

# Villas at Claremont Ranch Traffic Impact Analysis

Prepared for:  
Morley-Bentley Investments  
20 Boulder Crescent, 1st Floor  
Colorado Springs, CO 80903

Contact: Mr. Jim Morley

NOVEMBER 16, 2020

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LSC Transportation Consultants  
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LSC #204130



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DRAFT



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November 16, 2020

Mr. Jim Morley  
Morley-Bentley Investments  
20 Boulder Crescent, 1<sup>st</sup> Floor  
Colorado Springs, CO 80903

RE: Villas at Claremont Ranch  
El Paso County, Colorado  
Traffic Impact Analysis  
LSC #204130

Dear Mr. Morley,

In response to your request, we have prepared this traffic impact analysis for the proposed Villas at Claremont Ranch. The proposed 83-dwelling unit townhome development is located northeast of the intersection of Marksheffel Road/Meadowbrook Parkway in El Paso County, Colorado. Two site access points to Meadowbrook Parkway are proposed at approximately 595 and 890 feet east of the intersection of Marksheffel Road/Meadowbrook Parkway (centerline distance between proposed accesses and Marksheffel Road). The proposed location and vicinity are shown in Figure 1.

## REPORT CONTENTS

The report contains the following:

- Existing street and traffic conditions in the vicinity of the site, including the intersection lane geometries, traffic controls, posted speed limits, functional classifications, intersection spacing and alignment, sight distances, etc.
- Existing peak-hour turning movement traffic counts and estimates of future background traffic volumes at the intersections of:
  - Marksheffel Road/Meadowbrook Parkway
  - Marksheffel Road/US Hwy 24
  - Meadowbrook Parkway/southern site access
  - Meadowbrook Parkway/northern site access
- Description of the proposed land use and access
- Estimates of the average weekday and peak-hour vehicle-trips to be generated by the site
- Assignment of projected peak-hour site-generated traffic volumes to the study area intersections, including the site access point intersections

- Projected total daily and peak-hour traffic volumes at the study-area intersections
- Intersection level of service analysis at the study-area intersections
- Queuing analysis at study intersections as necessary
- Evaluation of short- and long-term projected intersection volumes to determine potential requirements for any auxiliary right-/left-turn lanes at the proposed site access points based on the criteria in El Paso County's Engineering Criteria Manual (ECM). Also included are potential long-term lane requirements.
- Findings and recommendations for submittal to El Paso County

## **RECENT TRAFFIC STUDIES**

The following traffic studies have been completed in the past few years in the vicinity of the site:

- Mountain View Academy, April 16, 2020
- Claremont Business Park, Filing 2, April 15, 2020
- The Sand Industrial, LSC, November 5, 2019
- Claremont Commercial Filing No. 2, LSC, April 15, 2020
- Meadowbrook Parkway, LSC, June 8, 2017
- Meadowbrook Crossing, LSC, May 5, 2017
- The Sands, LSC, May 17, 2016

All of these studies were considered when developing background traffic projections.

## **LAND USE AND ACCESS**

The Villas at Claremont Ranch is a proposed residential townhome development. Figure 2 shows the site plan for the development. Full-movement access is proposed at two proposed private street intersections with Meadowbrook Parkway, located approximately 595 and 890 feet east of the intersection of Marksheffel Road/Meadowbrook Parkway (between the centerline of proposed accesses and Marksheffel Road).

## **Adjacent and Nearby Future Development Parcels**

Anticipated future land uses for adjacent and nearby development parcels have been identified and projected trip generation/future traffic volumes have been included in this report for these parcels. Claremont Commercial Subdivision Filing No. 2 is a resubmission of Tract C, Claremont Business Park Filing No. 2. This proposed 8-lot commercial/industrial development is located southwest of the intersection of Meadowbrook Parkway and Marksheffel Road. Also included in the short-term analysis are trips to be generated by Meadowbrook Crossing and Circle K development to the southwest. Long-term analysis also assumes commercial development southeast of Meadowbrook/Marksheffel, buildout of Claremont Business Park to the west of Marksheffel, and the Mountain View Academy charter school located to the east.

## INTERSECTION SIGHT DISTANCE

The required access sight distance for the two site access points on Meadowbrook Parkway is calculated per Tables 2-33 and 2-35. The line of sight triangles need to allow for 250 feet of entering sight distance and 150 feet of sight distance along the roadway. The access points will meet the minimum sight distance provided landscaping, site improvements, etc. are kept out of the line of sight “triangles.”

## CURRENT ROADWAY AND TRAFFIC CONDITIONS

### Study Area Roadway System

Major roadways in the vicinity of the site are summarized below:

**US Highway 24 (US Hwy 24)** is a state highway extending locally from the City of Colorado Springs to Peyton in a northeasterly direction and then continuing east. US Hwy 24 is classified as an Expressway by the Colorado Department of Transportation (CDOT) in the vicinity of the site and is shown as an Expressway on the El Paso County *Major Transportation Corridors Plan (MTCP)*. At this location, US Hwy 24 is a four-lane urban highway with a depressed median and a speed limit of 65 mph. The 2040 MTCP shows US Hwy 24 to be upgraded to a 6-lane Expressway in the long term. The intersection with Marksheffel Road is signalized.

**Marksheffel Road** is a Principal Arterial that extends north from the City of Fountain to Woodmen Road. It is currently a four-lane roadway with a posted speed limit of 50 mph adjacent to the study area. The intersection with Meadowbrook Parkway was recently signalized. Marksheffel Road is shown as a six-lane expressway in the *2016 Major Transportation Corridors Plan Update (MTCP)* for 2060 corridor preservation.

**Meadowbrook Parkway** is a paved, Urban Non-Residential Collector that extends through the Claremont Business Park from the US Hwy 24/SH 94 intersection to Marksheffel Road (generally parallel to US Hwy 24). Meadowbrook Parkway continues east from Marksheffel Road into Claremont Ranch. Adjacent to the site, the posted speed limit is 25 mph.

### Access Management Plans

The 2006 US Highway 24 Access Control Plan indicates that the RI/RO at US Highway 24/Brookings Drive may be closed when Constitution/Banning Lewis Parkway/US Highway 24 interchange is constructed. The recent *US Highway 24 PEL study* recommended revisions indicate the access “*may be closed with highway and/or Constitution or Marksheffel intersection improvements.*”

The date of a possible future closure of this access is not known, but a future closure would have an effect on the local jurisdiction intersections - most notably, the intersection of

Marksheffel/Meadowbrook. The analysis scenario in this report representing potential long-term future closure indicates the possible need for an additional westbound-to-southbound left-turn lane.

**Planned CDOT and County Projects**

Address the recent widening of Meadowbrook done at Marksheffel

Based on the US Hwy 24 PEL study, US Hwy 24 is planned to be widened to a six-lane roadway in the future. The timings of these improvements are not known. Both improvements have been included in the long-term analysis.

**Existing Traffic Volumes**

Turning movement counts were conducted on at the intersection of Marksheffel Road/ Meadowbrook Parkway at the following times:

- Tuesday, February 11, 2020 – 6:30 to 8:30 a.m.
- Tuesday, February 11, 2020 – 4:00 to 6:00 p.m.

Existing morning (7:00 a.m. - 8:00 a.m.) and evening (4:30 p.m. - 5:30 p.m.) weekday peak-hour traffic volumes at this intersection are shown in Figure 3. Raw count data are attached.

**Existing Levels of Service**

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 1 shows the level of service delay ranges for signalized and unsignalized intersections.

**Table 1: 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) <sup>(1)</sup>
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 following existing intersections have been analyzed to determine existing, short-term, and long-term levels of service:

- Marksheffel/Meadowbrook
- US Highway 24/Marksheffel
- Meadowbrook/Greengate View (south access)
- Meadowbrook/Fieldside View (north access)

As shown in Figure 3, both existing signalized intersections currently operate at LOS D or better during the peak hours. Several movements at each intersection operate at LOS E, although all movements are still under capacity.

### **Crash History**

Three years of crash data were collected at the study intersections. The intersection of Meadowbrook Parkway/Marksheffel Road experienced nine crashes with two resulting in injuries. Of the nine crashes, 5 were broadside-type crashes between an eastbound left-turning vehicle and a southbound through vehicle. All of these crashes occurred prior to the signal installation. With the signal, the number of broadside crashes at this intersection should be reduced.

The intersection of US Hwy 24/Marksheffel Road had 43 crashes recorded during the study period with 13 crashes resulting in injuries. Of the 43 crashes, 12 were approach turn crashes between a westbound left-turning vehicle and an eastbound through vehicle. Six of these crashes resulted in injuries. All but one of the westbound left-approach turn crashes occurred in the afternoon evening period when there is a high volume of westbound left-turning vehicles against a high volume of eastbound through vehicles. Due to the projected increase in traffic volumes at this intersection, it is anticipated that these crashes will continue to occur if no countermeasures are taken. It is recommended that the westbound left-turn be converted to protected-only to reduce the approach turn crashes. The intersection of US Hwy 24/Marksheffel Road also had eight broadside crashes with no patterns and 13 rear-end crashes with no crash patterns.

### **PEDESTRIAN AND BICYCLE FACILITIES**

Meadowbrook Parkway has sidewalks and the street width is sufficient to accommodate bicycles. There is a 12-foot paved concrete trail along the west side of Marksheffel Road extending north from just south of the bridge just north of Meadowbrook.

### **TRIP GENERATION**

Estimates of the vehicle-trips projected to be generated by the 83-dwelling unit Villas at Claremont Ranch have been made using the nationally published trip generation rates from *Trip Generation, 10<sup>th</sup> Edition, 2017* by the Institute of Transportation Engineers (ITE). Land use code "210 – Multifamily Housing" was categorized using the *Trip Generation Manual, 10<sup>th</sup> Edition,*



2017 by the Institute of Transportation Engineers (ITE) and has been used to estimate the trip generation estimate for the site.

Villas at Claremont Ranch is expected to generate about 608 vehicle-trips on the average weekday (one-half entering and one-half exiting in a 24-hour period). During the morning peak hour, 9 vehicles are projected to enter the site while 29 are projected to exit. Approximately 29 vehicles would enter and 17 vehicles would exit the site during the evening peak hour. The morning peak hour generally occurs for one hour between 6:30 and 8:30 a.m., and the afternoon peak hour occurs for one hour between 4:00 and 6:00 p.m. Table 2 shows a summary of the results of the trip generation estimate.

**Table 2: Estimated Vehicle-Trip Generation**

<b>Analysis Period</b>	<b>In</b>	<b>Out</b>	<b>Total</b>
Morning Peak Hour (vehicle trips/hour)	9	29	38
Evening Peak Hour (vehicle trips/hour)	29	17	46
Weekday (vehicle trips/day)	304	304	608
* Please refer to Table 5 (attached) for detailed trip generation table			

#### **TRIP DISTRIBUTION AND ASSIGNMENT**

Distribution of the site-generated trips to the adjacent streets and key off-site intersections is a necessary step in the process of determining the site's traffic impacts. Figure 4 shows the directional distribution estimate for the site-generated trips. The distribution shown represents estimates of percentages of site-generated vehicle-trips oriented to and from the major roadway approaches. Estimates have been based on the following factors: the proposed new land use, the area roadway system serving the site, and the site's geographic location relative to the overall greater El Paso County/Colorado Springs area.

When the directional distribution percentages (from Figure 4) were applied to the trip generation estimates (from Table 2), the site-generated traffic volumes on the adjacent streets were determined. Figure 5 shows the projected site-generated traffic volumes.

#### **PROJECTED FUTURE BASELINE ROADWAY NETWORK AND TRAFFIC VOLUMES**

Background traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development's trip generation of site-generated traffic volumes. Background traffic includes the through traffic and the traffic generated by nearby developments, but assumes zero traffic generated by the site.

#### **Short Term Traffic Volumes**

Figure 6 shows the short-term background traffic volumes. The background volumes are estimates by LSC, based on the existing traffic volumes shown in Figure 3, with a yearly growth rate of two percent per year. In addition, planned developments that are anticipated to be

constructed in the near future have been included in the background traffic, including the Claremont Business Park and Mountain View Academy.

### **Long Term Traffic Volumes**

Figure 8 shows the projected 2040 background traffic volumes. The 2040 background traffic volumes are estimates by LSC, based on the Colorado Department of Transportation (CDOT) twenty-year growth factor (about one and a half percent per year) on US Hwy 24 adjacent to the site. The Pikes Peak Area Council of Governments (PPACCG) travel demand model was also used in projecting traffic volumes. Additionally, traffic generated by planned adjacent developments has been included.

The 2040 background traffic volumes assume that the right-in/right-out intersection of US Hwy 24/Brookings Drive has been closed. The traffic turning at the intersection was rerouted through the Claremont development.

### **US Hwy 24/Marksheffel**

It is anticipated that US Hwy 24 will be widened from four through lanes to six through lanes in the long term. Additionally, once funding becomes available, the intersection of US Hwy 24/Marksheffel may be upgraded to a grade-separated interchange.

## **PROJECTED BASELINE PLUS SITE-GENERATED (TOTAL) TRAFFIC VOLUMES**

### **Short-Term Background Plus Site-Generated Traffic Volumes**

Figure 7 shows the existing plus site traffic volumes, which are the sum of the site-generated traffic volumes (from Figure 5) and the short-term background weekday traffic volumes (from Figure 6).

### **2040 Background Plus Site-Generated Traffic Volumes**

Figure 9 shows the year 2040 total weekday traffic volumes, which are the sum of the site-generated traffic volumes (from Figure 5) and the 2040 background traffic volumes (from Figure 8).

## **INTERSECTION LEVELS OF SERVICE**

The following intersections and access points were analyzed in Synchro and SimTraffic using procedures from the *Highway Capacity Manual, 2010 Edition*:

- Marksheffel Road/US Hwy 24
- Marksheffel Road/Meadowbrook Parkway
- Meadowbrook Parkway/Greengate View
- Meadowbrook Parkway/Fieldside View

Study area intersections have been analyzed to determine the projected levels of service and control delay for the key turning movements. As the site access intersection will be stop sign-controlled, volumes on the southbound (as well as northbound in the future) approach incur delay given the stop sign control. The eastbound (and westbound in the future) left turns also incur delay as motorists must yield to opposing through and right-turning traffic.

### **Marksheffel Road/Meadowbrook Parkway**

#### Short-Term

Overall, the intersection of Marksheffel Road/Meadowbrook Parkway currently operates at and is projected to remain at LOS B during both peak hours, based on short-term and short-term background plus site-generated traffic conditions. All major and minor street left-turning movements are projected to operate at LOS E or better through the 20-year horizon, once all adjacent development projects have been completed.

#### Long-Term

provide an exhibit to scale  
showing how this can be done

Overall, this intersection is projected to operate at LOS C or better during the 2040 morning peak hour and evening peak hours, both before and after considering site-generated traffic. As in the short-term scenario, several movements are expected to operate at LOS E. In both the background and total traffic scenario, dual westbound left turn lanes are required along with three southbound through lanes. The dual westbound left-turn lanes are required due to the planned closure of the Brookings Drive/US Hwy 24 intersection. It is anticipated that much of the traffic that uses this intersection would reroute through the Claremont development and make a westbound left-turn at the intersection of Marksheffel Road/Meadowbrook Parkway.

### **Meadowbrook Parkway/Greengate View (South Site Access Point)**

All major and minor street approaches and turn lanes are projected to operate at LOS C or better during both the short- and long-term scenarios.

### **Meadowbrook Parkway/Fieldside View (North Site Access Point)**

All major and minor street approaches and turn lanes are projected to operate at LOS B or better during both the short- and long-term scenarios.

### **Marksheffel Road/US Hwy 24**

#### Short-Term

out?

Both with and with the site-generated traffic, the intersection of Marksheffel Road/US Hwy 24 is projected to operate at LOS E and LOS D overall during the morning and evening short-term peak

hours, respectively. Multiple turn movements are anticipated to operate at LOS E or LOS F with some volumes exceeding the capacity for the movement. It should be noted that these issues are forecast to exist even without the site-generated traffic.

Long-Term

The intersection of Marksheffel Road/US Hwy 24 is projected to operate at LOS F overall during the 2040 morning peak hour and evening peak hours, with and without considering site-generated traffic. This is expected to occur even with US Hwy 24 widened to 6-lanes. The volume of traffic at the intersections is very close to the available capacity in existing conditions. Traffic volume growth on US Hwy 24 and Marksheffel Road will cause the volumes to exceed capacity in the near future. These poor levels of service are expected to occur with or without the site-generated traffic.

Address mitigation options in general.

**VEHICLE QUEUING ANALYSIS**

A queuing analysis was performed for the westbound approach at the intersection of Meadowbrook Road/Marksheffel Road and for the eastbound left turn at the west site access. Table 3 and Table 4 present the results of the analysis. These analyses have been run utilizing the projected existing plus site-generated and 2040 background plus site-generated traffic volumes. Queuing reports are attached.

**Short-Term Background Plus Site-Generated**

Table 3 summarizes queuing analysis results, assuming short-term total traffic volumes.

**Table 3: Queuing Analysis Results (Short-Term Total Traffic Volumes)**

Intersection	Lane	Storage	95 <sup>th</sup> Percentile Queue (ft)	
		Length (ft)	AM	PM
Marksheffel @ Meadowbrook	EBL	225'	40	130
	EB T	---	25	55
	EBR	390'	25	55
	WBL	375'	155	60
	WB T	470'	40	30
	WBR	400'	60	25
	SBL	375'	475*	25
W Site Access	EBL	100'	25	25

\* The SBL queue in the Synchro report reflects through traffic blockage of the entry to the SBL turn lane and not left-turn traffic overflowing into the adjacent through lane

State what would be required to fix this.

