM					6:30:00 AM					7:00:00 AM					
+0 mins.	0	0	2	0	2	0	19	0	0	19	0	0	0	0	0	5	3	0	0	8	
+5 mins.	0	0	1	0	1	0	12	1	0	13	0	0	0	0	0	4	8	0	0	12	
+10 mins.	1	0	0	0	1	0	21	3	0	24	0	0	0	0	0	8	3	0	1	12	
+15 mins.	0	0	3	0	3	0	18	0	0	18	0	0	0	0	0	5	6	0	0	11	
Total Volume	1	0	6	0	7	0	70	4	0	74	0	0	0	0	0	22	20	0	1	43	
% App. Total	14.3	0	85.7	0		0	94.6	5.4	0		0	0	0	0		51.2	46.5	0	2.3		
PHF	.250	.000	.500	.000	.583	.000	.833	.333	.000	.771	.000	.000	.000	.000	.000	.688	.625	.000	.250	.896	

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File Name : Firehouse View - Rolling Thunder Wy PM
 Site Code : 00204440
 Start Date : 7/1/2020
 Page No : 1

Groups Printed- Unshifted

Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
04:00 PM	4	0	10	0	14	0	19	4	0	23	0	0	0	0	0	3	12	1	0	16	53
04:15 PM	0	0	4	0	4	0	9	3	0	12	0	0	0	0	0	2	16	0	0	18	34
04:30 PM	1	0	4	0	5	0	13	1	0	14	0	0	0	0	0	3	15	0	0	18	37
04:45 PM	1	0	5	0	6	0	9	3	0	12	0	0	0	0	0	8	12	0	0	20	38
Total	6	0	23	0	29	0	50	11	0	61	0	0	0	0	0	16	55	1	0	72	162
05:00 PM	7	0	23	0	30	0	15	5	0	20	0	0	0	0	0	12	27	0	0	39	89
05:15 PM	4	0	6	0	10	0	14	0	0	14	0	0	0	0	0	6	17	0	0	23	47
05:30 PM	0	0	8	0	8	0	24	0	0	24	0	0	0	0	0	2	15	0	0	17	49
05:45 PM	2	0	1	0	3	0	14	0	0	14	0	0	0	0	0	3	19	0	0	22	39
Total	13	0	38	0	51	0	67	5	0	72	0	0	0	0	0	23	78	0	0	101	224
Grand Total	19	0	61	0	80	0	117	16	0	133	0	0	0	0	0	39	133	1	0	173	386
Apprch %	23.8	0	76.2	0		0	88	12	0		0	0	0	0		22.5	76.9	0.6	0		
Total %	4.9	0	15.8	0	20.7	0	30.3	4.1	0	34.5	0	0	0	0	0	10.1	34.5	0.3	0	44.8	

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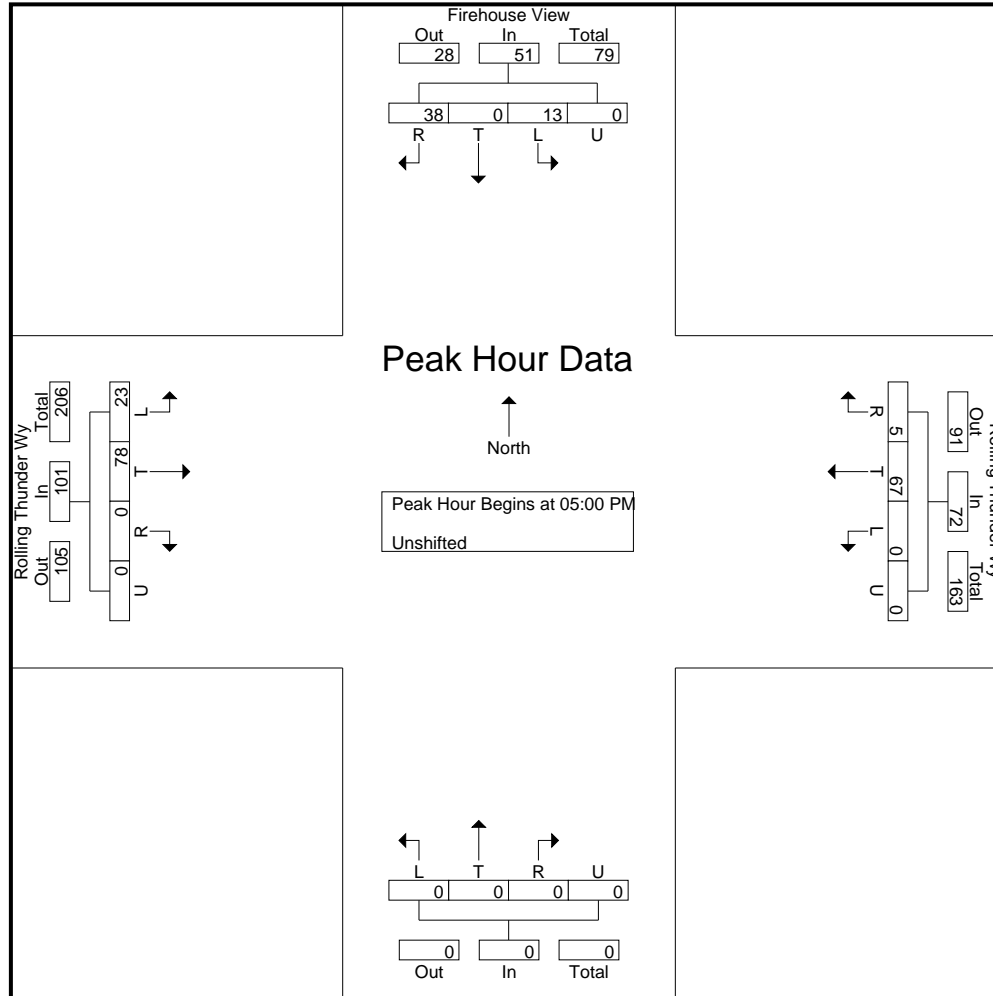
File Name : Firehouse View - Rolling Thunder Wy PM
 Site Code : 00204440
 Start Date : 7/1/2020
 Page No : 2

Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 5:00:00 PM																					
5:00:00 PM	7	0	23	0	30	0	15	5	0	20	0	0	0	0	0	12	27	0	0	39	89
5:15:00 PM	4	0	6	0	10	0	14	0	0	14	0	0	0	0	0	6	17	0	0	23	47
5:30:00 PM	0	0	8	0	8	0	24	0	0	24	0	0	0	0	0	2	15	0	0	17	49
5:45:00 PM	2	0	1	0	3	0	14	0	0	14	0	0	0	0	0	3	19	0	0	22	39
Total Volume	13	0	38	0	51	0	67	5	0	72	0	0	0	0	0	23	78	0	0	101	224
% App. Total	25.5	0	74.5	0		0	93.1	6.9	0		0	0	0	0		22.8	77.2	0	0		
PHF	.464	.000	.413	.000	.425	.000	.698	.250	.000	.750	.000	.000	.000	.000	.000	.479	.722	.000	.000	.647	.629

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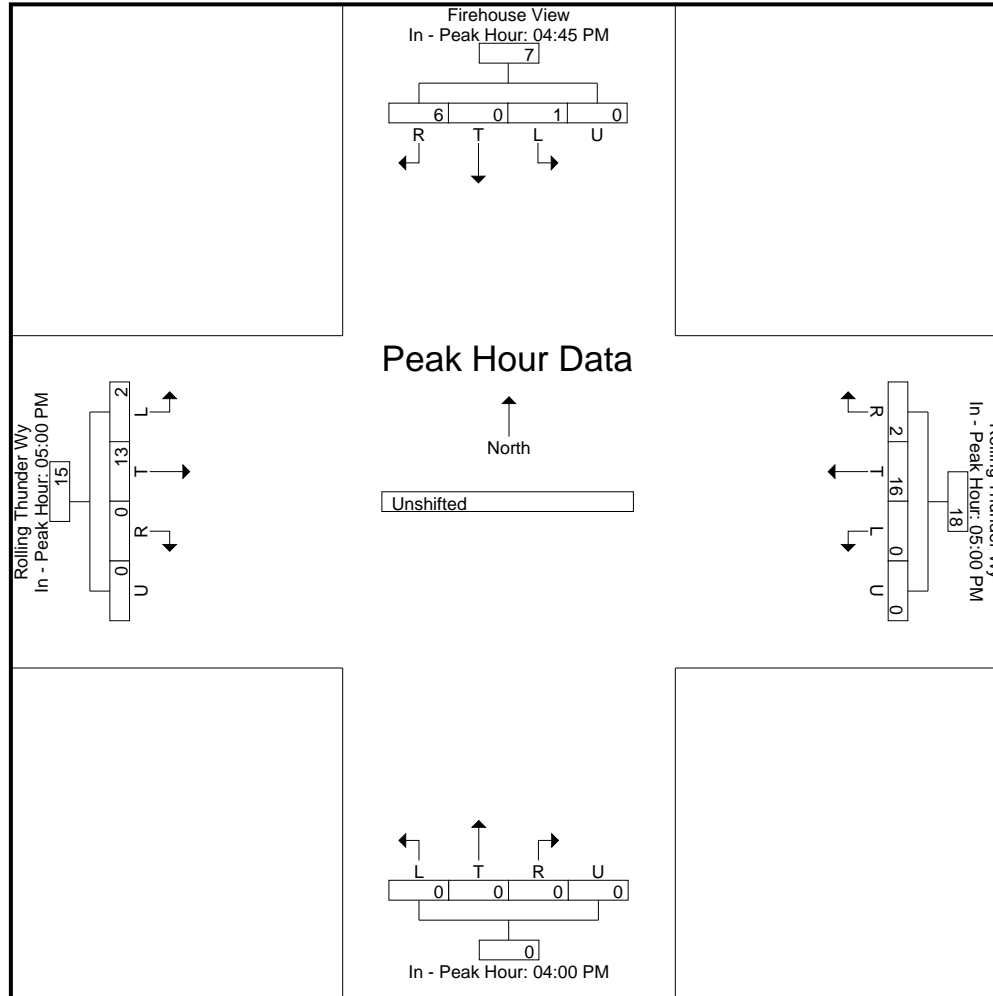
File Name : Firehouse View - Rolling Thunder Wy PM
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Start Time	Firehouse View Southbound					Rolling Thunder Wy Westbound					Northbound					Rolling Thunder Wy Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	4:45:00 PM					5:00:00 PM					4:00:00 PM					5:00:00 PM					
+0 mins.	1	0	5	0	6	0	15	5	0	20	0	0	0	0	0	12	27	0	0	39	
+5 mins.	7	0	23	0	30	0	14	0	0	14	0	0	0	0	0	6	17	0	0	23	
+10 mins.	4	0	6	0	10	0	24	0	0	24	0	0	0	0	0	2	15	0	0	17	
+15 mins.	0	0	8	0	8	0	14	0	0	14	0	0	0	0	0	3	19	0	0	22	
Total Volume	12	0	42	0	54	0	67	5	0	72	0	0	0	0	0	23	78	0	0	101	
% App. Total	22.2	0	77.8	0		0	93.1	6.9	0		0	0	0	0		22.8	77.2	0	0		
PHF	.429	.000	.457	.000	.450	.000	.698	.250	.000	.750	.000	.000	.000	.000	.000	.479	.722	.000	.000	.647	

