



LSC TRANSPORTATION CONSULTANTS, INC.
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Lorson Ranch East Filing No. 2 Transportation Memorandum (LSC #184540) June 26, 2018


Traffic Engineer's Statement

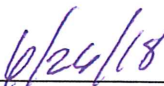
This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Developer's Statement

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





Date



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June 26, 2018

Mr. Jeff Mark
The Landhuis Company
212 North Wahsatch Avenue, Suite 301
Colorado Springs, CO 80903

RE: Lorson Ranch East Filing No. 2
El Paso County, Colorado
Transportation Memorandum
LSC #184540

Dear Mr. Mark:

LSC Transportation Consultants, Inc. has prepared this transportation memorandum to accompany the submittal for the Lorson Ranch East Filing No. 2 residential development to be located within the Lorson Ranch development in El Paso County, Colorado. The site location is shown in Figure 1. LSC prepared a traffic impact study (TIS) for the entire Lorson Ranch East Preliminary Plan dated November 9, 2017 and revised January 8, 2018. LSC also prepared a transportation memorandum for Filing No. 1 dated May 2, 2018. A separate traffic impact study was also submitted for the school site (by LSC - dated May 11, 2018). The lot and street plan has not changed since completion of the overall TIS. The site plan is shown in Figure 2. This memorandum contains the following:

- Recent/current street and traffic conditions in the vicinity of the site including the street widths, lane geometries, traffic controls, posted speed limits, street classification, etc.
- Existing traffic volumes at the key intersections in the vicinity of the site and estimates of short-term background traffic volumes.
- The projected average weekday and peak-hour vehicle-trips to be generated by Filing 2.
- The assignment of the projected trips to the existing and planned street system.
- The resulting short-term total traffic volumes on the street system.
- The resulting traffic impacts. The traffic impacts have been quantified by determining the future levels of service at the intersections of Marksheffel Road/Lorson Boulevard, Marksheffel Road/Fontaine Boulevard, Lamprey Drive/Fontaine Boulevard and the proposed site access point intersection on Fontaine Boulevard.

- Recommendations for a fair share contribution toward a future traffic signal at the intersection of Marksheffel Road and Lorson Boulevard.
- Recommendations for street functional classifications for streets within Filing 2.
- The required Countywide Road Impact Fees.

ROADWAY AND TRAFFIC CONDITIONS

Area Roadways

Figure 1 shows the roadways in the vicinity of the site. The major roadways are identified below followed by a brief description of each.

- **Marksheffel Road** extends north from the Link Road/C&S Road intersection in Fountain, Colorado to north of Woodmen Road. Marksheffel Road is shown as a future four-lane Expressway on the County *Major Transportation Corridors Plan (MTCP)*. The posted speed limit on Marksheffel Road at Fontaine Boulevard is 45 miles per hour (mph). The PPRTA has completed the Marksheffel Road upgrade between Mesa Ridge Parkway and Bradley Road. This included intersection improvements at the Fontaine Boulevard intersection.
- **Fontaine Boulevard** is designated as a four-lane Urban Principal Arterial east of Marksheffel Road and it has been constructed as such from Marksheffel Road east to Old Glory Drive. As part of Lorson Ranch East Filing No 1 Fontaine Boulevard will be extended east from Old Glory Drive adjacent to the site. In the interim, an Urban Non-Residential Collector Street will be constructed east of Stingray Lane as development progresses. The applicant will be dedicating 100 feet of right-of-way. The posted speed limit on Fontaine Boulevard is 35 mph just east of (and a short distance west of) Marksheffel Road. The speed limit increases to 45 mph just east of the bridge over Jimmy Camp Creek.
- **Lorson Boulevard** is a planned future roadway that will ultimately extend from Marksheffel Road about one-half mile south of Fontaine Boulevard. The section of Lorson Boulevard connecting Stingray Lane and Willapa Drive via a bridge over the east tributary will be constructed as part of Filing 1. Lorson Boulevard will be classified as an Urban Non-Residential Collector Street (modified for a 44-foot street width rather than the standard 52-foot street width) with an 80-foot-wide right-of-way. The section between the east boundary of Carriage Meadows Drive and Stingray Lane will be constructed with Filing 2. East of Stingray Lane, Lorson Boulevard will be classified as an Urban Non-Residential Collector Street (modified for a 44-foot street width rather than the standard 52-foot street width). The right-of-way will vary from 64 feet to 72 feet to accommodate anticipated future right-turn deceleration lanes. The right-of-way not adjacent to right-turn lanes would be 64 feet. Also, tracts adjacent to the right-of-way will allow for future right-of-way expansion to 80 feet if ever needed. The proposed cross section includes two 14-foot

"shared-use" travel lanes, a striped two-way left-turn lane and right-turn deceleration lanes where warranted.

Baseline Traffic Volumes

Figure 3 shows the recent traffic volumes at the intersection of Marksheffel Road/Fontaine Boulevard. These "baseline" traffic volumes were based on traffic counts conducted by LSC in March 2018. The traffic count reports are attached.