The southbound left-turn queue on Marksheffel Road approaching Meadowbrook Parkway is projected to be 25 feet long during the short-term evening peak hours, based on the projected short-term total traffic volumes. During the morning peak hour, the southbound through lane queue is longer than the left-turn auxiliary lane. As a result, the southbound through lane will occasionally block left-turning vehicles from getting into the left-turn lane.

The proposed westbound left-turn queue at Marksheffel/Meadowbrook is projected to be less than 200 feet. This available stacking distance would provide adequate storage capacity for projected volumes for the westbound approach, while the eastbound right-turn at the west site access is expected to have a queue of 25 feet or less.

**2040 Background Plus Site-Generated Condition**

The table below shows the anticipated available left-turn stacking lengths and the available stacking distance between the two intersections for the westbound through lane. The latter distance is a function of the intersection spacing. These left-turn stacking lengths have been determined based on this queuing analysis and access spacing.

The long-term analysis assumes restriping for future dual eastbound left-turn lanes on the Meadowbrook Parkway eastbound approach to Marksheffel Road and the addition of a future westbound right-turn lane. ← Will this require additional right-of-way?

**Table 4: Queuing Analysis Results (2040 Background Plus Site-generated Traffic)**

Intersection	Lane	Storage	95 <sup>th</sup> Percentile Queue (ft)	
		Length (ft)	AM	PM
Marksheffel @ Meadowbrook	EBL	225'	100	260
	EB T	---	25	65
	EBR	390'	25	70
	WBL	375'	230	130
	WB T	470'	40	60
	WBR	400'	65	25
	SBL	375'	475*	140
W Site Access	EBL	100'	25	25

\* The SBL queue in the Synchro report reflects through traffic blockage of the entry to the SBL turn lane and not left-turn traffic overflowing into the adjacent through lane

The queuing analysis indicates the projected 95<sup>th</sup> percentile queue for the westbound left-turn movement on Meadowbrook at Marksheffel would reach a maximum length of 230 feet. The projected 95<sup>th</sup> percentile queue for the eastbound left-turn lane into the west site access on Meadowbrook Parkway is projected to reach a length of 25 feet.

The projected southbound left-turn queue on Marksheffel Road approaching Meadowbrook Parkway is projected to be about 140 feet long during the 2040 evening peak hour. During the morning peak hour, the southbound through queue length is anticipated to be 475 feet, which would block the left-turning vehicles from getting into the turn lane. The full-width lane length not including taper is about 375 feet for the southbound left movement.

### ECM ACCESS CRITERIA

The two site access points are planned to be private streets and as such, criteria in ECM section 2.4.1 applies. Corner clearance to intersections would be satisfied and the access points would be separated by a distance exceeding the sight distance requirement. The access points would have adequate intersection sight distance (provided landscaping, site improvements, etc. are kept out of the line of sight “triangles”).

### PEDESTRIAN AND BICYCLE ACCOMMODATION

There are currently sidewalks along Marksheffel Road adjacent to the site. Additionally, sidewalks will be constructed on Meadowbrook Parkway adjacent to the site, which will connect to existing sidewalks to the east. There is a 12-foot wide paved concrete trail along the west side of Marksheffel Road extending north from just south of the bridge just north of Meadowbrook. There is connectivity to the future Rock Island Regional Trail through the neighborhood to the north. The US Highway 24 PEL Study shows a proposed multi-use path along the north side of the highway. Mountain Metro Transit does not currently provide service adjacent to this site. However, the nearest route runs along Peterson Road (north of Galley). This is reasonably accessible via bicycle and the transit busses are furnished with bicycle racks. Transit service may expand to the east as growth continues to the east.

### COUNTY ROAD IMPROVEMENT FEE PROGRAM

#### Transportation Impact Fees

Per ECM Appendix B: *State what the current applicable Transportation Impact Fees are and what option the developer will be selecting for payment.*

The applicant intends to <<<< opt out of the PID options and will pay the full fee amount at the time of building permit. The current “full-fee” is \$2,407 per multi-family dwelling unit. The total fee amount for the \_\_\_\_ dwelling units is \$ \_\_\_\_.>>>>

OR

complete

<<<<join the 5 mil PID and pay the associated upfront fee amount at a rate of \$1,934 per dwelling unit. The total upfront fee under this option would be \_\_\_\_ based on a planned \_\_\_\_ dwelling units.>>>>

OR

<<<join the 10 mil PID and pay the associated upfront fee amount at a rate of \$1,458 per dwelling unit. The total upfront fee under this option would be \_\_\_\_\_ based on a planned \_\_\_\_\_ dwelling units.>>>>

## CONCLUSIONS AND RECOMMENDATIONS

### Trip Generation

The site is projected to generate about 608 vehicle-trips on the average weekday, with about half entering and half exiting the site. Projected morning **peak-hour** trip generation for the site is 9 entering and 29 exiting trips. Projected evening **peak-hour** trip generation for the site is 29 entering and 17 exiting trips.

### Level of Service Analysis

Please refer to the "Level of Service" section above for detailed intersection LOS analysis results:

- Marksheffel/Meadowbrook – With dual westbound left-turn lanes in the long-term, this intersection is projected to operate at LOS C or better during both peak hours. Some movements are anticipated to operate at LOS E.
- Marksheffel/US Hwy 24 – This intersection currently operates at LOS D during the peak hours, with many movements operating at LOS E. The intersection of Marksheffel Road/US Hwy 24 is projected to operate at LOS F overall during both the 2040 morning and afternoon peak hours, with and without considering site-generated traffic. High through volumes on US Hwy 24 and a high northeast-bound to north-bound left-turn volume (background traffic) are projected to result in LOS F overall operational performance during the 2040 evening peak hour.
- Meadowbrook/site accesses – all approaches and individual turning movements are projected to operate at satisfactory levels of service through 2040 at the site access points.

### Traffic Control Recommendations – Site Access Points

Both site access points (Greengate View and Fieldside View) should be stop sign-controlled for the southeast-bound (exiting the site) approaches.


### Queuing Analysis

should future access to the parcel across Meadowbrook be directly across from the proposed locations for this site?

A queuing analysis was performed for the Meadowbrook/Marksheffel intersection. Short-term and long-term scenario simulations indicate the queue would not exceed the stacking lengths between Marksheffel and the west site access, during the morning or evening peak hours.


Please refer to the Queuing Analysis section above for the complete queuing analysis and queue length results.

### **Auxiliary Turn Lane Recommendations**

According to the El Paso County *Engineering Criteria Manual* (ECM), exclusive left-turn lanes shall be provided for any access on a Minor Arterial or Collector with a projected peak-hour ingress turning volume of 25 vehicles per hour (vph) or greater. Neither site access is anticipated to exceed this amount. However, to 1) define the laneage in the vicinity of the west access due to the proximity of the start of the westbound left-turn lane on the approach to Marksheffel and 2) to begin to get drivers accustomed to a painted left-turn median area between the two access points as this could potentially be needed for future commercial development on the south side of Meadowbrook.  finish the statement

Westbound right-turn deceleration lanes would not be needed at either of the two site access points.

### **Lane Configurations/Striping Recommendations**

- Meadowbrook/site accesses:
  - LSC recommends restriping Meadowbrook adjacent to the site for 75 to 100-foot long eastbound left-turn bay into the west access. A 75-foot-long reverse curve bay taper would precede this turn bay and this bay taper would be shared with the westbound left-turn bay extending back from the Meadowbrook/Marksheffel intersection (resulting in back-to-back turn bays). This left-turn bay would accommodate the projected queuing into the west site access.  provide exhibit
  - The section between the access points should be striped for a 150-foot left-turn bay preceded by an approximately 75-foot-long bay taper. Striping transitions/redirect tapers would be needed east of the east site access to transition the new striping to the existing striping.
- Marksheffel/Meadowbrook intersection:
  - Westbound – A second westbound left-turn lane on Meadowbrook Parkway may need to be added with future development and the closure of US Hwy 24/Brookings Drive (dual westbound left-turn lanes).
  - This site should provide any necessary right-of-way to accommodate these future dual left-turn lanes. Also, any site improvements along the north side of Meadowbrook should anticipate this potential future improvement to the extent possible to avoid the need for relocation if/when the north side curb line (or a portion of) is reconstructed in the future (if necessary). LSC has prepared a preliminary concept for potential future



dual left-turn lanes and, based on that concept, it appears that much of the existing north-side curb could remain

← please provide exhibit

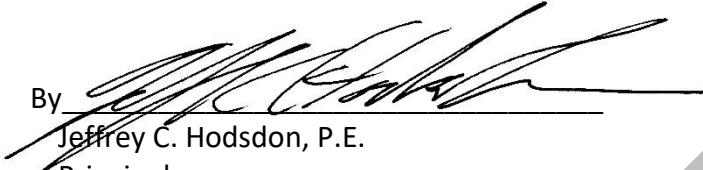
\* \* \* \* \*

Please contact me if you have any questions regarding this analysis.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By

  
Jeffrey C. Hodsdon, P.E.  
Principal

CRG:JAB:jas

Enclosures: Table 9  
Figure 1 – Figure 9  
Traffic Count Reports  
Level of Service Reports  
Queuing Reports

DRAFT

# Tables

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**Table 5: Detailed Trip Generation Estimate**

ITE		Value	Units <sup>2</sup>	Trip Generation Rates <sup>1</sup>				Total Trips Generated					
Code	Description			Average Weekday	A.M.		P.M.		Average Weekday	A.M.		P.M.	
				In	Out	In	Out		In	Out	In	Out	
210	Multi-Family Housing	83	DU	7.32	0.11	0.35	0.35	0.21	608	9	29	29	17

<sup>1</sup> Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)

<sup>2</sup> DU = dwelling unit

# Figures

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Colorado Tech Ave.

Marksheffel Rd.

SITE

Dewhirst Dr.

Meadowbrook Pkwy.

Riverwalk Pkwy.

24



Approximate Scale  
Scale: 1" = 600'

Figure 1

# Vicinity Map

Villas at Claremont Ranch (LSC #204130)



Approximate Scale  
Scale: 1" = 200'



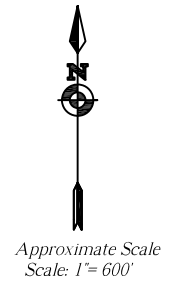
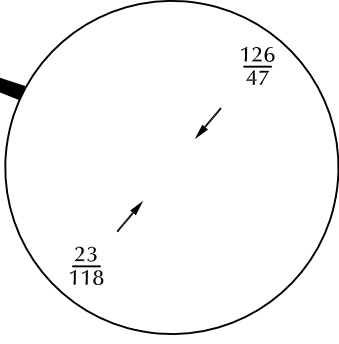
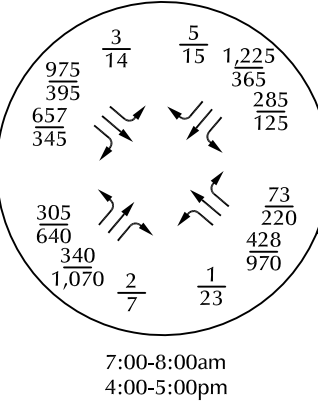
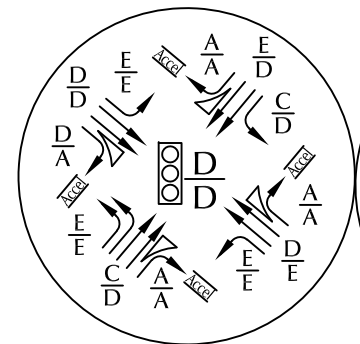
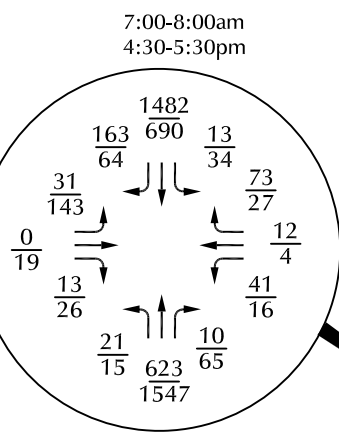
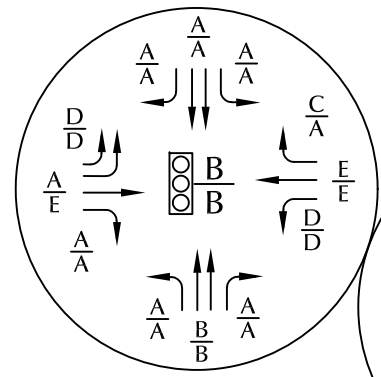
Figure 2

# Site Plan

Villas at Claremont Ranch (LSC #204130)







LEGEND:

- ⊥ = Stop Sign
- $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour) Counts by LSC February 2020
- XX,XXX = Average Weekday 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
- = Traffic Signal

\*Estimated by LSC  
\*\*CDOT 2018


# Existing Traffic, Lane Geometry, Traffic Control and Level of Service

Figure 3

Villas at Claremont Ranch (LSC #204130)





  
 Approximate Scale  
 Scale: 1" = 600'

LEGEND:

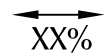

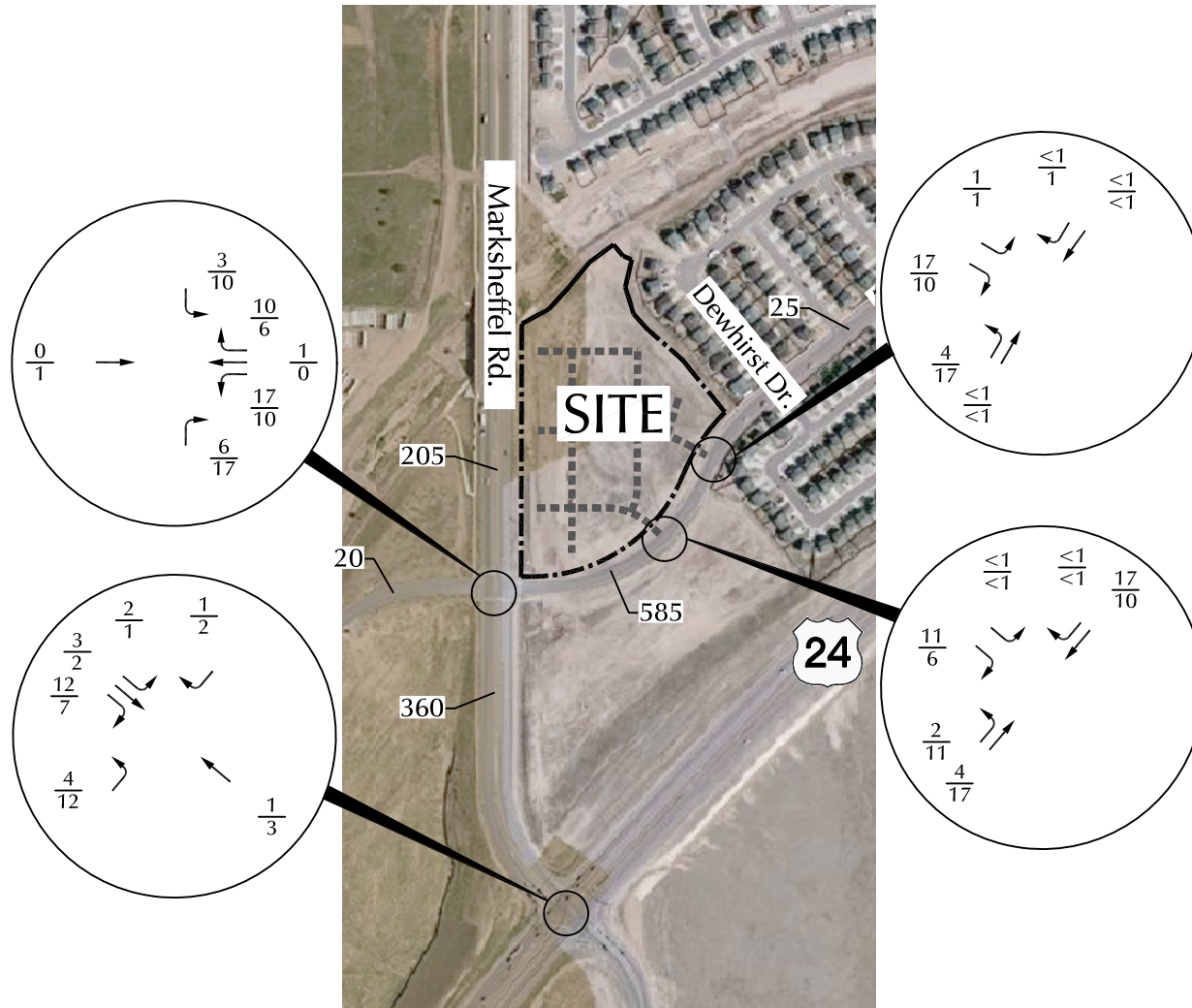
 = Percent Directional Distribution  



Figure 4

# Directional Distribution of Site-Generated Trips

Villas at Claremont Ranch (LSC #204130)





  
 Approximate Scale  
 Scale: 1" = 600'