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File Name : Firehouse View - Rolling Thunder Wy PM
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Levels of Service



HCM 6th TWSC
1: Firehouse View & Maltese Point

Existing
AM Peak Hour

Intersection						
Int Delay, s/veh	7.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	1	0	5	1	2	24
Future Vol, veh/h	1	0	5	1	2	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	25	75	75	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	0	7	1	2	30

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	4	0	19
Stage 1	-	-	-	-	4
Stage 2	-	-	-	-	15
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1618	-	998
Stage 1	-	-	-	-	1019
Stage 2	-	-	-	-	1008
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1618	-	994
Mov Cap-2 Maneuver	-	-	-	-	994
Stage 1	-	-	-	-	1019
Stage 2	-	-	-	-	1004

Approach	EB	WB	NB
HCM Control Delay, s	0	6	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1073	-	-	1618	-
HCM Lane V/C Ratio	0.03	-	-	0.004	-
HCM Control Delay (s)	8.5	-	-	7.2	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th TWSC
2: Rolling Thunder & Firehouse View

Existing
AM Peak Hour

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↗		↘	
Traffic Vol, veh/h	22	20	70	4	1	4
Future Vol, veh/h	22	20	70	4	1	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	77	77	62	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	22	91	5	2	6

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	96	0	-	0	164 94
Stage 1	-	-	-	-	94 -
Stage 2	-	-	-	-	70 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1498	-	-	-	827 963
Stage 1	-	-	-	-	930 -
Stage 2	-	-	-	-	953 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1498	-	-	-	814 963
Mov Cap-2 Maneuver	-	-	-	-	814 -
Stage 1	-	-	-	-	915 -
Stage 2	-	-	-	-	953 -

Approach	EB	WB	SB
HCM Control Delay, s	3.9	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1498	-	-	-	929
HCM Lane V/C Ratio	0.016	-	-	-	0.009
HCM Control Delay (s)	7.4	-	-	-	8.9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0

Timings
25: Golden Sage & Woodmen

Existing Traffic
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	47	661	44	15	1475	83	134	13	3	53	20
Future Volume (vph)	47	661	44	15	1475	83	134	13	3	53	20
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			8			4
Permitted Phases	2		2	6		6	8		8	4	
Detector Phase	2	2	2	6	6	6	8	8	8	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	21.5	21.5	21.5	21.5	21.5
Total Split (s)	63.0	63.0	63.0	63.0	63.0	63.0	27.0	27.0	27.0	27.0	27.0
Total Split (%)	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.5	5.5	5.5	5.5	5.5
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	Max	Max	Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	56.2	56.2	56.2	56.2	56.2	56.2	16.4	16.4	16.4	16.4	16.4
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.44	0.31	0.05	0.04	0.71	0.09	0.76	0.04	0.01	0.24	0.47
Control Delay	23.6	7.1	2.2	6.6	12.2	1.8	54.1	27.1	0.0	30.7	28.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	7.1	2.2	6.6	12.2	1.8	54.1	27.1	0.0	30.7	28.9
LOS	C	A	A	A	B	A	D	C	A	C	C
Approach Delay		7.9			11.6			50.6			29.4
Approach LOS		A			B			D			C