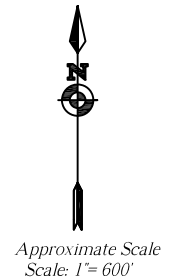
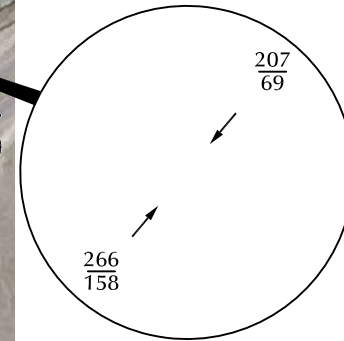
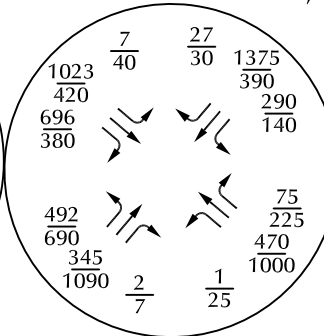
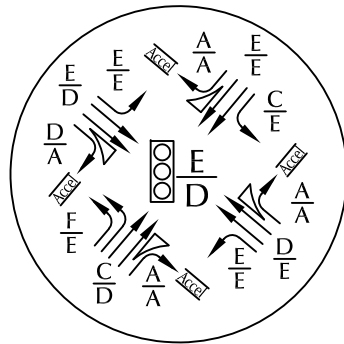
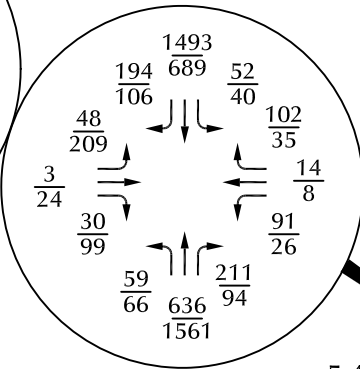
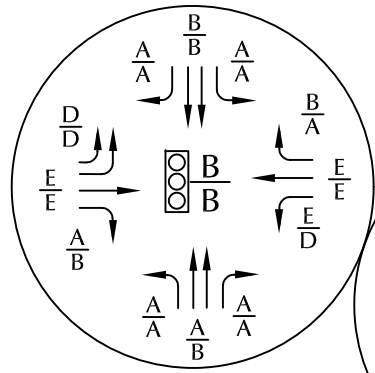
LEGEND:

$\frac{XX}{XX} = \frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$

$XX,XXX = \text{Average Weekday Traffic (vehicles per day)}$



Figure 5  
**Assignment of Site-Generated Trips**  
 Villas at Claremont Ranch (LSC #204130)



LEGEND:

⊥ = Stop Sign

$\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)

$\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)

XX,XXX = Average Weekday Traffic (vehicles per day)

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

$\frac{C}{D}$  = PM Individual Movement Peak-Hour Level of Service

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

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

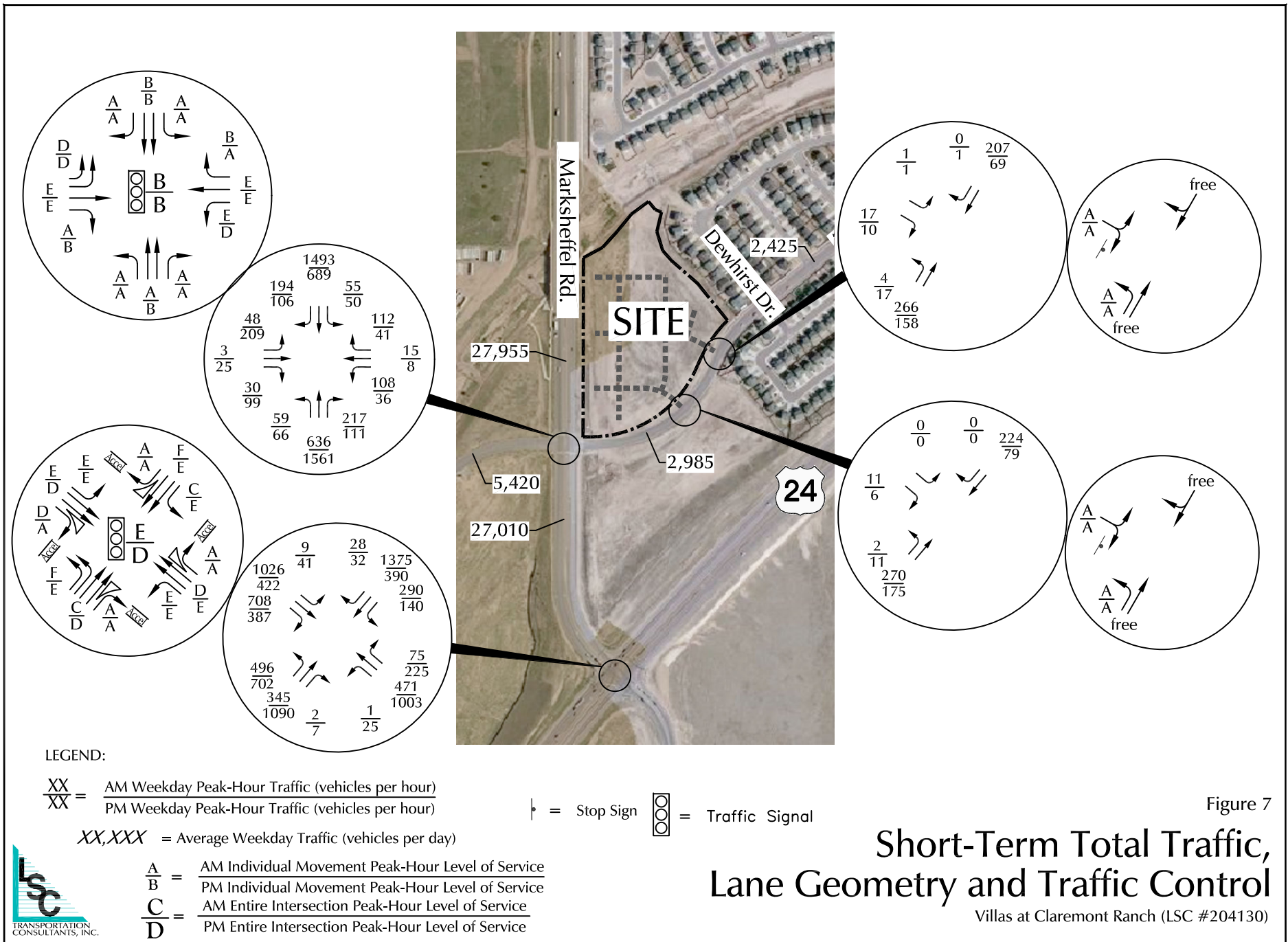
= Traffic Signal

# Short-Term Background Traffic, Lane Geometry, Traffic Control, and Level of Service

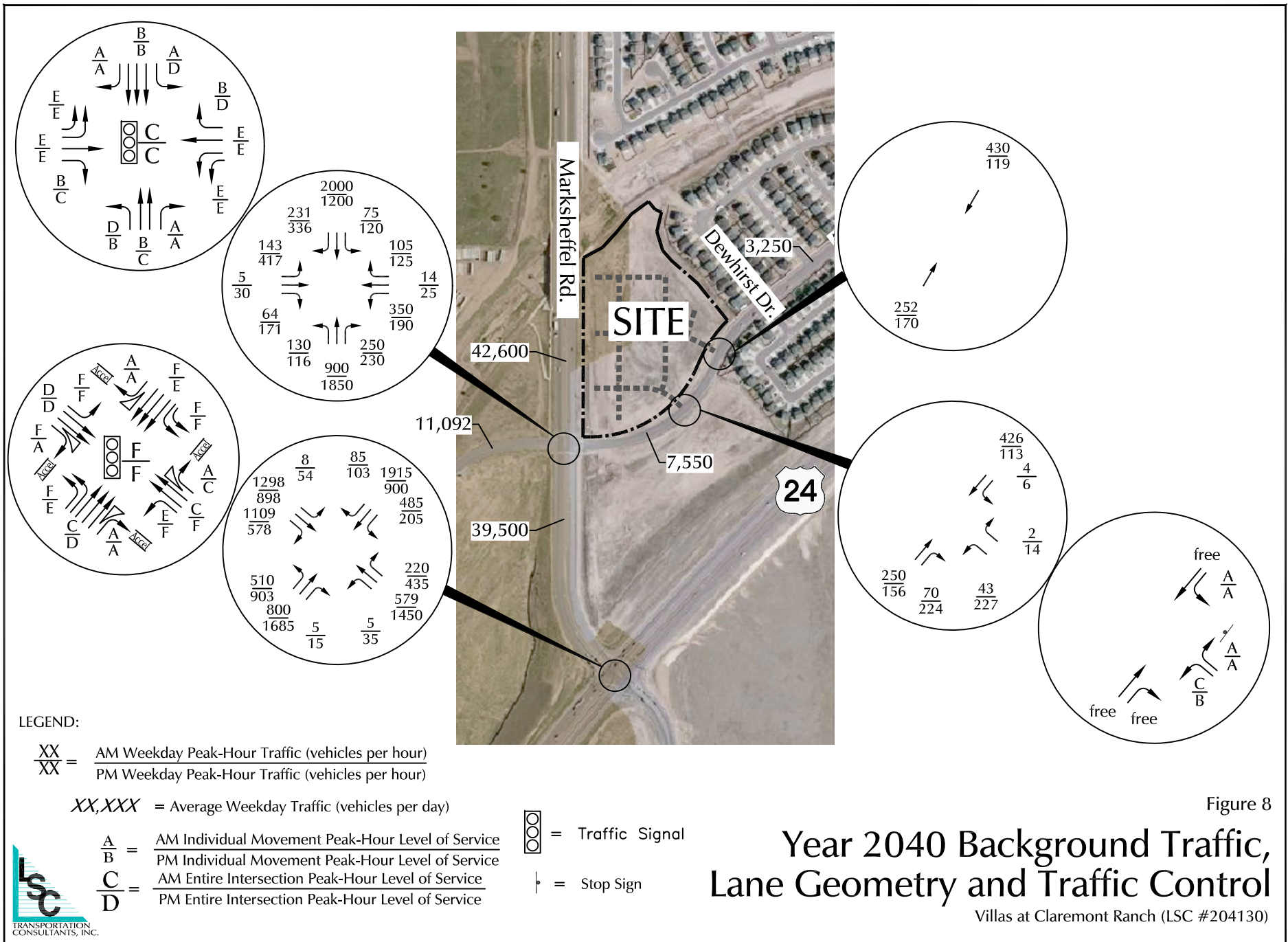
Figure 6

Villas at Claremont Ranch (LSC #204130)









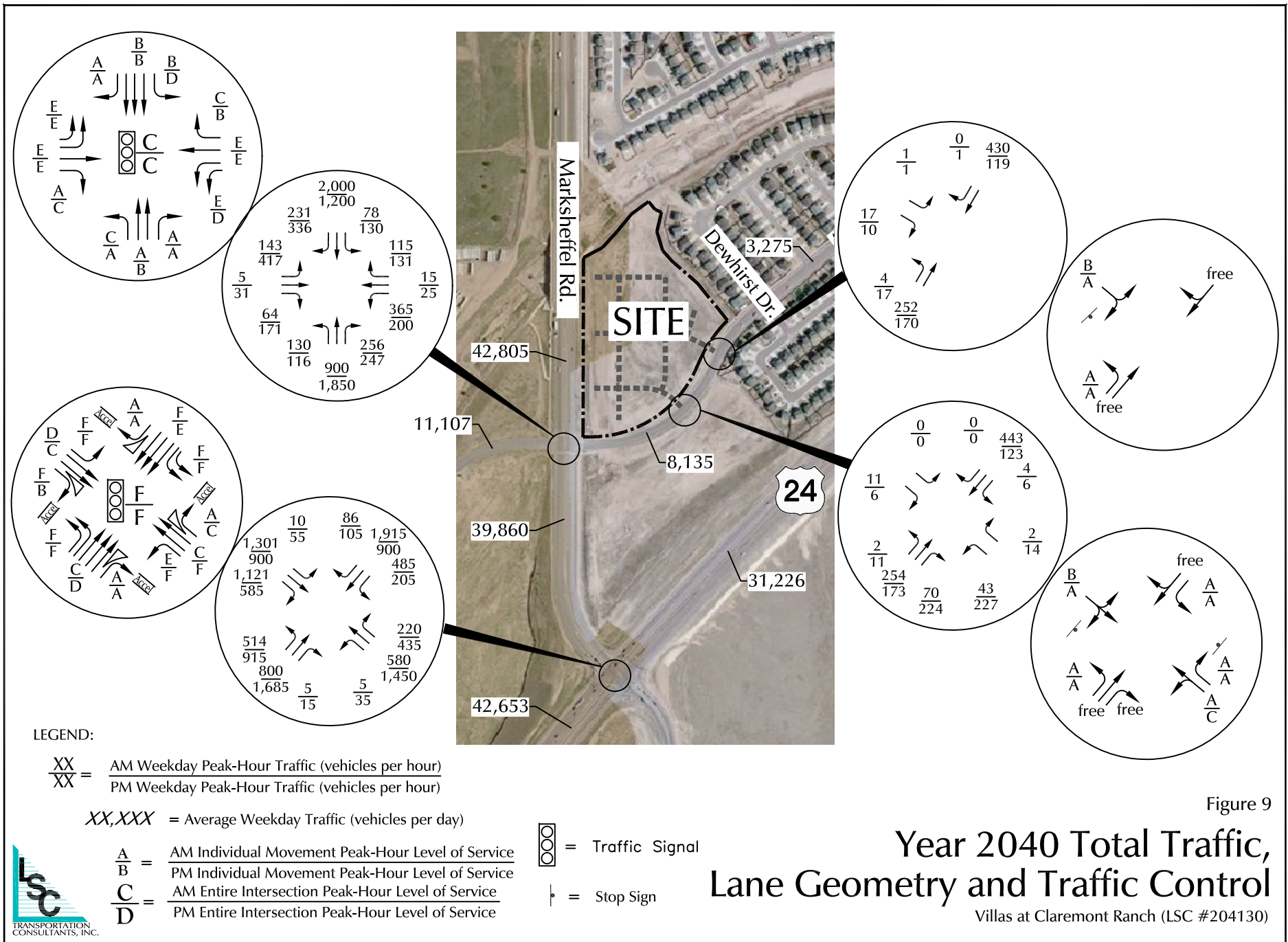


Figure 9

# Traffic Counts

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# LSC Transportation Consultants, Inc.

545 E Pikes Peak Ave, Suite 210  
 Colorado Springs, CO 80905  
 719-633-2868

File Name : Marksheffel Rd - Meadowbrook Pkwy AM  
 Site Code : 174080  
 Start Date : 2/11/2020  
 Page No : 1

### Groups Printed- Unshifted

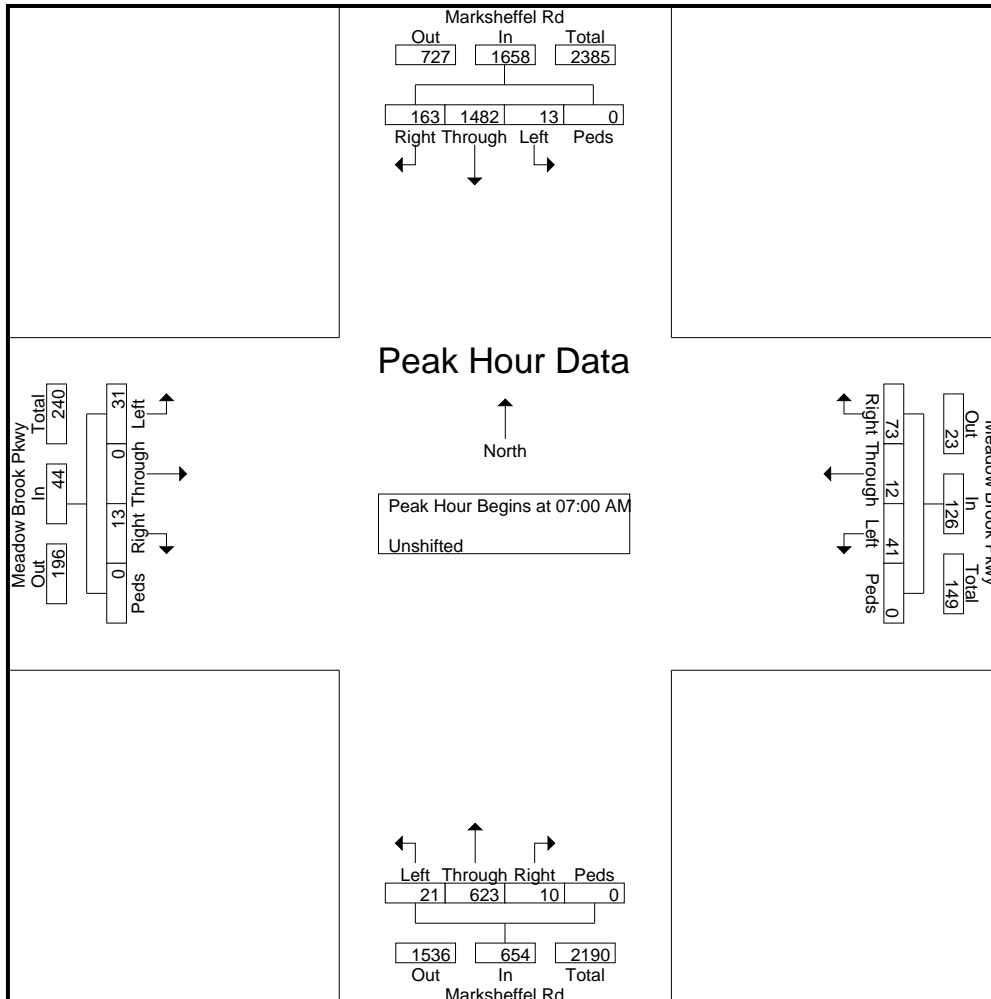
Start Time	Marksheffel Rd Southbound					Meadow Brook Pkwy Westbound					Marksheffel Rd Northbound					Meadow Brook Pkwy Eastbound					Int. Total
	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
06:30 AM	1	345	24	0	370	14	3	5	0	22	3	93	2	0	98	7	0	3	0	10	500
06:45 AM	5	379	29	0	413	7	1	11	0	19	4	115	0	0	119	8	0	5	0	13	564
Total	6	724	53	0	783	21	4	16	0	41	7	208	2	0	217	15	0	8	0	23	1064
07:00 AM	2	432	34	0	468	21	4	18	0	43	5	149	1	0	155	5	0	4	0	9	675
07:15 AM	3	402	43	0	448	5	1	18	0	24	2	161	2	0	165	3	0	3	0	6	643
07:30 AM	3	304	41	0	348	13	7	22	0	42	7	153	3	0	163	10	0	2	0	12	565
07:45 AM	5	344	45	0	394	2	0	15	0	17	7	160	4	0	171	13	0	4	0	17	599
Total	13	1482	163	0	1658	41	12	73	0	126	21	623	10	0	654	31	0	13	0	44	2482
08:00 AM	8	327	35	0	370	7	0	7	0	14	4	141	2	1	148	13	0	9	0	22	554
08:15 AM	4	280	32	0	316	3	0	4	0	7	3	111	4	1	119	15	0	5	0	20	462
Grand Total	31	2813	283	0	3127	72	16	100	0	188	35	1083	18	2	1138	74	0	35	0	109	4562
Apprch %	1	90	9.1	0		38.3	8.5	53.2	0		3.1	95.2	1.6	0.2		67.9	0	32.1	0		
Total %	0.7	61.7	6.2	0	68.5	1.6	0.4	2.2	0	4.1	0.8	23.7	0.4	0	24.9	1.6	0	0.8	0	2.4	

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 Site Code : 174080  
 Start Date : 2/11/2020  
 Page No : 2

Start Time	Marksheffel Rd Southbound					Meadow Brook Pkwy Westbound					Marksheffel Rd Northbound					Meadow Brook Pkwy Eastbound					Int. Total
	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
<b>Peak Hour Analysis From 6:30:00 AM to 8:15:00 AM - Peak 1 of 1</b>																					
Peak Hour for Entire Intersection Begins at 7:00:00 AM																					
7:00:00 AM	2	432	34	0	468	21	4	18	0	43	5	149	1	0	155	5	0	4	0	9	675
7:15:00 AM	3	402	43	0	448	5	1	18	0	24	2	161	2	0	165	3	0	3	0	6	643
7:30:00 AM	3	304	41	0	348	13	7	22	0	42	7	153	3	0	163	10	0	2	0	12	565
7:45:00 AM	5	344	45	0	394	2	0	15	0	17	7	160	4	0	171	13	0	4	0	17	599
Total Volume	13	1482	163	0	1658	41	12	73	0	126	21	623	10	0	654	31	0	13	0	44	2482
% App. Total	0.8	89.4	9.8	0		32.5	9.5	57.9	0		3.2	95.3	1.5	0		70.5	0	29.5	0		
PHF	.650	.858	.906	.000	.886	.488	.429	.830	.000	.733	.750	.967	.625	.000	.956	.596	.000	.813	.000	.647	.919



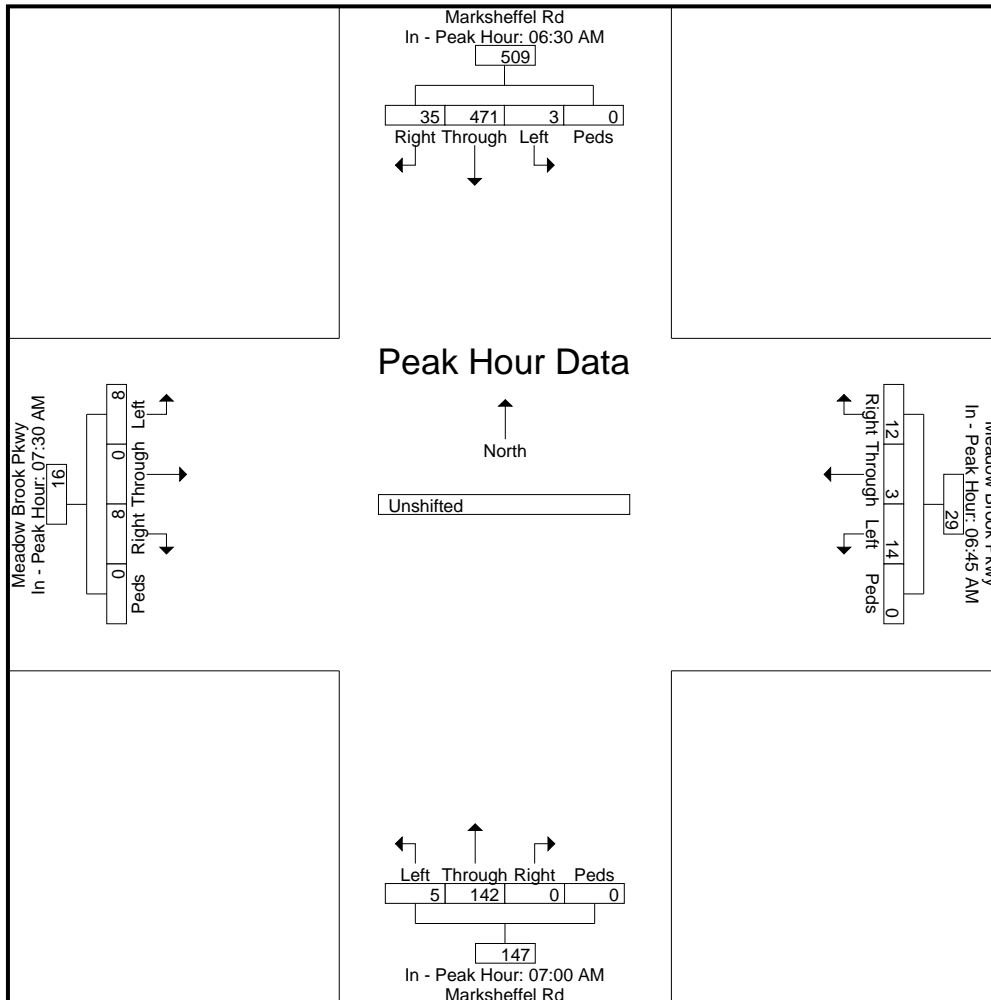


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File Name : Marksheffel Rd - Meadowbrook Pkwy AM  
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 Page No : 3

Start Time	Marksheffel Rd Southbound					Meadow Brook Pkwy Westbound					Marksheffel Rd Northbound					Meadow Brook Pkwy Eastbound					Int. Total
	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
<b>Peak Hour Analysis From 6:30:00 AM to 8:15:00 AM - Peak 1 of 1</b>																					
Peak Hour for Each Approach Begins at:																					
	6:30:00 AM					6:45:00 AM					7:00:00 AM					7:30:00 AM					
+0 mins.	1	345	24	0	370	7	1	11	0	19	5	149	1	0	155	10	0	2	0	12	
+5 mins.	5	379	29	0	413	21	4	18	0	43	2	161	2	0	165	13	0	4	0	17	
+10 mins.	2	432	34	0	468	5	1	18	0	24	7	153	3	0	163	13	0	9	0	22	
+15 mins.	3	402	43	0	448	13	7	22	0	42	7	160	4	0	171	15	0	5	0	20	
Total Volume	11	1558	130	0	1699	46	13	69	0	128	21	623	10	0	654	51	0	20	0	71	
% App. Total	0.6	91.7	7.7	0		35.9	10.2	53.9	0		3.2	95.3	1.5	0		71.8	0	28.2	0		
PHF	.550	.902	.756	.000	.908	.548	.464	.784	.000	.744	.750	.967	.625	.000	.956	.850	.000	.556	.000	.807	



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Start Date : 2/11/2020

Page No : 1

### Groups Printed- Unshifted

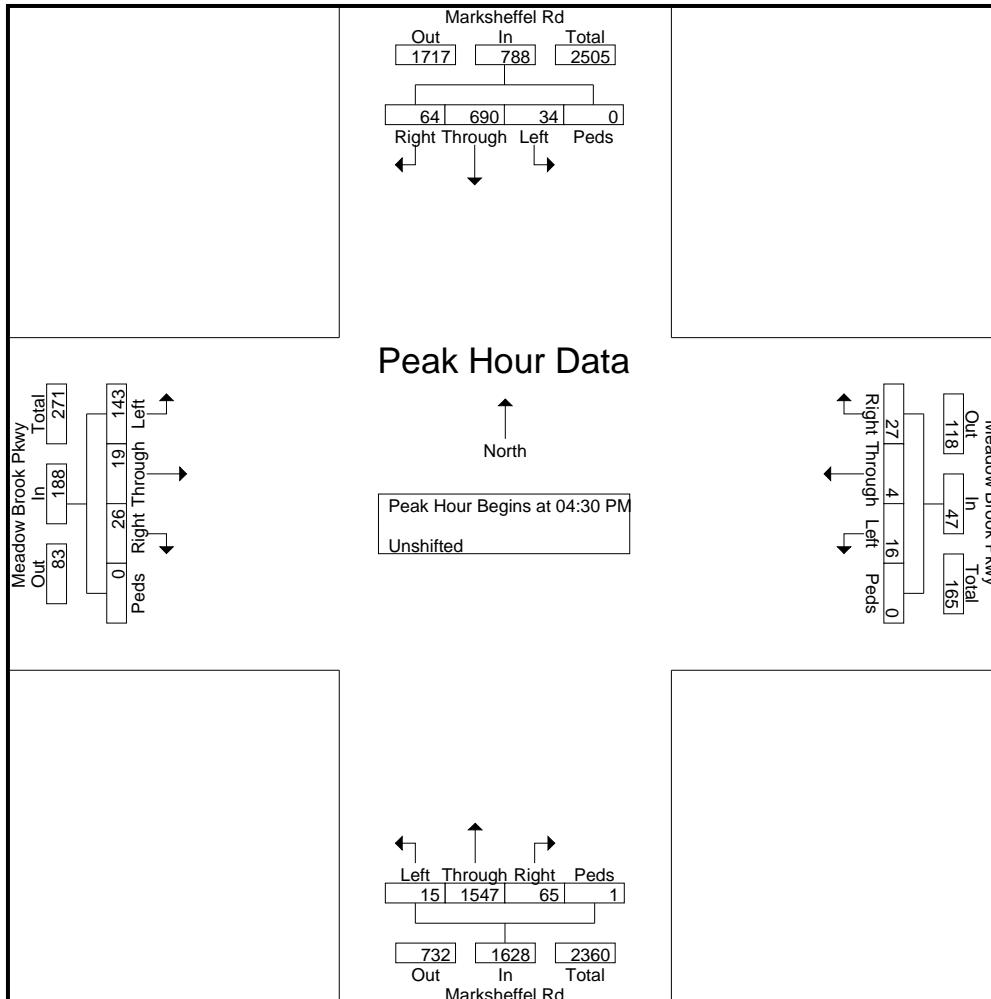
Start Time	Marksheffel Rd Southbound					Meadow Brook Pkwy Westbound					Marksheffel Rd Northbound					Meadow Brook Pkwy Eastbound					Int. Total
	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
04:00 PM	7	154	17	0	178	2	1	13	0	16	4	364	22	0	390	34	2	11	0	47	631
04:15 PM	15	157	16	1	189	6	3	6	0	15	4	381	16	0	401	19	1	5	0	25	630
04:30 PM	8	157	14	0	179	2	1	9	0	12	4	381	22	1	408	34	5	6	0	45	644
04:45 PM	9	172	19	0	200	4	2	6	0	12	1	380	14	0	395	35	4	1	0	40	647
Total	39	640	66	1	746	14	7	34	0	55	13	1506	74	1	1594	122	12	23	0	157	2552
05:00 PM	9	196	10	0	215	8	0	4	0	12	2	411	15	0	428	42	2	12	0	56	711
05:15 PM	8	165	21	0	194	2	1	8	0	11	8	375	14	0	397	32	8	7	0	47	649
05:30 PM	9	166	15	0	190	4	2	6	0	12	2	359	17	0	378	28	1	5	0	34	614
05:45 PM	14	148	13	0	175	1	2	8	0	11	6	255	14	0	275	16	4	7	0	27	488
Total	40	675	59	0	774	15	5	26	0	46	18	1400	60	0	1478	118	15	31	0	164	2462
Grand Total	79	1315	125	1	1520	29	12	60	0	101	31	2906	134	1	3072	240	27	54	0	321	5014
Apprch %	5.2	86.5	8.2	0.1		28.7	11.9	59.4	0		1	94.6	4.4	0		74.8	8.4	16.8	0		
Total %	1.6	26.2	2.5	0	30.3	0.6	0.2	1.2	0	2	0.6	58	2.7	0	61.3	4.8	0.5	1.1	0	6.4	

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Start Time	Marksheffel Rd Southbound					Meadow Brook Pkwy Westbound					Marksheffel Rd Northbound					Meadow Brook Pkwy Eastbound					Int. Total
	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
<b>Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1</b>																					
Peak Hour for Entire Intersection Begins at 4:30:00 PM																					
4:30:00 PM	8	157	14	0	179	2	1	9	0	12	4	381	22	1	408	34	5	6	0	45	644
4:45:00 PM	9	172	19	0	200	4	2	6	0	12	1	380	14	0	395	35	4	1	0	40	647
5:00:00 PM	9	196	10	0	215	8	0	4	0	12	2	411	15	0	428	42	2	12	0	56	711
5:15:00 PM	8	165	21	0	194	2	1	8	0	11	8	375	14	0	397	32	8	7	0	47	649
Total Volume	34	690	64	0	788	16	4	27	0	47	15	1547	65	1	1628	143	19	26	0	188	2651
% App. Total	4.3	87.6	8.1	0		34	8.5	57.4	0		0.9	95	4	0.1		76.1	10.1	13.8	0		
PHF	.944	.880	.762	.000	.916	.500	.500	.750	.000	.979	.469	.941	.739	.250	.951	.851	.594	.542	.000	.839	.932

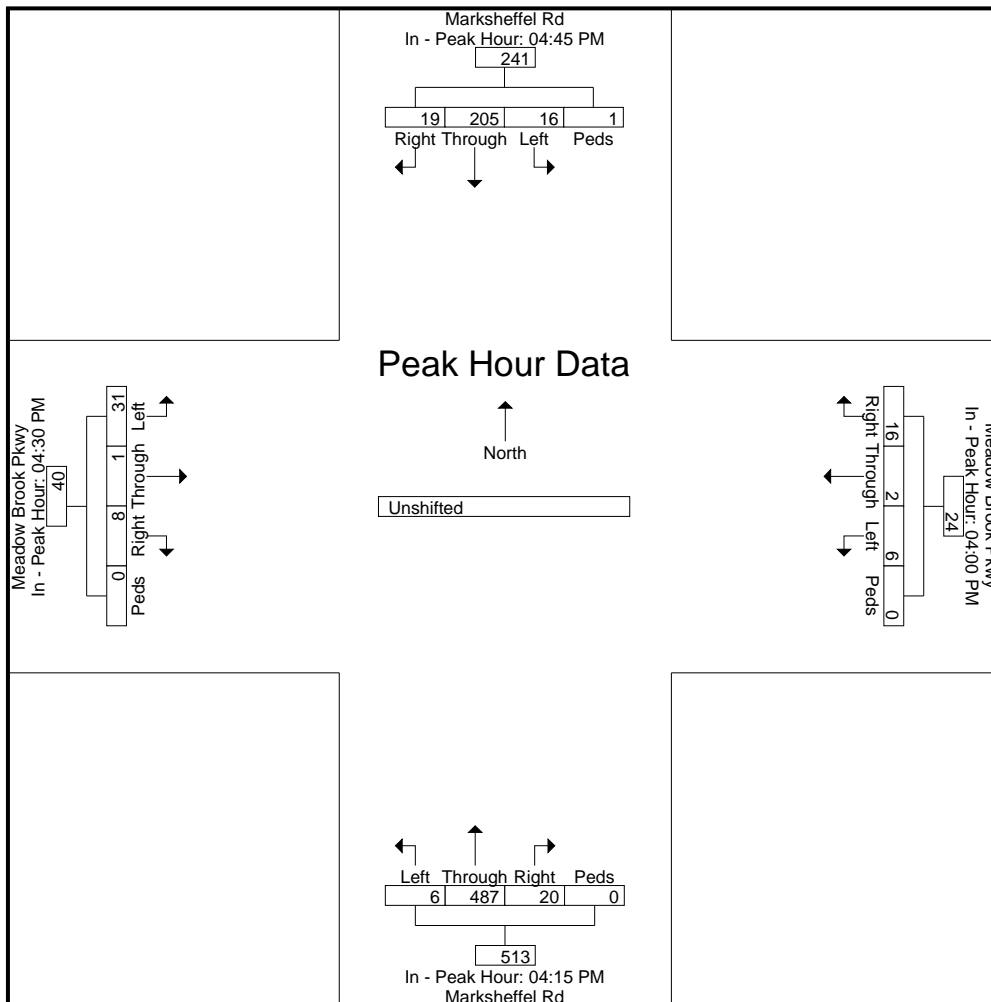


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	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	Left	Through	Right	Peds	App. Total	
<b>Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1</b>																					
Peak Hour for Each Approach Begins at:																					
	4:45:00 PM					4:00:00 PM					4:15:00 PM					4:30:00 PM					
+0 mins.	9	172	19	0	200	2	1	13	0	16	4	381	16	0	401	34	5	6	0	45	
+5 mins.	9	196	10	0	215	6	3	6	0	15	4	381	22	1	408	35	4	1	0	40	
+10 mins.	8	165	21	0	194	2	1	9	0	12	1	380	14	0	395	42	2	12	0	56	
+15 mins.	9	166	15	0	190	4	2	6	0	12	2	411	15	0	428	32	8	7	0	47	
Total Volume	35	699	65	0	799	14	7	34	0	55	11	1553	67	1	1632	143	19	26	0	188	
% App. Total	4.4	87.5	8.1	0		25.5	12.7	61.8	0		0.7	95.2	4.1	0.1		76.1	10.1	13.8	0		
PHF	.972	.892	.774	.000	.929	.583	.583	.654	.000	.859	.688	.945	.761	.250	.953	.851	.594	.542	.000	.839	