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 85.1
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 14.3
 Intersection Capacity Utilization 71.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 25: Golden Sage & Woodmen



HCM 6th TWSC
1: Firehouse View & Maltese Point

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	4.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	0	38	17	0	34	2
Future Vol, veh/h	0	38	17	0	34	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	47	47	50	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	100	36	0	68	4

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	100	0	122 50
Stage 1	-	-	-	-	50 -
Stage 2	-	-	-	-	72 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1493	-	873 1018
Stage 1	-	-	-	-	972 -
Stage 2	-	-	-	-	951 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1493	-	852 1018
Mov Cap-2 Maneuver	-	-	-	-	852 -
Stage 1	-	-	-	-	972 -
Stage 2	-	-	-	-	928 -

Approach	EB	WB	NB
HCM Control Delay, s	0	7.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	860	-	-	1493	-
HCM Lane V/C Ratio	0.084	-	-	0.024	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

HCM 6th TWSC
2: Rolling Thunder & Firehouse View

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↔		↘	
Traffic Vol, veh/h	23	78	67	5	13	38
Future Vol, veh/h	23	78	67	5	13	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	75	75	42	42
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	120	89	7	31	90

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	96	0	-	0	283 93
Stage 1	-	-	-	-	93 -
Stage 2	-	-	-	-	190 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1498	-	-	-	707 964
Stage 1	-	-	-	-	931 -
Stage 2	-	-	-	-	842 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1498	-	-	-	691 964
Mov Cap-2 Maneuver	-	-	-	-	691 -
Stage 1	-	-	-	-	910 -
Stage 2	-	-	-	-	842 -

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1498	-	-	-	876
HCM Lane V/C Ratio	0.024	-	-	-	0.139
HCM Control Delay (s)	7.5	-	-	-	9.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Timings
25: Golden Sage & Woodmen

Existing Traffic
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	88	1345	44	18	875	67	105	28	23	96	13
Future Volume (vph)	88	1345	44	18	875	67	105	28	23	96	13
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA
Protected Phases		2			6			8			4
Permitted Phases	2		2	6		6	8		8	4	
Detector Phase	2	2	2	6	6	6	8	8	8	4	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	21.5	21.5	21.5	21.5	21.5
Total Split (s)	65.0	65.0	65.0	65.0	65.0	65.0	25.0	25.0	25.0	25.0	25.0
Total Split (%)	72.2%	72.2%	72.2%	72.2%	72.2%	72.2%	27.8%	27.8%	27.8%	27.8%	27.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-3.0	-3.0	-1.0	-3.0	-3.0	-1.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	4.0	4.0	6.0	4.0	4.0	4.5	5.5	5.5	5.5	5.5
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	Max	Max	Max	Max	Max	Max	None	None	None	None	None
Act Effct Green (s)	58.1	61.1	61.1	59.1	61.1	61.1	16.2	15.2	15.2	15.2	15.2
Actuated g/C Ratio	0.68	0.71	0.71	0.69	0.71	0.71	0.19	0.18	0.18	0.18	0.18
v/c Ratio	0.25	0.58	0.04	0.11	0.37	0.06	0.69	0.10	0.09	0.71	0.45
Control Delay	8.5	7.7	1.6	7.3	5.8	1.4	52.4	29.6	4.7	49.6	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	7.7	1.6	7.3	5.8	1.4	52.4	29.6	4.7	49.6	10.6
LOS	A	A	A	A	A	A	D	C	A	D	B
Approach Delay		7.6			5.5			41.2			29.0
Approach LOS		A			A			D			C

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 85.8
 Natural Cycle: 55
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 11.3
 Intersection Capacity Utilization 65.9%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 25: Golden Sage & Woodmen



Intersection						
Int Delay, s/veh	5.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1	16	24	1	20	53
Future Vol, veh/h	1	16	24	1	20	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	25	75	75	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	64	32	1	25	65

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	68	0	101 36
Stage 1	-	-	-	-	36 -
Stage 2	-	-	-	-	65 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1533	-	898 1037
Stage 1	-	-	-	-	986 -
Stage 2	-	-	-	-	958 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1533	-	879 1037
Mov Cap-2 Maneuver	-	-	-	-	879 -
Stage 1	-	-	-	-	986 -
Stage 2	-	-	-	-	938 -

Approach	EB	WB	NB
HCM Control Delay, s	0	7.1	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	988	-	-	1533	-
HCM Lane V/C Ratio	0.091	-	-	0.021	-
HCM Control Delay (s)	9	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↗		↘	
Traffic Vol, veh/h	59	30	104	14	10	36
Future Vol, veh/h	59	30	104	14	10	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	77	77	62	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	33	135	18	16	58