QUALITY COUNTS REPORT

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Intersectio Marksheffel Rc Hwy 24

City/State: Colorado Sprin CO

QCJobNo: 15171515

ClientID:

Date: 1/28/2020

Comments:

Latitude/Lc 38.85214378 -104.682

PEAK HOU 7:00 AM

PEAK HOU 8:00 AM

PEAK 15-M 7:15 AM

PEAK 15-M 7:30 AM

PHF 0.91

Lane Configuration:

SIGNAL	SBLane1	SBLane2	SBLane3	SBLane4	SBLane5	SBLane6	SBLane7	SIGNAL
	R	T	T	L				
EBLane7								R
EBLane6								T
EBLane5	L							T
EBLane4	L							L
EBLane3	T							
EBLane2	T							
EBLane1	R							
SIGNAL				L	T	T	R	
	NBLane7	NBLane6	NBLane5	NBLane4	NBLane3	NBLane2	NBLane1	SIGNAL

PEAK-HOUR VOLUMES

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight	NBEntering	SBEntering	EBEntering	WBEnterin	NBLeaving	SBLeaving	EBLeaving	WBLeaving
1	428	73	3	975	657	305	340	2	285	1225	15	502	1635	647	1525	748	1262	416	1883

PERCENT HEAVY VEHICLES

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight	NBEntering	SBEntering	EBEntering	WBEnterin	NBLeaving	SBLeaving	EBLeaving	WBLeaving
0	2.8	4.1	66.7	2.3	3.8	8.9	11.8	0	1.1	3	13.3	3	3	10.4	2.8	5.5	2	10.8	3.3

HEAVY VEHICLES

PEAK-HOUR VOLUMES - PEDESTRIANS

Leg/Crossv South	North	West	East
0	0	0	0

PEAK-HOUR VOLUMES - MICROMOBILITY

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
0	0	0	0	0	0	0	0	0	0	0	0

Bicycles

Scoters

PEAK 15-MIN FLOWRATES

VehicleTyp	NBLeft	NBThru	NBRight	NBU-Turn	NBRTOR	SBLeft	SBThru	SBRight	SBU-Turn	SBRTOR	EBLeft	EBThru	EBRight	EBU-Turn	EBRTOR	WBLeft	WBThru	WBRight	WBU-Turn	WBRTOR	Total
All Vehicle:	0	444	92	0	0	0	1020	748	0	0	324	360	4	0	0	292	1420	8	0	0	4712
Heavy Truc	0	8	0			0	24	36			20	40	0			8	24	0			160
Buses																					
Pedestrians			0					0					0								0
Bicycles	0	0	0			0	0	0				0	0	0		0	0	0			0
Scoters																					

ALL-VEHICLE VOLUMES

Time Perio	NB Left	NB Thru	NB Right	NB U-Turn	NB RTOR	SB Left	SB Thru	SB Right	SB U-Turn	SB RTOR	EB Left	EB Thru	EB Right	EB U-Turn	EB RTOR	WB Left	WB Thru	WB Right	WB U-Turn	WB RTOR	Total	Hourly Tot
7:00 AM	1	103	19	0		1	286	190	0		75	96	0	0		87	312	4	0		1174	
7:15 AM	0	111	23	0		0	255	187	0		81	90	1	0		73	355	2	0		1178	
7:30 AM	0	111	14	0		1	240	151	0		78	77	0	0		58	281	5	0		1016	
7:45 AM	0	103	17	0		1	194	129	0		71	77	1	0		67	277	4	0		941	4309
8:00 AM	0	70	6	0		0	162	165	0		57	94	1	0		57	222	3	1		838	3973
8:15 AM	2	75	12	0		2	135	130	0		43	75	0	0		32	193	2	1		702	3497
8:30 AM	0	80	11	0		0	100	130	0		51	83	1	0		30	191	4	0		681	3162
8:45 AM	3	47	7	0		1	104	91	0		50	64	2	0		17	144	4	0		534	2755

QUALITY COUNTS REPORT

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Intersection: Marksheff Hwy 24

City/State: Colorado S CO

QCJobNo: 15171516

ClientID: #

Date: #####

Comments:

Latitude/Lc 38.85214 -104.682

PEAK HOU 3:00 PM

PEAK HOU 4:00 PM

PEAK 15-M 3:45 PM

PEAK 15-M 4:00 PM

PHF 0.85

Lane Configuration:

SIGNAL	SBLane1	SBLane2	SBLane3	SBLane4	SBLane5	SBLane6	SBLane7		SIGNAL
	R	T	T	L					
	EBLane7							R	WBLane1
	EBLane6							T	WBLane2
	EBLane5	L						T	WBLane3
	EBLane4	L						L	WBLane4
	EBLane3	T							WBLane5
	EBLane2	T							WBLane6
	EBLane1	R							WBLane7
SIGNAL				L	T	T	R		
	NBLane7	NBLane6	NBLane5	NBLane4	NBLane3	NBLane2	NBLane1	SIGNAL	

PEAK-HOUR VOLUMES

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight	NBEntering	SBEntering	EBEntering	WBEntering	NBLeaving	SBLeaving	EBLeaving	WBLeaving
13	736	156	8	343	312	487	707	4	78	361	8	905	663	1198	447	1228	425	871	689

PERCENT HEAVY VEHICLES

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight	NBEntering	SBEntering	EBEntering	WBEntering	NBLeaving	SBLeaving	EBLeaving	WBLeaving
0	1.4	5.8	0	3.5	16	7	6.5	0	3.8	8.9	25	2.1	9.4	6.7	8.3	3.7	3.5	6.3	11.9

BUSES

PEAK-HOUR VOLUMES - PEDESTRIANS

Leg/Crossw.	South	North	West	East
	1	1	1	1

PEAK-HOUR VOLUMES - MICROMOBILITY

NBLeft	NBThru	NBRight	SBLeft	SBThru	SBRight	EBLeft	EBThru	EBRight	WBLeft	WBThru	WBRight
0	0	0	0	0	0	0	0	0	0	0	0

Bicycles  
Scooters

PEAK 15-MIN FLOWRATES

VehicleTyp	NBLeft	NBThru	NBRight	NBU-Turn	NBRTOR	SBLeft	SBThru	SBRight	SBU-Turn	SBRTOR	EBLeft	EBThru	EBRight	EBU-Turn	EBRTOR	WBLeft	WBThru	WBRight	WBU-Turn	WBRTOR	Total
All Vehicles	20	864	176	0	0	8	396	392	0	0	592	824	4	0	0	84	424	4	0	0	3788
Heavy Truc	0	12	12			0	20	68			32	32	0			0	52	0			228
Buses																					
Pedestrians		4				4					4						4				16
Bicycles	0	0	0			0	0	0			0	0	0			0	0	0			0
Scooters																					

ALL-VEHICLE VOLUMES

Time Period	NB Left	NB Thru	NB Right	NB U-Turn	NB RTOR	SB Left	SB Thru	SB Right	SB U-Turn	SB RTOR	EB Left	EB Thru	EB Right	EB U-Turn	EB RTOR	WB Left	WB Thru	WB Right	WB U-Turn	WB RTOR	Total	Hourly Tot:
2:00 PM	1	59	18	0	0	1	54	45	0	0	53	117	0	0	0	18	77	4	0	0	447	
2:15 PM	1	118	22	0	0	3	66	73	0	0	76	111	0	0	0	25	87	3	0	0	585	
2:30 PM	1	98	25	0	0	1	65	68	0	0	65	124	0	0	0	15	83	1	0	0	546	
2:45 PM	1	119	18	0	0	0	74	76	0	0	92	147	2	0	0	19	89	2	0	0	639	2217
3:00 PM	1	128	31	0	0	1	71	73	0	0	111	155	1	3	0	18	77	2	0	0	672	2442
3:15 PM	2	177	38	0	0	3	81	73	0	0	120	160	1	0	0	17	97	2	0	0	771	2628
3:30 PM	5	215	43	0	0	2	92	68	0	0	105	186	1	0	0	22	81	3	0	0	823	2905
3:45 PM	5	216	44	0	0	2	99	98	0	0	148	206	1	0	0	21	106	1	0	0	947	3213

# Levels of Service

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DRAFT

Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

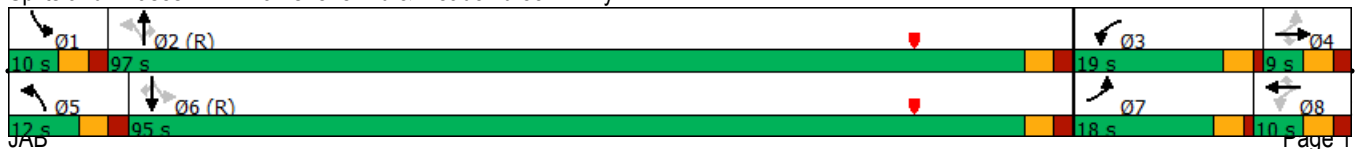
2020 Existing  
AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	0	13	41	12	73	21	623	10	13	1482	163
Future Volume (vph)	31	0	13	41	12	73	21	623	10	13	1482	163
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted				0.526			0.117			0.387		
Satd. Flow (perm)	3614	1863	1583	980	1863	1583	218	3539	1583	721	3539	1583
Satd. Flow (RTOR)			179			89			89			172
Peak Hour Factor	0.78	0.78	0.78	0.87	0.87	0.87	0.93	0.93	0.93	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	0	17	47	14	84	23	670	11	14	1560	172
Turn Type	pm+pt		Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	9.0	9.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	18.0	9.0	9.0	19.0	10.0	10.0	12.0	97.0	97.0	10.0	95.0	95.0
Total Split (%)	13.3%	6.7%	6.7%	14.1%	7.4%	7.4%	8.9%	71.9%	71.9%	7.4%	70.4%	70.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	2.0	1.0	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)	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	10.0		5.8	16.7	7.2	7.2	107.1	104.6	104.6	105.5	102.1	102.1
Actuated g/C Ratio	0.07		0.04	0.12	0.05	0.05	0.79	0.77	0.77	0.78	0.76	0.76
v/c Ratio	0.15		0.07	0.24	0.14	0.50	0.10	0.24	0.01	0.02	0.58	0.14
Control Delay	53.6		0.5	53.2	62.9	21.1	4.3	5.5	0.0	3.7	9.8	1.3
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6		0.5	53.2	62.9	21.1	4.3	5.5	0.0	3.7	9.8	1.3
LOS	D		A	D	E	C	A	A	A	A	A	A
Approach Delay		37.8			35.5			5.4			8.9	
Approach LOS		D			D			A			A	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 111 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.58  
 Intersection Signal Delay: 10.1  
 Intersection Capacity Utilization 59.3%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy





Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

2020 Existing  
AM

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	3	975	657	1	428	73	305	340	2	285	1225	15
Future Volume (vph)	3	975	657	1	428	73	305	340	2	285	1225	15
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.488		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	909	3539	1583
Satd. Flow (RTOR)			397			102			95			95
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	1060	714	1	465	79	332	370	2	310	1332	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	pm+pt	NA	Prot
Protected Phases	1	6		5	2		7	4	4	3	8	8
Permitted Phases			6			2				8		
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	15.0	44.0	44.0	15.0	44.0	44.0	26.0	62.0	62.0	29.0	65.0	65.0
Total Split (%)	10.0%	29.3%	29.3%	10.0%	29.3%	29.3%	17.3%	41.3%	41.3%	19.3%	43.3%	43.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	1.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	7.0	5.0	5.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	6.1	51.8	49.8	6.0	51.7	49.7	18.8	60.0	60.0	81.1	60.2	60.2
Actuated g/C Ratio	0.04	0.35	0.33	0.04	0.34	0.33	0.13	0.40	0.40	0.54	0.40	0.40
v/c Ratio	0.04	0.87	0.90	0.01	0.38	0.13	0.77	0.26	0.00	0.52	0.94	0.02
Control Delay	70.3	54.4	36.6	70.0	38.9	3.9	75.9	31.4	0.0	20.1	56.5	0.1
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	70.3	54.4	36.6	70.0	38.9	3.9	75.9	31.4	0.0	20.1	56.5	0.1
LOS	E	D	D	E	D	A	E	C	A	C	E	A
Approach Delay		47.3			33.9			52.3			49.1	
Approach LOS		D			C			D			D	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of FDW or yellow

Natural Cycle: 135

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 47.1

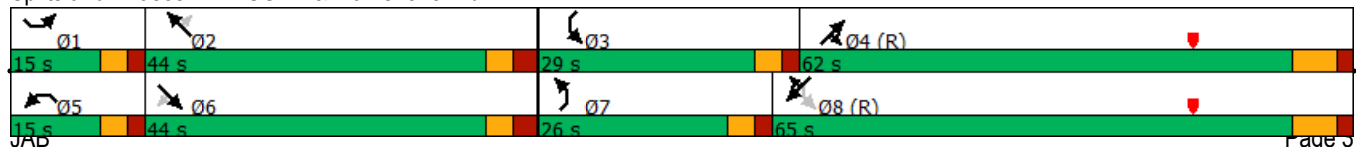
Intersection LOS: D

Intersection Capacity Utilization 95.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

2020 Existing  
PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	19	26	16	4	27	15	1547	65	34	690	64
Future Volume (vph)	143	19	26	16	4	27	15	1547	65	34	690	64
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.513						0.360			0.098		
Satd. Flow (perm)	1854	1863	1583	1863	1863	1583	671	3539	1583	183	3539	1583
Satd. Flow (RTOR)			101			101			97			97
Peak Hour Factor	0.87	0.87	0.87	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	164	22	30	19	5	33	16	1628	68	37	742	69
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.5	11.5	10.0	11.5	11.5
Total Split (s)	19.0	17.0	17.0	19.0	17.0	17.0	13.0	88.0	88.0	11.0	86.0	86.0
Total Split (%)	14.1%	12.6%	12.6%	14.1%	12.6%	12.6%	9.6%	65.2%	65.2%	8.1%	63.7%	63.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0
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)	4.0	6.0	6.0	4.0	6.0	6.0	5.0	6.5	6.5	5.0	5.5	5.5
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	18.8	12.1	12.1	11.8	6.0	6.0	102.8	96.6	96.6	105.4	102.2	102.2
Actuated g/C Ratio	0.14	0.09	0.09	0.09	0.04	0.04	0.76	0.72	0.72	0.78	0.76	0.76
v/c Ratio	0.42	0.13	0.13	0.12	0.06	0.20	0.03	0.64	0.06	0.17	0.28	0.06
Control Delay	53.9	57.5	1.2	48.2	63.0	2.7	4.6	13.6	0.8	6.0	6.8	0.8
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	53.9	57.5	1.2	48.2	63.0	2.7	4.6	13.6	0.8	6.0	6.8	0.8
LOS	D	E	A	D	E	A	A	B	A	A	A	A
Approach Delay		46.9			23.1			13.0			6.3	
Approach LOS		D			C			B			A	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of FDW or yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.8

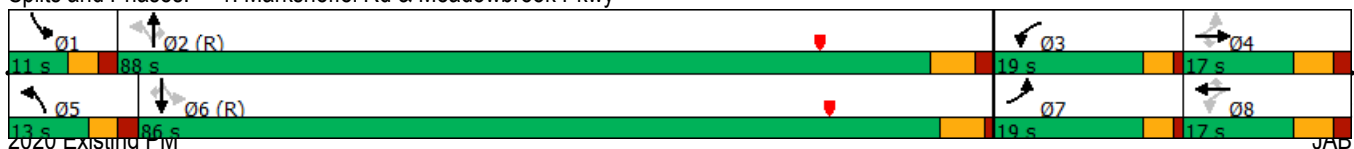
Intersection LOS: B

Intersection Capacity Utilization 63.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