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	153	0	-	0	309 144
Stage 1	-	-	-	-	144 -
Stage 2	-	-	-	-	165 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1428	-	-	-	683 903
Stage 1	-	-	-	-	883 -
Stage 2	-	-	-	-	864 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1428	-	-	-	652 903
Mov Cap-2 Maneuver	-	-	-	-	652 -
Stage 1	-	-	-	-	842 -
Stage 2	-	-	-	-	864 -

Approach	EB	WB	SB
HCM Control Delay, s	5.1	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1428	-	-	-	833
HCM Lane V/C Ratio	0.046	-	-	-	0.089
HCM Control Delay (s)	7.6	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Lanes, Volumes, Timings
25: Golden Sage Rd & Woodmen Rd

Long Term Background
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	319	734	73	64	1776	110	160	19	46	98	25	392
Future Volume (vph)	319	734	73	64	1776	110	160	19	46	98	25	392
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.367			0.429			0.744		
Satd. Flow (perm)	3433	3539	1583	684	3539	1583	799	1863	1583	1386	1863	1583
Satd. Flow (RTOR)			109				155			173		283
Peak Hour Factor	0.95	0.98	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	336	749	77	67	1812	116	168	20	48	103	26	413
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		Free
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	12.0	12.0	10.0	12.0	12.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	21.0	71.0	71.0	10.0	60.0	60.0	24.0	15.0	15.0	24.0	15.0	
Total Split (%)	17.5%	59.2%	59.2%	8.3%	50.0%	50.0%	20.0%	12.5%	12.5%	20.0%	12.5%	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	15.4	66.3	66.3	62.6	54.5	54.5	24.1	10.4	10.4	17.4	8.1	108.3
Actuated g/C Ratio	0.14	0.61	0.61	0.58	0.50	0.50	0.22	0.10	0.10	0.16	0.07	1.00
v/c Ratio	0.69	0.35	0.08	0.15	1.02	0.13	0.51	0.11	0.16	0.39	0.19	0.26
Control Delay	53.2	12.7	1.2	8.5	54.4	1.5	41.1	47.8	1.1	39.8	53.2	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	12.7	1.2	8.5	54.4	1.5	41.1	47.8	1.1	39.8	53.2	0.4
LOS	D	B	A	A	D	A	D	D	A	D	D	A
Approach Delay		23.6			49.8			33.5			10.4	
Approach LOS		C			D			C			B	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 108.3	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 35.7	Intersection LOS: D
Intersection Capacity Utilization 85.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 25: Golden Sage Rd & Woodmen Rd



Intersection						
Int Delay, s/veh	7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	58	54	0	62	39
Future Vol, veh/h	0	58	54	0	62	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	47	47	50	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	153	115	0	124	78

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	153	0	307
Stage 1	-	-	-	-	77
Stage 2	-	-	-	-	230
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1428	-	685
Stage 1	-	-	-	-	946
Stage 2	-	-	-	-	808
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1428	-	630
Mov Cap-2 Maneuver	-	-	-	-	630
Stage 1	-	-	-	-	946
Stage 2	-	-	-	-	743

Approach	EB	WB	NB
HCM Control Delay, s	0	7.7	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	732	-	-	1428	-
HCM Lane V/C Ratio	0.276	-	-	0.08	-
HCM Control Delay (s)	11.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.1	-	-	0.3	-

Intersection						
Int Delay, s/veh	5.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	150	203	19	25	83
Future Vol, veh/h	74	150	203	19	25	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	75	75	42	42
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	231	271	25	60	198

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	296	0	-	0	743 284
Stage 1	-	-	-	-	284 -
Stage 2	-	-	-	-	459 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1265	-	-	-	383 755
Stage 1	-	-	-	-	764 -
Stage 2	-	-	-	-	636 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1265	-	-	-	349 755
Mov Cap-2 Maneuver	-	-	-	-	349 -
Stage 1	-	-	-	-	695 -
Stage 2	-	-	-	-	636 -

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	15.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1265	-	-	-	595
HCM Lane V/C Ratio	0.09	-	-	-	0.432
HCM Control Delay (s)	8.1	-	-	-	15.6
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	2.2