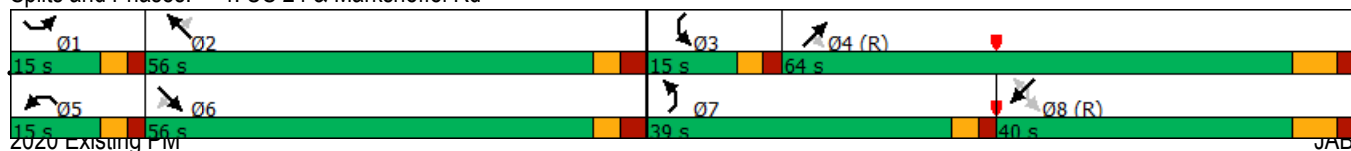
2020 Existing  
PM

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	14	395	345	23	970	220	640	1070	7	125	365	15
Future Volume (vph)	14	395	345	23	970	220	640	1070	7	125	365	15
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.153		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	285	3539	1583
Satd. Flow (RTOR)			375			211			95			131
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	429	375	25	1054	239	696	1163	8	136	397	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4	8		8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	15.0	56.0	56.0	15.0	56.0	56.0	39.0	64.0	64.0	15.0	40.0	40.0
Total Split (%)	10.0%	37.3%	37.3%	10.0%	37.3%	37.3%	26.0%	42.7%	42.7%	10.0%	26.7%	26.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	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)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	7.0	47.2	47.2	7.7	50.2	50.2	33.4	66.1	66.1	55.7	43.2	43.2
Actuated g/C Ratio	0.05	0.31	0.31	0.05	0.33	0.33	0.22	0.44	0.44	0.37	0.29	0.29
v/c Ratio	0.18	0.39	0.50	0.28	0.89	0.36	0.91	0.75	0.01	0.65	0.39	0.03
Control Delay	73.4	41.1	5.6	75.5	57.5	7.9	73.7	40.2	0.0	41.2	46.3	0.1
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	73.4	41.1	5.6	75.5	57.5	7.9	73.7	40.2	0.0	41.2	46.3	0.1
LOS	E	D	A	E	E	A	E	D	A	D	D	A
Approach Delay		25.4			48.9			52.5			43.7	
Approach LOS		C			D			D			D	

Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 45.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 83.4%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

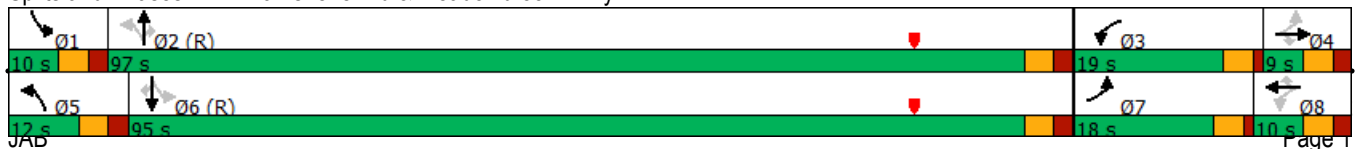
2023 Background  
AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	3	30	91	14	102	59	636	211	52	1493	194
Future Volume (vph)	48	3	30	91	14	102	59	636	211	52	1493	194
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted				0.506			0.110			0.376		
Satd. Flow (perm)	3614	1863	1583	943	1863	1583	205	3539	1583	700	3539	1583
Satd. Flow (RTOR)			89			117			227			204
Peak Hour Factor	0.78	0.78	0.78	0.87	0.87	0.87	0.93	0.93	0.93	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	4	38	105	16	117	63	684	227	55	1572	204
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	9.0	9.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	18.0	9.0	9.0	19.0	10.0	10.0	12.0	97.0	97.0	10.0	95.0	95.0
Total Split (%)	13.3%	6.7%	6.7%	14.1%	7.4%	7.4%	8.9%	71.9%	71.9%	7.4%	70.4%	70.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	2.0	1.0	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)	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.3	5.0	5.0	20.1	9.5	9.5	102.9	97.5	97.5	100.9	96.5	96.5
Actuated g/C Ratio	0.09	0.04	0.04	0.15	0.07	0.07	0.76	0.72	0.72	0.75	0.71	0.71
v/c Ratio	0.19	0.06	0.26	0.49	0.12	0.53	0.27	0.27	0.19	0.10	0.62	0.17
Control Delay	49.4	65.3	4.4	58.5	60.6	19.3	7.0	7.7	1.3	4.5	12.7	1.4
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	49.4	65.3	4.4	58.5	60.6	19.3	7.0	7.7	1.3	4.5	12.7	1.4
LOS	D	E	A	E	E	B	A	A	A	A	B	A
Approach Delay		33.6			39.4			6.1			11.2	
Approach LOS		C			D			A			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 111 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 12.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.8%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

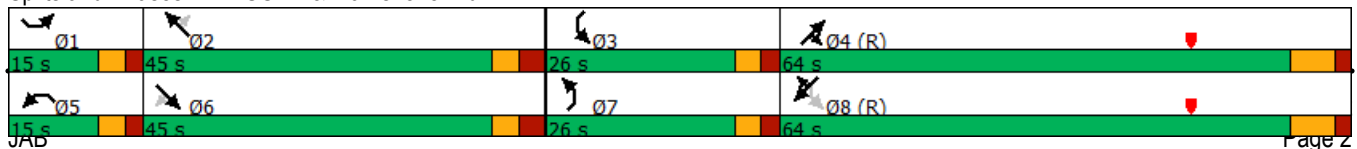
2023 Background  
AM

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	7	1023	696	1	490	75	492	345	2	290	1375	25
Future Volume (vph)	7	1023	696	1	490	75	492	345	2	290	1375	25
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.508		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	946	3539	1583
Satd. Flow (RTOR)			385			102			95			95
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1112	757	1	533	82	535	375	2	315	1495	27
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	pm+pt	NA	Prot
Protected Phases	1	6		5	2		7	4	4	3	8	8
Permitted Phases			6			2				8		
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	15.0	45.0	45.0	15.0	45.0	45.0	26.0	64.0	64.0	26.0	64.0	64.0
Total Split (%)	10.0%	30.0%	30.0%	10.0%	30.0%	30.0%	17.3%	42.7%	42.7%	17.3%	42.7%	42.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	1.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	7.0	5.0	5.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	6.5	52.8	50.8	6.0	52.5	50.5	21.0	59.5	59.5	77.5	57.0	57.0
Actuated g/C Ratio	0.04	0.35	0.34	0.04	0.35	0.34	0.14	0.40	0.40	0.52	0.38	0.38
v/c Ratio	0.11	0.89	0.96	0.01	0.43	0.14	1.11	0.27	0.00	0.53	1.11	0.04
Control Delay	71.6	55.9	46.8	70.0	39.4	4.4	133.3	31.6	0.0	21.1	104.3	0.1
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	71.6	55.9	46.8	70.0	39.4	4.4	133.3	31.6	0.0	21.1	104.3	0.1
LOS	E	E	D	E	D	A	F	C	A	C	F	A
Approach Delay		52.3			34.8			91.2			88.5	
Approach LOS		D			C			F			F	

Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of FDW or yellow  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.11  
 Intersection Signal Delay: 69.7  
 Intersection Capacity Utilization 101.9%  
 Analysis Period (min) 15  
 Intersection LOS: E  
 ICU Level of Service G

Splits and Phases: 4: US 24 & Marksheffel Rd



Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

2023 Background  
PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	24	99	26	8	35	66	1561	94	40	689	106
Future Volume (vph)	209	24	99	26	8	35	66	1561	94	40	689	106
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.438			0.739			0.339			0.090		
Satd. Flow (perm)	1583	1863	1583	1377	1863	1583	631	3539	1583	168	3539	1583
Satd. Flow (RTOR)			114			101			97			114
Peak Hour Factor	0.87	0.87	0.87	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	28	114	31	10	42	69	1643	99	43	741	114
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.5	11.5	10.0	11.5	11.5
Total Split (s)	19.0	17.0	17.0	19.0	17.0	17.0	13.0	88.0	88.0	11.0	86.0	86.0
Total Split (%)	14.1%	12.6%	12.6%	14.1%	12.6%	12.6%	9.6%	65.2%	65.2%	8.1%	63.7%	63.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0
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)	4.0	6.0	6.0	4.0	6.0	6.0	5.0	6.5	6.5	5.0	5.5	5.5
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	23.6	14.1	14.1	14.3	6.3	6.3	98.9	91.6	91.6	97.9	92.1	92.1
Actuated g/C Ratio	0.17	0.10	0.10	0.11	0.05	0.05	0.73	0.68	0.68	0.73	0.68	0.68
v/c Ratio	0.52	0.14	0.43	0.19	0.12	0.25	0.13	0.68	0.09	0.22	0.31	0.10
Control Delay	52.5	57.2	15.0	46.8	64.0	3.4	5.6	16.7	2.2	7.8	10.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	57.2	15.0	46.8	64.0	3.4	5.6	16.7	2.2	7.8	10.3	1.9
LOS	D	E	B	D	E	A	A	B	A	A	B	A
Approach Delay		41.6			26.9			15.5			9.1	
Approach LOS		D			C			B			A	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 17.1

Intersection LOS: B

Intersection Capacity Utilization 73.7%

ICU Level of Service D

Analysis Period (min) 15

Description:

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



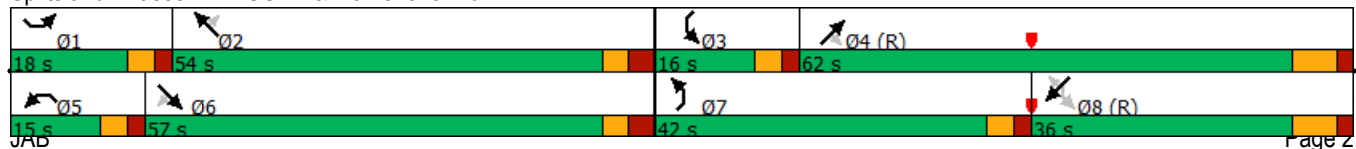
Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	40	420	380	25	1000	225	690	1090	7	140	390	30
Future Volume (vph)	40	420	380	25	1000	225	690	1090	7	140	390	30
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.125		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	233	3539	1583
Satd. Flow (RTOR)			413			206			95			131
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	457	413	27	1087	245	750	1185	8	152	424	33
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4	8		8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	18.0	57.0	57.0	15.0	54.0	54.0	42.0	62.0	62.0	16.0	36.0	36.0
Total Split (%)	12.0%	38.0%	38.0%	10.0%	36.0%	36.0%	28.0%	41.3%	41.3%	10.7%	24.0%	24.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	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)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	9.1	54.0	54.0	7.8	50.4	50.4	35.6	59.0	59.0	46.9	34.2	34.2
Actuated g/C Ratio	0.06	0.36	0.36	0.05	0.34	0.34	0.24	0.39	0.39	0.31	0.23	0.23
v/c Ratio	0.40	0.36	0.50	0.29	0.91	0.37	0.92	0.85	0.01	0.84	0.53	0.07
Control Delay	78.1	36.6	5.2	76.0	60.0	9.1	73.1	49.6	0.0	72.2	55.3	0.3
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	78.1	36.6	5.2	76.0	60.0	9.1	73.1	49.6	0.0	72.2	55.3	0.3
LOS	E	D	A	E	E	A	E	D	A	E	E	A
Approach Delay		24.3			51.2			58.5			56.6	
Approach LOS		C			D			E			E	

Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 49.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 91.3%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd





Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

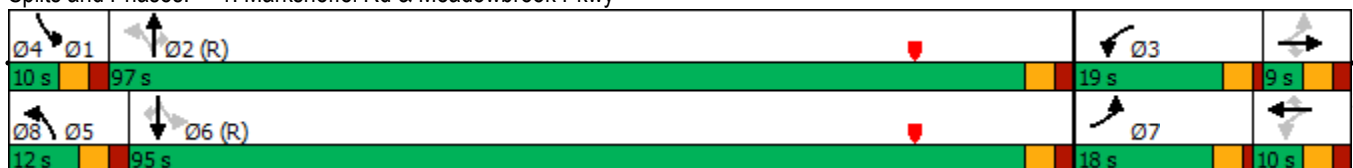
2023 Background + Site  
AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	3	30	108	15	112	59	636	217	55	1493	194
Future Volume (vph)	48	3	30	108	15	112	59	636	217	55	1493	194
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted				0.519			0.109			0.376		
Satd. Flow (perm)	3614	1863	1583	967	1863	1583	203	3539	1583	700	3539	1583
Satd. Flow (RTOR)			89			129			233			204
Peak Hour Factor	0.78	0.78	0.78	0.87	0.87	0.87	0.93	0.93	0.93	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	4	38	124	17	129	63	684	233	58	1572	204
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	9.0	9.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	18.0	9.0	9.0	19.0	10.0	10.0	12.0	97.0	97.0	10.0	95.0	95.0
Total Split (%)	13.3%	6.7%	6.7%	14.1%	7.4%	7.4%	8.9%	71.9%	71.9%	7.4%	70.4%	70.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	2.0	1.0	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)	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.1	4.8	4.8	20.7	10.1	10.1	102.5	97.1	97.1	100.2	95.9	95.9
Actuated g/C Ratio	0.09	0.04	0.04	0.15	0.07	0.07	0.76	0.72	0.72	0.74	0.71	0.71
v/c Ratio	0.20	0.06	0.27	0.55	0.12	0.54	0.28	0.27	0.19	0.10	0.63	0.17
Control Delay	49.2	65.7	4.6	60.5	60.3	18.6	7.1	7.8	1.2	4.6	13.0	1.4
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	49.2	65.7	4.6	60.5	60.3	18.6	7.1	7.8	1.2	4.6	13.0	1.4
LOS	D	E	A	E	E	B	A	A	A	A	B	A
Approach Delay		33.6			40.4			6.2			11.4	
Approach LOS		C			D			A			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 111 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 13.0  
 Intersection LOS: B  
 Intersection Capacity Utilization 69.8%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy





Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

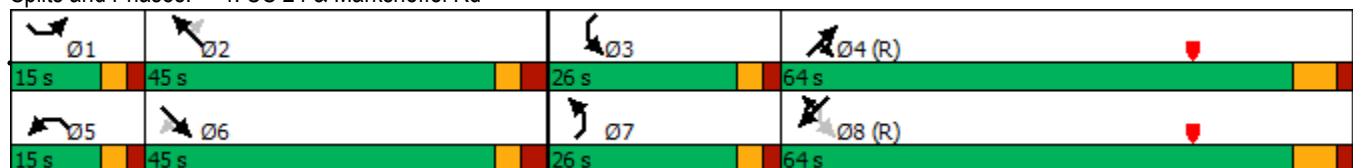
2023 Background + Site  
AM

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	9	1026	708	1	471	75	492	345	2	290	1375	28
Future Volume (vph)	9	1026	708	1	471	75	492	345	2	290	1375	28
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.508		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	946	3539	1583
Satd. Flow (RTOR)			385			102			95			95
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	1115	770	1	512	82	535	375	2	315	1495	30
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	pm+pt	NA	Prot
Protected Phases	1	6		5	2		7	4	4	3	8	8
Permitted Phases			6			2				8		
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	15.0	45.0	45.0	15.0	45.0	45.0	26.0	64.0	64.0	26.0	64.0	64.0
Total Split (%)	10.0%	30.0%	30.0%	10.0%	30.0%	30.0%	17.3%	42.7%	42.7%	17.3%	42.7%	42.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	1.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	7.0	5.0	5.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	6.6	52.8	50.8	6.0	50.0	48.0	21.0	59.5	59.5	77.5	57.0	57.0
Actuated g/C Ratio	0.04	0.35	0.34	0.04	0.33	0.32	0.14	0.40	0.40	0.52	0.38	0.38
v/c Ratio	0.13	0.90	0.97	0.01	0.43	0.14	1.11	0.27	0.00	0.53	1.11	0.05
Control Delay	72.1	56.1	50.5	70.0	41.4	4.5	133.3	31.6	0.0	21.1	104.3	0.1
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	72.1	56.1	50.5	70.0	41.4	4.5	133.3	31.6	0.0	21.1	104.3	0.1
LOS	E	E	D	E	D	A	F	C	A	C	F	A
Approach Delay		53.9			36.4			91.2			88.4	
Approach LOS		D			D			F			F	

Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of FDW or yellow  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.11  
 Intersection Signal Delay: 70.5  
 Intersection LOS: E  
 Intersection Capacity Utilization 102.7%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	270	224	0	0	11
Future Vol, veh/h	2	270	224	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	293	243	0	0	12

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	243	0	0 540 243
Stage 1	-	-	- 243 -
Stage 2	-	-	- 297 -
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	1323	-	- 503 796
Stage 1	-	-	- 797 -
Stage 2	-	-	- 754 -
Platoon blocked, %		-	- -
Mov Cap-1 Maneuver	1323	-	- 502 796
Mov Cap-2 Maneuver	-	-	- 502 -
Stage 1	-	-	- 795 -
Stage 2	-	-	- 754 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1323	-	-	-	796
HCM Lane V/C Ratio	0.002	-	-	-	0.015
HCM Control Delay (s)	7.7	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	266	207	0	1	17
Future Vol, veh/h	4	266	207	0	1	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	4	289	225	0	1	18

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	225	0	-	0	522 225
Stage 1	-	-	-	-	225 -
Stage 2	-	-	-	-	297 -
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	1344	-	-	-	515 814
Stage 1	-	-	-	-	812 -
Stage 2	-	-	-	-	754 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1344	-	-	-	513 814
Mov Cap-2 Maneuver	-	-	-	-	513 -
Stage 1	-	-	-	-	810 -
Stage 2	-	-	-	-	754 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1344	-	-	-	788
HCM Lane V/C Ratio	0.003	-	-	-	0.025
HCM Control Delay (s)	7.7	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