Lanes, Volumes, Timings
25: Golden Sage Rd & Woodmen Rd

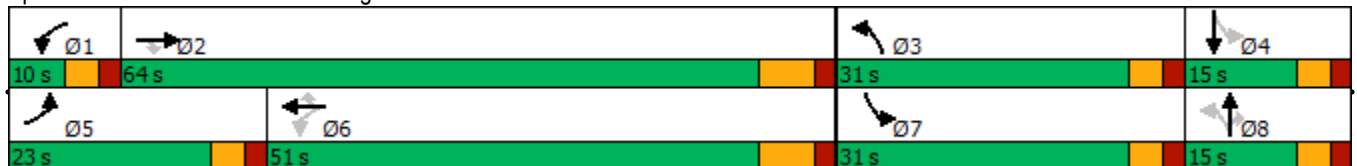
Long Term Background
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	447	1629	72	80	1083	121	172	39	86	136	20	391
Future Volume (vph)	447	1629	72	80	1083	121	172	39	86	136	20	391
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.094			0.506					
Satd. Flow (perm)	3433	3539	1583	175	3539	1583	943	1863	1583	1863	1863	1583
Satd. Flow (RTOR)			109			155			173			367
Peak Hour Factor	0.95	0.98	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	471	1662	76	84	1105	127	181	41	91	143	21	412
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		Free
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	12.0	12.0	10.0	12.0	12.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	23.0	64.0	64.0	10.0	51.0	51.0	31.0	15.0	15.0	31.0	15.0	15.0
Total Split (%)	19.2%	53.3%	53.3%	8.3%	42.5%	42.5%	25.8%	12.5%	12.5%	25.8%	12.5%	12.5%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	18.5	56.6	56.6	49.6	41.3	41.3	23.7	9.3	9.3	17.1	7.9	98.5
Actuated g/C Ratio	0.19	0.57	0.57	0.50	0.42	0.42	0.24	0.09	0.09	0.17	0.08	1.00
v/c Ratio	0.73	0.82	0.08	0.44	0.75	0.17	0.46	0.23	0.30	0.46	0.14	0.26
Control Delay	47.8	23.8	1.3	20.5	29.0	2.5	35.6	48.8	2.5	39.9	49.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	23.8	1.3	20.5	29.0	2.5	35.6	48.8	2.5	39.9	49.1	0.4
LOS	D	C	A	C	C	A	D	D	A	D	D	A
Approach Delay		28.1			25.9			27.7			12.0	
Approach LOS		C			C			C			B	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 98.5
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.3
 Intersection Capacity Utilization 77.3%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 25: Golden Sage Rd & Woodmen Rd



HCM 6th TWSC
1: Firehouse View & Maltese Point

Short Term Total
AM Peak Hour

Intersection						
Int Delay, s/veh	4.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	1	10	5	1	14	24
Future Vol, veh/h	1	10	5	1	14	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	25	75	75	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	40	7	1	17	30

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	44	0	39
Stage 1	-	-	-	-	24
Stage 2	-	-	-	-	15
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1564	-	973
Stage 1	-	-	-	-	999
Stage 2	-	-	-	-	1008
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1564	-	969
Mov Cap-2 Maneuver	-	-	-	-	969
Stage 1	-	-	-	-	999
Stage 2	-	-	-	-	1004

Approach	EB	WB	NB
HCM Control Delay, s	0	6.1	8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1020	-	-	1564	-
HCM Lane V/C Ratio	0.046	-	-	0.004	-
HCM Control Delay (s)	8.7	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	32	55	153	6	3	12
Future Vol, veh/h	32	55	153	6	3	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	77	77	62	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	61	199	8	5	19

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	207	0	-	0	336 203
Stage 1	-	-	-	-	203 -
Stage 2	-	-	-	-	133 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1364	-	-	-	659 838
Stage 1	-	-	-	-	831 -
Stage 2	-	-	-	-	893 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1364	-	-	-	642 838
Mov Cap-2 Maneuver	-	-	-	-	642 -
Stage 1	-	-	-	-	809 -
Stage 2	-	-	-	-	893 -

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1364	-	-	-	790
HCM Lane V/C Ratio	0.026	-	-	-	0.031
HCM Control Delay (s)	7.7	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lanes, Volumes, Timings
25: Golden Sage & Woodmen

Short Term Total
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	661	47	19	1475	83	143	14	8	53	21	112
Future Volume (vph)	47	661	47	19	1475	83	143	14	8	53	21	112
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1626	0
Flt Permitted	0.092			0.373			0.613			0.746		
Satd. Flow (perm)	171	3539	1583	695	3539	1583	1142	1863	1583	1390	1626	0
Satd. Flow (RTOR)			51			93			48		28	
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.81	0.81	0.81	0.83	0.83	0.83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	718	51	21	1657	93	177	17	10	64	160	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	6	6	6	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	21.5	21.5	21.5	21.5	21.5	21.5
Total Split (s)	62.0	62.0	62.0	62.0	62.0	62.0	28.0	28.0	28.0	28.0	28.0	28.0
Total Split (%)	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	31.1%	31.1%	31.1%	31.1%	31.1%	31.1%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	55.2	55.2	55.2	55.2	55.2	55.2	17.2	17.2	17.2	17.2	17.2	17.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.65	0.65	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.46	0.31	0.05	0.05	0.72	0.09	0.77	0.05	0.03	0.23	0.46	0.46
Control Delay	26.6	7.5	2.3	7.1	12.9	1.9	53.7	26.4	0.1	29.7	28.3	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	7.5	2.3	7.1	12.9	1.9	53.7	26.4	0.1	29.7	28.3	28.3
LOS	C	A	A	A	B	A	D	C	A	C	C	C
Approach Delay		8.4			12.3			48.8			28.7	
Approach LOS		A			B			D			C	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 84.9
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 14.9
 Intersection Capacity Utilization 71.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 25: Golden Sage & Woodmen



HCM 6th TWSC
1: Firehouse View & Maltese Point

Short Term Total
PM Peak Hour

Intersection						
Int Delay, s/veh	4.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	54	17	0	50	2
Future Vol, veh/h	0	54	17	0	50	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	47	47	50	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	142	36	0	100	4

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	142	0	143
Stage 1	-	-	-	-	71
Stage 2	-	-	-	-	72
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1441	-	850
Stage 1	-	-	-	-	952
Stage 2	-	-	-	-	951
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1441	-	829
Mov Cap-2 Maneuver	-	-	-	-	829
Stage 1	-	-	-	-	952
Stage 2	-	-	-	-	927

Approach	EB	WB	NB
HCM Control Delay, s	0	7.6	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	834	-	-	1441	-
HCM Lane V/C Ratio	0.125	-	-	0.025	-
HCM Control Delay (s)	9.9	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

HCM 6th TWSC
2: Rolling Thunder & Firehouse View

Short Term Total
PM Peak Hour

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	36	78	118	8	16	51
Future Vol, veh/h	36	78	118	8	16	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	75	75	42	42
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	55	120	157	11	38	121

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	168	0	-	0	393
Stage 1	-	-	-	-	163
Stage 2	-	-	-	-	230
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1410	-	-	-	611
Stage 1	-	-	-	-	866
Stage 2	-	-	-	-	808
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1410	-	-	-	587
Mov Cap-2 Maneuver	-	-	-	-	587
Stage 1	-	-	-	-	832
Stage 2	-	-	-	-	808

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1410	-	-	-	787
HCM Lane V/C Ratio	0.039	-	-	-	0.203
HCM Control Delay (s)	7.7	-	-	-	10.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Lanes, Volumes, Timings
25: Golden Sage & Woodmen

Short Term Total
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	1345	50	24	875	67	111	29	29	96	14	94
Future Volume (vph)	88	1345	50	24	875	67	111	29	29	96	14	94
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1619	0
Flt Permitted	0.275			0.135			0.526			0.734		
Satd. Flow (perm)	512	3539	1583	251	3539	1583	980	1863	1583	1367	1619	0
Satd. Flow (RTOR)			54			72			48		168	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.83	0.83	0.83	0.56	0.56	0.56
Growth Factor	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	1462	54	26	941	72	134	35	35	171	193	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	6	6	6	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	21.5	21.5	21.5	21.5	21.5	21.5
Total Split (s)	64.0	64.0	64.0	64.0	64.0	64.0	26.0	26.0	26.0	26.0	26.0	26.0
Total Split (%)	71.1%	71.1%	71.1%	71.1%	71.1%	71.1%	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-3.0	-3.0	-1.0	-3.0	-3.0	-1.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	4.0	4.0	6.0	4.0	4.0	4.5	5.5	5.5	5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	57.2	60.2	60.2	58.2	60.2	60.2	16.5	15.5	15.5	15.5	15.5	15.5
Actuated g/C Ratio	0.67	0.71	0.71	0.68	0.71	0.71	0.19	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.25	0.59	0.05	0.15	0.38	0.06	0.71	0.10	0.11	0.69	0.45	
Control Delay	9.0	8.1	1.6	8.6	6.0	1.5	52.3	28.8	6.8	47.1	10.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	9.0	8.1	1.6	8.6	6.0	1.5	52.3	28.8	6.8	47.1	10.5	
LOS	A	A	A	A	A	A	D	C	A	D	B	
Approach Delay		7.9			5.8			40.5			27.7	
Approach LOS		A			A			D			C	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 85.2
 Natural Cycle: 55
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 11.5
 Intersection Capacity Utilization 66.2%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 25: Golden Sage & Woodmen



HCM 6th TWSC
1: Firehouse View & Maltese Point

Long Term Total
AM Peak Hour

Intersection						
Int Delay, s/veh	5.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	1	17	24	1	22	53
Future Vol, veh/h	1	17	24	1	22	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	25	75	75	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	68	32	1	27	65

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	72	0	103 38
Stage 1	-	-	-	-	38 -
Stage 2	-	-	-	-	65 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1528	-	895 1034
Stage 1	-	-	-	-	984 -
Stage 2	-	-	-	-	958 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1528	-	876 1034
Mov Cap-2 Maneuver	-	-	-	-	876 -
Stage 1	-	-	-	-	984 -
Stage 2	-	-	-	-	938 -