2023 Background + Site  
PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	25	99	36	8	41	66	1561	111	50	689	106
Future Volume (vph)	209	25	99	36	8	41	66	1561	111	50	689	106
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.435			0.769			0.340			0.091		
Satd. Flow (perm)	1572	1863	1583	1432	1863	1583	633	3539	1583	170	3539	1583
Satd. Flow (RTOR)			114			101			100			114
Peak Hour Factor	0.87	0.87	0.87	0.83	0.83	0.83	0.95	0.95	0.95	0.93	0.93	0.93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	29	114	43	10	49	69	1643	117	54	741	114
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.5	11.5	10.0	11.5	11.5
Total Split (s)	19.0	17.0	17.0	19.0	17.0	17.0	13.0	88.0	88.0	11.0	86.0	86.0
Total Split (%)	14.1%	12.6%	12.6%	14.1%	12.6%	12.6%	9.6%	65.2%	65.2%	8.1%	63.7%	63.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0
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)	4.0	6.0	6.0	4.0	6.0	6.0	5.0	6.5	6.5	5.0	5.5	5.5
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	23.5	11.2	11.2	15.0	6.3	6.3	98.8	91.5	91.5	98.2	92.2	92.2
Actuated g/C Ratio	0.17	0.08	0.08	0.11	0.05	0.05	0.73	0.68	0.68	0.73	0.68	0.68
v/c Ratio	0.52	0.19	0.49	0.24	0.11	0.29	0.13	0.69	0.11	0.27	0.31	0.10
Control Delay	52.6	60.2	17.2	47.9	64.0	4.2	5.6	16.9	2.8	8.5	10.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	60.2	17.2	47.9	64.0	4.2	5.6	16.9	2.8	8.5	10.3	1.9
LOS	D	E	B	D	E	A	A	B	A	A	B	A
Approach Delay		42.7			28.5			15.5			9.1	
Approach LOS		D			C			B			A	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 17.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 73.7%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 Description:

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy

 Ø1 11 s	 Ø2 (R) 88 s	 Ø3 19 s	 Ø4 17 s
 Ø5 13 s	 Ø6 (R) 86 s	 Ø7 19 s	 Ø8 17 s

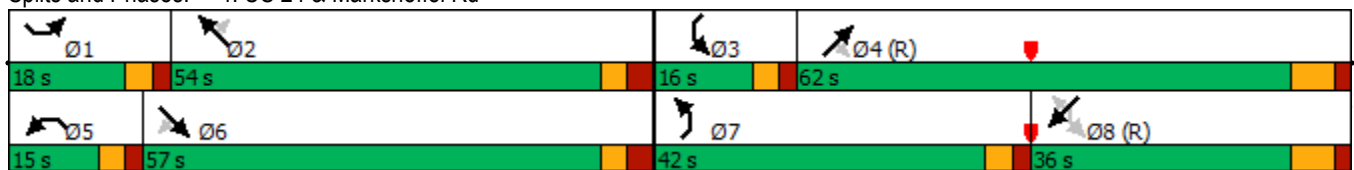
Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	41	422	387	25	1003	225	702	1090	7	140	390	32
Future Volume (vph)	41	422	387	25	1003	225	702	1090	7	140	390	32
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.950			0.126		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	235	3539	1583
Satd. Flow (RTOR)			421			205			95			131
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	459	421	27	1090	245	763	1185	8	152	424	35
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4	8		8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	18.0	57.0	57.0	15.0	54.0	54.0	42.0	62.0	62.0	16.0	36.0	36.0
Total Split (%)	12.0%	38.0%	38.0%	10.0%	36.0%	36.0%	28.0%	41.3%	41.3%	10.7%	24.0%	24.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	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)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	9.3	54.1	54.1	7.8	50.3	50.3	35.9	58.9	58.9	46.4	33.7	33.7
Actuated g/C Ratio	0.06	0.36	0.36	0.05	0.34	0.34	0.24	0.39	0.39	0.31	0.22	0.22
v/c Ratio	0.41	0.36	0.50	0.29	0.92	0.37	0.93	0.85	0.01	0.84	0.53	0.08
Control Delay	78.2	36.5	5.2	76.0	60.5	9.2	74.0	49.7	0.0	72.3	55.7	0.3
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	78.2	36.5	5.2	76.0	60.5	9.2	74.0	49.7	0.0	72.3	55.7	0.3
LOS	E	D	A	E	E	A	E	D	A	E	E	A
Approach Delay		24.3			51.6			59.0			56.7	
Approach LOS		C			D			E			E	

**Intersection Summary**

Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 50.0  
 Intersection LOS: D  
 Intersection Capacity Utilization 92.4%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	175	79	0	0	6
Future Vol, veh/h	11	175	79	0	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	12	190	86	0	0	7

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	86	0	-	0	300 86
Stage 1	-	-	-	-	86 -
Stage 2	-	-	-	-	214 -
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	1510	-	-	-	691 973
Stage 1	-	-	-	-	937 -
Stage 2	-	-	-	-	822 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1510	-	-	-	685 973
Mov Cap-2 Maneuver	-	-	-	-	685 -
Stage 1	-	-	-	-	930 -
Stage 2	-	-	-	-	822 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1510	-	-	-	973
HCM Lane V/C Ratio	0.008	-	-	-	0.007
HCM Control Delay (s)	7.4	-	-	-	8.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	158	69	1	1	10
Future Vol, veh/h	17	158	69	1	1	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	18	172	75	1	1	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	76	0	-	0	284 76
Stage 1	-	-	-	-	76 -
Stage 2	-	-	-	-	208 -
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	1523	-	-	-	706 985
Stage 1	-	-	-	-	947 -
Stage 2	-	-	-	-	827 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1523	-	-	-	698 985
Mov Cap-2 Maneuver	-	-	-	-	698 -
Stage 1	-	-	-	-	936 -
Stage 2	-	-	-	-	827 -

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1523	-	-	-	950
HCM Lane V/C Ratio	0.012	-	-	-	0.013
HCM Control Delay (s)	7.4	-	-	-	8.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0



Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

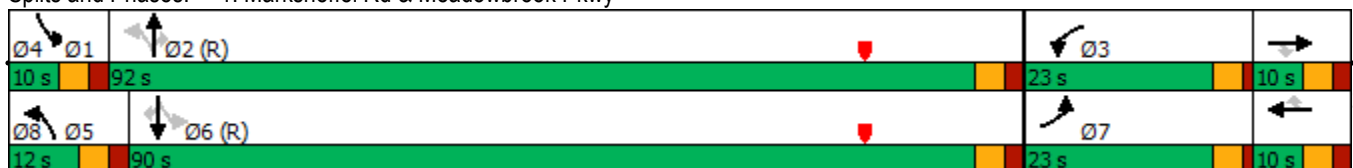
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	5	64	350	14	105	130	900	250	75	2000	231
Future Volume (vph)	143	5	64	350	14	105	130	900	250	75	2000	231
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3539	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.052			0.264		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	97	3539	1583	492	5085	1583
Satd. Flow (RTOR)			89			114			263			243
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	5	70	380	15	114	137	947	263	79	2105	243
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	9.0	9.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	23.0	10.0	10.0	23.0	10.0	10.0	12.0	92.0	92.0	10.0	90.0	90.0
Total Split (%)	17.0%	7.4%	7.4%	17.0%	7.4%	7.4%	8.9%	68.1%	68.1%	7.4%	66.7%	66.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	2.0	1.0	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)	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	11.4	5.2	5.2	18.9	10.6	10.6	96.2	88.8	88.8	91.8	86.6	86.6
Actuated g/C Ratio	0.08	0.04	0.04	0.14	0.08	0.08	0.71	0.66	0.66	0.68	0.64	0.64
v/c Ratio	0.53	0.07	0.48	0.79	0.10	0.50	0.86	0.41	0.23	0.21	0.65	0.22
Control Delay	65.8	65.0	18.2	69.0	59.5	18.2	51.9	19.7	9.8	7.0	16.2	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.8	65.0	18.2	69.0	59.5	18.2	51.9	19.7	9.8	7.0	16.2	1.6
LOS	E	E	B	E	E	B	D	B	A	A	B	A
Approach Delay		51.3			57.3			21.0			14.5	
Approach LOS		D			E			C			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 111 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 23.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 75.0%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

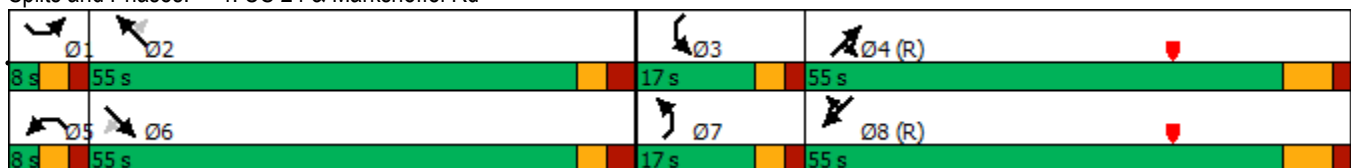
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Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	8	1298	1109	5	579	220	510	800	5	485	1915	85
Future Volume (vph)	8	1298	1109	5	579	220	510	800	5	485	1915	85
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			247			239			105			105
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	1411	1205	5	629	239	554	870	5	527	2082	92
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	1	6		5	2		7	4	4	3	8	8
Permitted Phases			6			2						
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	8.0	55.0	55.0	8.0	55.0	55.0	17.0	55.0	55.0	17.0	55.0	55.0
Total Split (%)	5.9%	40.7%	40.7%	5.9%	40.7%	40.7%	12.6%	40.7%	40.7%	12.6%	40.7%	40.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	1.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	7.0	5.0	5.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	3.0	56.4	54.4	3.0	56.4	54.4	12.0	48.0	48.0	12.0	48.0	48.0
Actuated g/C Ratio	0.02	0.42	0.40	0.02	0.42	0.40	0.09	0.36	0.36	0.09	0.36	0.36
v/c Ratio	0.23	0.95	1.54	0.13	0.43	0.31	1.82	0.48	0.01	1.73	1.15	0.15
Control Delay	98.6	42.4	267.2	71.8	29.4	4.4	413.5	34.9	0.0	376.2	114.7	4.4
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	98.6	42.4	267.2	71.8	29.4	4.4	413.5	34.9	0.0	376.2	114.7	4.4
LOS	F	D	F	E	C	A	F	C	A	F	F	A
Approach Delay		145.8			22.8			181.6			162.0	
Approach LOS		F			C			F			F	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 32 (24%), Referenced to phase 4:NET and 8:SWT, Start of FDW or yellow  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.82  
 Intersection Signal Delay: 144.2  
 Intersection LOS: F  
 Intersection Capacity Utilization 126.5%  
 ICU Level of Service H  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	250	70	4	426	43	2
Future Vol, veh/h	250	70	4	426	43	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	0	-	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	272	76	4	463	47	2

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	348	0	743	272
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	471	-
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	-	-	1211	-	383	767
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1211	-	382	767
Mov Cap-2 Maneuver	-	-	-	-	382	-
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	382	767	-	-	1211	-
HCM Lane V/C Ratio	0.122	0.003	-	-	0.004	-
HCM Control Delay (s)	15.7	9.7	-	-	8	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-

Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

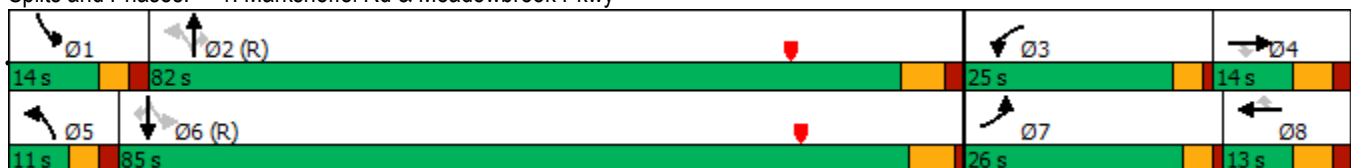
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	417	30	171	190	25	125	116	1850	230	120	1200	336
Future Volume (vph)	417	30	171	190	25	125	116	1850	230	120	1200	336
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3539	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.178			0.050		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	332	3539	1583	93	5085	1583
Satd. Flow (RTOR)			149			101			157			354
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	453	33	186	207	27	136	122	1947	242	126	1263	354
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.5	11.5	10.0	11.5	11.5
Total Split (s)	26.0	14.0	14.0	25.0	13.0	13.0	11.0	82.0	82.0	14.0	85.0	85.0
Total Split (%)	19.3%	10.4%	10.4%	18.5%	9.6%	9.6%	8.1%	60.7%	60.7%	10.4%	63.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0
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)	4.0	6.0	6.0	4.0	6.0	6.0	5.0	6.5	6.5	5.0	5.5	5.5
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	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	21.0	14.3	14.3	13.4	6.7	6.7	85.1	77.2	77.2	89.5	80.4	80.4
Actuated g/C Ratio	0.16	0.11	0.11	0.10	0.05	0.05	0.63	0.57	0.57	0.66	0.60	0.60
v/c Ratio	0.85	0.17	0.62	0.61	0.29	0.78	0.44	0.96	0.25	0.75	0.42	0.33
Control Delay	71.1	58.0	24.4	65.6	70.0	48.5	10.8	25.3	7.3	52.7	15.3	2.0
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	71.1	58.0	24.4	65.6	70.0	48.5	10.8	25.3	7.3	52.7	15.3	2.0
LOS	E	E	C	E	E	D	B	C	A	D	B	A
Approach Delay		57.5			59.6			22.6			15.3	
Approach LOS		E			E			C			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 27.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 90.9%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

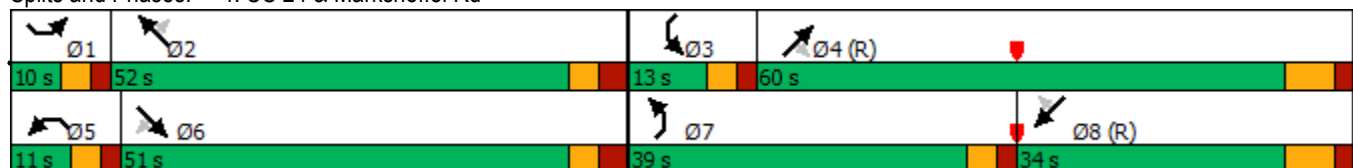
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Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	54	898	578	35	1450	435	903	1685	15	205	900	103
Future Volume (vph)	54	898	578	35	1450	435	903	1685	15	205	900	103
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			538			155			105			145
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	59	976	628	38	1576	473	982	1832	16	223	978	112
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	10.0	51.0	51.0	11.0	52.0	52.0	39.0	60.0	60.0	13.0	34.0	34.0
Total Split (%)	7.4%	37.8%	37.8%	8.1%	38.5%	38.5%	28.9%	44.4%	44.4%	9.6%	25.2%	25.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	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)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	5.0	47.2	47.2	6.0	46.0	46.0	34.0	53.0	53.0	8.0	27.0	27.0
Actuated g/C Ratio	0.04	0.35	0.35	0.04	0.34	0.34	0.25	0.39	0.39	0.06	0.20	0.20
v/c Ratio	0.91	0.79	0.70	0.49	1.31	0.74	1.14	0.92	0.02	2.14	0.96	0.26
Control Delay	160.2	36.0	6.8	83.8	181.4	33.7	120.9	47.4	0.1	574.2	73.7	4.4
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	160.2	36.0	6.8	83.8	181.4	33.7	120.9	47.4	0.1	574.2	73.7	4.4
LOS	F	D	A	F	F	C	F	D	A	F	E	A
Approach Delay		29.4			146.2			72.6			152.8	
Approach LOS		C			F			E			F	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 32 (24%), Referenced to phase 4:NET and 8:SWT, Start of Green  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 2.14  
 Intersection Signal Delay: 96.3  
 Intersection LOS: F  
 Intersection Capacity Utilization 109.0%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Intersection						
Int Delay, s/veh	4.3					
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	156	224	6	113	227	14
Future Vol, veh/h	156	224	6	113	227	14
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	-	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	170	243	7	123	247	15

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	413	0	307	170
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	137	-
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	-	-	1146	-	685	874
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	890	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1146	-	681	874
Mov Cap-2 Maneuver	-	-	-	-	681	-
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	885	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0.4	13.1
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	NWLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	681	874	-	-	1146	-
HCM Lane V/C Ratio	0.362	0.017	-	-	0.006	-
HCM Control Delay (s)	13.3	9.2	-	-	8.2	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	1.7	0.1	-	-	0	-

Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

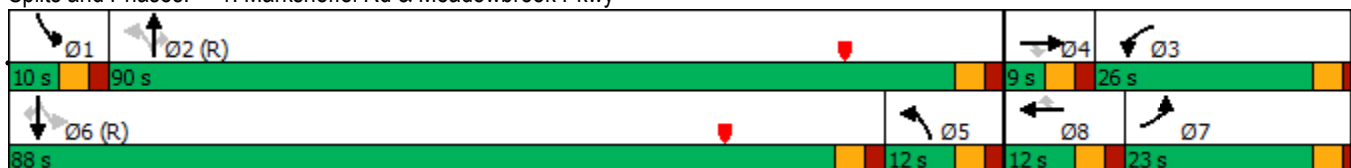
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	5	64	365	15	115	130	900	256	78	2000	231
Future Volume (vph)	143	5	64	365	15	115	130	900	256	78	2000	231
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3539	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.062			0.232		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	115	3539	1583	432	5085	1583
Satd. Flow (RTOR)			129			129			269			243
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	5	70	397	16	125	137	947	269	82	2105	243
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	9.0	9.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	23.0	9.0	9.0	26.0	12.0	12.0	12.0	90.0	90.0	10.0	88.0	88.0
Total Split (%)	17.0%	6.7%	6.7%	19.3%	8.9%	8.9%	8.9%	66.7%	66.7%	7.4%	65.2%	65.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	2.0	1.0	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)	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	16.3	4.0	4.0	20.4	6.4	6.4	87.5	87.5	87.5	86.4	86.4	86.4
Actuated g/C Ratio	0.12	0.03	0.03	0.15	0.05	0.05	0.65	0.65	0.65	0.64	0.64	0.64
v/c Ratio	0.38	0.09	0.41	0.76	0.18	0.63	0.86	0.41	0.24	0.25	0.65	0.22
Control Delay	56.5	67.4	7.0	65.3	66.3	24.2	34.5	4.0	0.2	11.9	16.6	1.7
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	56.5	67.4	7.0	65.3	66.3	24.2	34.5	4.0	0.2	11.9	16.6	1.7
LOS	E	E	A	E	E	C	C	A	A	B	B	A
Approach Delay		41.7			55.8			6.4			15.0	
Approach LOS		D			E			A			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 120 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 18.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 75.4%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

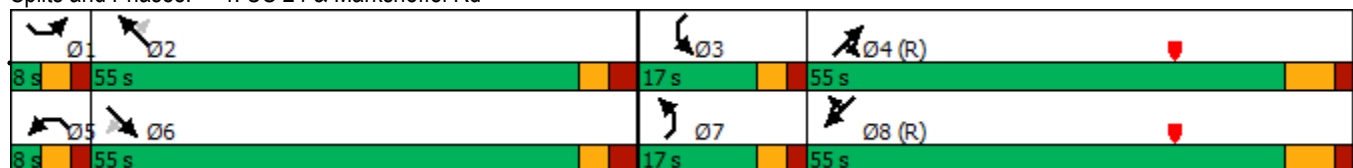
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Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	1301	1121	5	580	220	514	800	5	485	1915	86
Future Volume (vph)	10	1301	1121	5	580	220	514	800	5	485	1915	86
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Satd. Flow (RTOR)			247			239			105			105
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	1414	1218	5	630	239	559	870	5	527	2082	93
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	1	6		5	2		7	4	4	3	8	8
Permitted Phases			6			2						
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	8.0	55.0	55.0	8.0	55.0	55.0	17.0	55.0	55.0	17.0	55.0	55.0
Total Split (%)	5.9%	40.7%	40.7%	5.9%	40.7%	40.7%	12.6%	40.7%	40.7%	12.6%	40.7%	40.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	1.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	7.0	5.0	5.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	3.0	56.4	54.4	3.0	54.8	52.8	12.0	48.0	48.0	12.0	48.0	48.0
Actuated g/C Ratio	0.02	0.42	0.40	0.02	0.41	0.39	0.09	0.36	0.36	0.09	0.36	0.36
v/c Ratio	0.28	0.96	1.55	0.13	0.44	0.31	1.83	0.48	0.01	1.73	1.15	0.15
Control Delay	94.4	39.0	273.1	71.8	30.8	4.7	420.5	34.9	0.0	376.2	114.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.4	39.0	273.1	71.8	30.8	4.7	420.5	34.9	0.0	376.2	114.7	4.6
LOS	F	D	F	E	C	A	F	C	A	F	F	A
Approach Delay		147.1			23.9			185.1			161.9	
Approach LOS		F			C			F			F	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 32 (24%), Referenced to phase 4:NET and 8:SWT, Start of FDW or yellow  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.83  
 Intersection Signal Delay: 145.4  
 Intersection LOS: F  
 Intersection Capacity Utilization 127.2%  
 ICU Level of Service H  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd





Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	254	70	4	443	0	43	0	2	0	0	11
Future Vol, veh/h	2	254	70	4	443	0	43	0	2	0	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	0	100	-	-	-	-	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	2	276	76	4	482	0	47	0	2	0	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	482	0	0	352	0	0	776	770	276	809	846	482
Stage 1	-	-	-	-	-	-	280	280	-	490	490	-
Stage 2	-	-	-	-	-	-	496	490	-	319	356	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1081	-	-	1207	-	-	315	331	763	299	299	584
Stage 1	-	-	-	-	-	-	727	679	-	560	549	-
Stage 2	-	-	-	-	-	-	556	549	-	693	629	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1081	-	-	1207	-	-	307	329	763	297	298	584
Mov Cap-2 Maneuver	-	-	-	-	-	-	307	329	-	297	298	-
Stage 1	-	-	-	-	-	-	726	678	-	559	547	-
Stage 2	-	-	-	-	-	-	543	547	-	690	628	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			9.7			11.3		
HCM LOS							A			B		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	763	763	1081	-	-	1207	-	-	584
HCM Lane V/C Ratio	0.001	0.002	0.002	-	-	0.004	-	-	0.02
HCM Control Delay (s)	9.7	9.7	8.3	-	-	8	-	-	11.3
HCM Lane LOS	A	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	252	430	0	1	17
Future Vol, veh/h	4	252	430	0	1	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	4	274	467	0	1	18

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	467	0	-	0	749 467
Stage 1	-	-	-	-	467 -
Stage 2	-	-	-	-	282 -
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	1094	-	-	-	379 596
Stage 1	-	-	-	-	631 -
Stage 2	-	-	-	-	766 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1094	-	-	-	377 596
Mov Cap-2 Maneuver	-	-	-	-	377 -
Stage 1	-	-	-	-	628 -
Stage 2	-	-	-	-	766 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1094	-	-	-	577
HCM Lane V/C Ratio	0.004	-	-	-	0.034
HCM Control Delay (s)	8.3	-	-	-	11.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lanes, Volumes, Timings  
1: Marksheffel Rd & Meadowbrook Pkwy

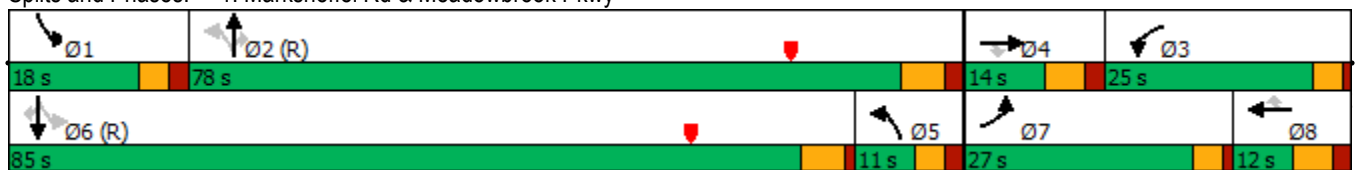
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	417	31	171	200	25	131	116	1850	247	130	1200	336
Future Volume (vph)	417	31	171	200	25	131	116	1850	247	130	1200	336
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3539	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.208			0.057		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	387	3539	1583	106	5085	1583
Satd. Flow (RTOR)			194			194			158			354
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	453	34	186	217	27	142	122	1947	260	137	1263	354
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
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)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	11.5	11.5	10.0	11.5	11.5
Total Split (s)	27.0	14.0	14.0	25.0	12.0	12.0	11.0	78.0	78.0	18.0	85.0	85.0
Total Split (%)	20.0%	10.4%	10.4%	18.5%	8.9%	8.9%	8.1%	57.8%	57.8%	13.3%	63.0%	63.0%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0
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)	4.0	6.0	6.0	4.0	6.0	6.0	5.0	6.5	6.5	5.0	5.5	5.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	21.5	7.2	7.2	20.2	6.0	6.0	76.9	75.4	75.4	81.5	81.0	81.0
Actuated g/C Ratio	0.16	0.05	0.05	0.15	0.04	0.04	0.57	0.56	0.56	0.60	0.60	0.60
v/c Ratio	0.83	0.34	0.69	0.42	0.33	0.56	0.43	0.99	0.27	0.70	0.41	0.32
Control Delay	68.7	70.8	21.4	54.6	73.6	10.9	5.7	15.5	0.7	45.4	15.0	2.0
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	68.7	70.8	21.4	54.6	73.6	10.9	5.7	15.5	0.7	45.4	15.0	2.0
LOS	E	E	C	D	E	B	A	B	A	D	B	A
Approach Delay		55.7			39.9			13.3			14.8	
Approach LOS		E			D			B			B	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 18 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of FDW or yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 21.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 91.5%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Meadowbrook Pkwy



Lanes, Volumes, Timings  
4: US 24 & Marksheffel Rd

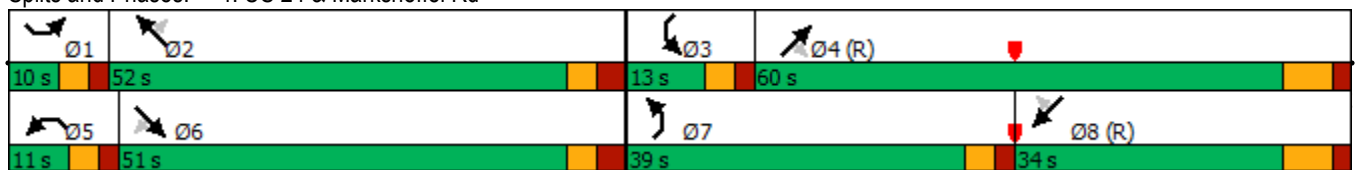
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Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	55	900	585	35	1450	435	915	1685	15	205	900	105
Future Volume (vph)	55	900	585	35	1450	435	915	1685	15	205	900	105
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	5085	1583	1770	5085	1583
Satd. Flow (RTOR)			543			155			105			145
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	978	636	38	1576	473	995	1832	16	223	978	114
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	28.0	28.0	6.0	28.0	28.0
Minimum Split (s)	15.0	16.0	16.0	15.0	16.0	16.0	15.0	35.0	35.0	15.0	35.0	35.0
Total Split (s)	10.0	51.0	51.0	11.0	52.0	52.0	39.0	60.0	60.0	13.0	34.0	34.0
Total Split (%)	7.4%	37.8%	37.8%	8.1%	38.5%	38.5%	28.9%	44.4%	44.4%	9.6%	25.2%	25.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	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)	5.0	6.0	6.0	5.0	6.0	6.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	5.0	47.2	47.2	6.0	46.0	46.0	34.0	53.0	53.0	8.0	27.0	27.0
Actuated g/C Ratio	0.04	0.35	0.35	0.04	0.34	0.34	0.25	0.39	0.39	0.06	0.20	0.20
v/c Ratio	0.92	0.79	0.70	0.49	1.31	0.74	1.15	0.92	0.02	2.14	0.96	0.26
Control Delay	163.5	32.5	11.0	83.8	181.4	33.7	126.3	47.4	0.1	574.2	73.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	163.5	32.5	11.0	83.8	181.4	33.7	126.3	47.4	0.1	574.2	73.7	4.6
LOS	F	C	B	F	F	C	F	D	A	F	E	A
Approach Delay		29.0			146.2			74.8			152.6	
Approach LOS		C			F			E			F	

Intersection Summary

Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 32 (24%), Referenced to phase 4:NET and 8:SWT, Start of Green  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 2.14  
 Intersection Signal Delay: 96.8  
 Intersection LOS: F  
 Intersection Capacity Utilization 110.1%  
 ICU Level of Service H  
 Analysis Period (min) 15

Splits and Phases: 4: US 24 & Marksheffel Rd



Intersection												
Int Delay, s/veh	4.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	173	224	6	123	0	227	0	14	0	0	6
Future Vol, veh/h	11	173	224	6	123	0	227	0	14	0	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	0	100	-	-	-	-	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	188	243	7	134	0	247	0	15	0	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	134	0	0	431	0	0	364	360	188	489	603	134
Stage 1	-	-	-	-	-	-	212	212	-	148	148	-
Stage 2	-	-	-	-	-	-	152	148	-	341	455	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1451	-	-	1129	-	-	592	567	854	489	413	915
Stage 1	-	-	-	-	-	-	790	727	-	855	775	-
Stage 2	-	-	-	-	-	-	850	775	-	674	569	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1451	-	-	1129	-	-	581	559	854	475	407	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	581	559	-	475	407	-
Stage 1	-	-	-	-	-	-	784	721	-	848	770	-
Stage 2	-	-	-	-	-	-	839	770	-	657	564	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.4			15.3			9		
HCM LOS							C			A		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	581	854	1451	-	-	1129	-	-	915
HCM Lane V/C Ratio	0.425	0.018	0.008	-	-	0.006	-	-	0.007
HCM Control Delay (s)	15.7	9.3	7.5	-	-	8.2	-	-	9
HCM Lane LOS	C	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	2.1	0.1	0	-	-	0	-	-	0

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	170	119	1	1	10
Future Vol, veh/h	17	170	119	1	1	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	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	18	185	129	1	1	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	130	0	-	0	351 130
Stage 1	-	-	-	-	130 -
Stage 2	-	-	-	-	221 -
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	1455	-	-	-	646 920
Stage 1	-	-	-	-	896 -
Stage 2	-	-	-	-	816 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1455	-	-	-	638 920
Mov Cap-2 Maneuver	-	-	-	-	638 -
Stage 1	-	-	-	-	885 -
Stage 2	-	-	-	-	816 -

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1455	-	-	-	884
HCM Lane V/C Ratio	0.013	-	-	-	0.014
HCM Control Delay (s)	7.5	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

# Queuing Reports

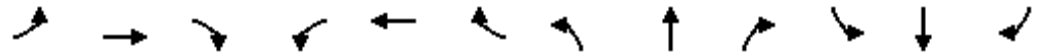
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DRAFT

Queues

1: Marksheffel Rd & Meadowbrook Pkwy

AM



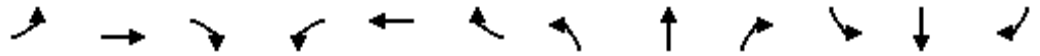
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	62	4	38	124	17	129	63	684	233	58	1572	204
v/c Ratio	0.20	0.06	0.27	0.55	0.12	0.54	0.28	0.27	0.19	0.10	0.63	0.17
Control Delay	49.2	65.7	4.6	60.5	60.3	18.6	7.1	7.8	1.2	4.6	13.0	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.2	65.7	4.6	60.5	60.3	18.6	7.1	7.8	1.2	4.6	13.0	1.4
Queue Length 50th (ft)	23	3	0	97	14	0	12	114	0	11	400	0
Queue Length 95th (ft)	39	14	0	156	38	58	24	143	26	22	476	26
Internal Link Dist (ft)		415			395			1025			885	
Turn Bay Length (ft)	210		195	300		190	420			350		350
Base Capacity (vph)	477	66	142	245	139	238	236	2545	1204	561	2515	1184
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.27	0.51	0.12	0.54	0.27	0.27	0.19	0.10	0.63	0.17

Intersection Summary



1: Marksheffel Rd & Meadowbrook Pkwy

PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	240	29	114	43	10	49	69	1643	117	54	741	114
v/c Ratio	0.52	0.19	0.49	0.24	0.11	0.29	0.13	0.69	0.11	0.27	0.31	0.10
Control Delay	52.6	60.2	17.2	47.9	64.0	4.2	5.6	16.9	2.8	8.5	10.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	60.2	17.2	47.9	64.0	4.2	5.6	16.9	2.8	8.5	10.3	1.9
Queue Length 50th (ft)	94	24	0	31	9	0	15	474	5	11	142	0
Queue Length 95th (ft)	128	55	54	60	27	0	30	607	30	24	193	24
Internal Link Dist (ft)		415			397			1025			885	
Turn Bay Length (ft)	210		195	300		190	420			350		350
Base Capacity (vph)	490	160	240	269	151	221	534	2398	1105	203	2417	1117
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.18	0.47	0.16	0.07	0.22	0.13	0.69	0.11	0.27	0.31	0.10

Intersection Summary

Description:

Queues

1: Marksheffel Rd & Meadowbrook Pkwy

AM



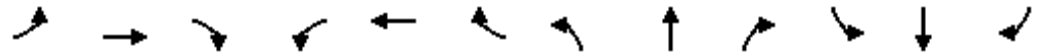
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	155	5	70	397	16	125	137	947	269	82	2105	243
v/c Ratio	0.38	0.09	0.41	0.76	0.18	0.63	0.86	0.41	0.24	0.25	0.65	0.22
Control Delay	56.5	67.4	7.0	65.3	66.3	24.2	34.5	4.0	0.2	11.9	16.6	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	67.4	7.0	65.3	66.3	24.2	34.5	4.0	0.2	11.9	16.6	1.7
Queue Length 50th (ft)	64	4	0	174	14	0	23	31	0	27	408	0
Queue Length 95th (ft)	99	19	0	228	39	61	m47	m23	m0	50	471	32
Internal Link Dist (ft)		415			379			1025			885	
Turn Bay Length (ft)	225		225	300		190	420			350		350
Base Capacity (vph)	483	55	172	559	96	204	160	2293	1120	334	3252	1099
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.09	0.41	0.71	0.17	0.61	0.86	0.41	0.24	0.25	0.65	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Queues

1: Marksheffel Rd & Meadowbrook Pkwy



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	453	34	186	217	27	142	122	1947	260	137	1263	354
v/c Ratio	0.83	0.34	0.69	0.42	0.33	0.56	0.43	0.99	0.27	0.70	0.41	0.32
Control Delay	68.7	70.8	21.4	54.6	73.6	10.9	5.7	15.5	0.7	45.4	15.0	2.0
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	68.7	70.8	21.4	54.6	73.6	10.9	5.7	15.5	0.7	45.4	15.0	2.0
Queue Length 50th (ft)	197	29	0	89	23	0	10	~726	9	67	211	0
Queue Length 95th (ft)	259	67	69	130	57	22	m12	m470	m10	138	245	40
Internal Link Dist (ft)		415			395			1025			885	
Turn Bay Length (ft)	225		225	300		190	420			350		350
Base Capacity (vph)	584	110	276	534	83	256	281	1976	953	224	3052	1091
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.31	0.67	0.41	0.33	0.55	0.43	0.99	0.27	0.61	0.41	0.32

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.