Approach	EB	WB	NB
HCM Control Delay, s	0	7.1	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	982	-	-	1528	-
HCM Lane V/C Ratio	0.094	-	-	0.021	-
HCM Control Delay (s)	9	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	118	174	15	10	37
Future Vol, veh/h	60	118	174	15	10	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	77	77	62	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	131	226	19	16	60

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	245	0	-	0	501 236
Stage 1	-	-	-	-	236 -
Stage 2	-	-	-	-	265 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1321	-	-	-	530 803
Stage 1	-	-	-	-	803 -
Stage 2	-	-	-	-	779 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1321	-	-	-	503 803
Mov Cap-2 Maneuver	-	-	-	-	503 -
Stage 1	-	-	-	-	762 -
Stage 2	-	-	-	-	779 -

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1321	-	-	-	713
HCM Lane V/C Ratio	0.05	-	-	-	0.106
HCM Control Delay (s)	7.9	-	-	-	10.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

HCM 6th TWSC
1: Firehouse View & Maltese Point

Long Term Total
PM Peak Hour

Intersection						
Int Delay, s/veh	7.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	74	54	0	78	39
Future Vol, veh/h	0	74	54	0	78	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	47	47	50	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	195	115	0	156	78

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	195	0	328 98
Stage 1	-	-	-	-	98 -
Stage 2	-	-	-	-	230 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1378	-	666 958
Stage 1	-	-	-	-	926 -
Stage 2	-	-	-	-	808 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1378	-	611 958
Mov Cap-2 Maneuver	-	-	-	-	611 -
Stage 1	-	-	-	-	926 -
Stage 2	-	-	-	-	741 -

Approach	EB	WB	NB
HCM Control Delay, s	0	7.9	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	695	-	-	1378	-
HCM Lane V/C Ratio	0.337	-	-	0.083	-
HCM Control Delay (s)	12.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.5	-	-	0.3	-

HCM 6th TWSC
2: Rolling Thunder & Firehouse View

Long Term Total
PM Peak Hour

Intersection						
Int Delay, s/veh	6.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	87	150	203	22	28	96
Future Vol, veh/h	87	150	203	22	28	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	75	75	42	42
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	134	231	271	29	67	229

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	300	0	-	0	785 286
Stage 1	-	-	-	-	286 -
Stage 2	-	-	-	-	499 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1261	-	-	-	361 753
Stage 1	-	-	-	-	763 -
Stage 2	-	-	-	-	610 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1261	-	-	-	323 753
Mov Cap-2 Maneuver	-	-	-	-	323 -
Stage 1	-	-	-	-	682 -
Stage 2	-	-	-	-	610 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	17.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1261	-	-	-	579
HCM Lane V/C Ratio	0.106	-	-	-	0.51
HCM Control Delay (s)	8.2	-	-	-	17.5
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	2.9

Lanes, Volumes, Timings
25: Golden Sage Rd & Woodmen Rd

Long Term Total
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	447	1629	78	86	1083	121	178	40	72	136	21	391
Future Volume (vph)	447	1629	78	86	1083	121	178	40	72	136	21	391
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.095			0.506					
Satd. Flow (perm)	3433	3539	1583	177	3539	1583	943	1863	1583	1863	1863	1583
Satd. Flow (RTOR)			109			155			173			362
Peak Hour Factor	0.95	0.98	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	471	1662	82	91	1105	127	187	42	76	143	22	412
Turn Type	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6	8		8	4		Free
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	12.0	12.0	10.0	12.0	12.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	23.0	64.0	64.0	10.0	51.0	51.0	31.0	15.0	15.0	31.0	15.0	
Total Split (%)	19.2%	53.3%	53.3%	8.3%	42.5%	42.5%	25.8%	12.5%	12.5%	25.8%	12.5%	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	18.6	55.9	55.9	48.8	40.5	40.5	24.5	9.4	9.4	17.7	8.0	98.5
Actuated g/C Ratio	0.19	0.57	0.57	0.50	0.41	0.41	0.25	0.10	0.10	0.18	0.08	1.00
v/c Ratio	0.73	0.83	0.09	0.48	0.76	0.17	0.46	0.24	0.25	0.45	0.15	0.26
Control Delay	47.7	24.4	1.5	22.6	29.7	2.6	35.4	48.7	1.9	39.3	49.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.7	24.4	1.5	22.6	29.7	2.6	35.4	48.7	1.9	39.3	49.5	0.4
LOS	D	C	A	C	C	A	D	D	A	D	D	A
Approach Delay		28.5			26.6			28.9			11.9	
Approach LOS		C			C			C			B	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 98.5
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 25.8
 Intersection Capacity Utilization 78.0%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 25: Golden Sage Rd & Woodmen Rd