Baseline Levels of Service

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A represents control delay of less than 10 seconds for unsignalized and signalized intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections and more than 80 seconds for signalized intersections. Table 1 shows the level of service delay ranges.

| Table 1 | | | |
|--|--|--------------------------|--|
| Intersection Levels of Service Delay Ranges | | | |
| Level of Service | Signalized Intersections | | Unsignalized Intersections |
| | Average Control Delay (seconds per vehicle) | V/C⁽¹⁾ | Average Control Delay (seconds per vehicle)⁽²⁾ |
| A | 10.0 sec or less | less than 0.60 | 10.0 sec or less |
| B | 10.1-20.0 sec | 0.60-0.69 | 10.1-15.0 sec |
| C | 20.1-35.0 sec | 0.70-0.79 | 15.1-25.0 sec |
| D | 35.1-55.0 sec | 0.80-0.89 | 25.1-35.0 sec |
| E | 55.1-80.0 sec | 0.90-0.99 | 35.1-50.0 sec |
| F | 80.1 sec or more | 1.00 and greater | 50.1 sec or more |

(1) Source: *Transportation Research Circular 212*
 (2) 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 intersection of Marksheffel/Fontaine was analyzed to determine the baseline levels of service using Synchro. Figure 3 shows the level of service analysis results. As shown on the figure, all movements at this intersection are level of service C or better during the peak hours. The level of service (LOS) reports are attached.

SHORT-TERM (YEAR 2020) BACKGROUND TRAFFIC

Background traffic is the traffic estimated to be on the roadways without the Lorson Ranch East Filing 2 traffic. The short-term background traffic volumes are shown in Figure 4. The background traffic volumes are based on the baseline traffic volumes shown in Figure 3 with a portion of the

volumes assumed to be rerouted with the construction of Lorson Boulevard from Marksheffel Road to Willapa Drive including crossing both the Jimmy Camp Creek main channel and east tributary. The short-term background traffic also includes additional traffic generated by buildout of the residential portion of Lorson Ranch subdivisions north of Lorson Boulevard between Jimmy Camp Creek and the east tributary, the Carriage Meadows North and Carriage Meadows South subdivisions located west of Jimmy Camp Creek, Lorson Ranch East Filing 1, and the school located northeast of Fontaine Boulevard and Lamprey Drive but assumes zero traffic generated by Lorson Ranch East Filing 2.

SITE DEVELOPMENT AND LAND USE

Land Use

Filing No. 1 and the Lorson Ranch School Site

Lorson Ranch East Filing 1 is planned to include 303 lots for single-family homes. This is 28 fewer lots than were included in Phase 1 of the Preliminary Plan Traffic Impact Study. A separate Transportation Memorandum dated May 2, 2018 has been submitted for this filing. The school site north of Fontaine Boulevard and east of Lamprey Drive is also planned to be developed in the short-term future. A separate traffic impact study has been submitted for the school site dated May 11, 2018.

As part of Filing 1, Fontaine Boulevard is planned to be extended east from its current terminus at the intersection of Stingray Lane and Old Glory (east) to the east boundary of the school site. Lamprey Drive would be constructed north from Fontaine Boulevard to the north Lorson Ranch East Filing 2 access point (Shavers Drive) and south to Lorson Boulevard.

Filing No. 2

Figure 2 shows the proposed site plan for Lorson Ranch East Filing 2. There are no changes to the lot layout, street network, and access points from the plan shown in the Preliminary Plan Traffic Impact Study. As shown in Figure 2, Filing 2 is planned to include 196 lots for single-family homes. The location of these lots is **not** in the same location assumed in the Preliminary Plan TIS for the remaining 28 lots included as part Phase 1.

One full-movement access (Edisto Drive) is proposed to Fontaine Boulevard about 390 feet east of Lamprey Drive. This approved access location does not meet the criteria for intersection spacing on a Principal Arterial. However, the street will function as a Collector street for the foreseeable future and will be constructed as an interim Urban Non-Residential Collector street. Once Fontaine Boulevard is constructed as a Principal Arterial, this access points would likely be restricted to right-in/right-out only. Please refer to the overall TIS for details. Two additional full-movement access points are proposed to Lamprey Drive.

Dwelling Unit Cap

The proposed 196 single-family homes would cause the total number of dwelling units within Lorson Ranch to exceed the allowable 1,750 single-family equivalent dwelling units east of the main channel of Jimmy Camp Creek as per the amended development agreement. The development agreement states:

Amendment Regarding Second Access. The Parties stipulate and agree that Lorson and LRMD shall be required to construct a second access benefitting all lots to that portion of Lorson Ranch lying east of the main channel of Jimmy Camp Creek only at such time as Lorson, or its successor or assign, submits a development application to the County that will increase the number of single-family-equivalent residential units above 1750 units approved or planned within that same area of Lorson Ranch.

Table 2 shows the updated dwelling unit cap status table with the proposed Lorson East Filing 2 added. As the dwelling unit cap will be exceeded, Lorson Boulevard must be constructed from the Carriage Meadows South east boundary to Stingray Lane including a crossing of the main Jimmy Camp Creek channel with this filing.

TRIP GENERATION

Estimates of the traffic volumes expected to be generated by the site have been made using the nationally published trip generation rates found in *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 3 shows the results of the trip generation estimates.

As shown in Table 3, Lorson Ranch East Filing 2 is projected to generate about 1,850 new vehicle-trips on the average weekday, with about one-half of the vehicles entering and one-half of the vehicles exiting in a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 36 vehicles would enter and 109 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:30 and 6:30 p.m., about 122 vehicles would enter and 72 vehicles would exit the site.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated traffic volumes on the street and roadway system serving the site is one of the most important factors in determining the site's traffic impacts. Figure 5 shows the external trip distribution estimates (external to Lorson Ranch). The directional distribution estimates have been based on the location of the site with respect to the regional residential employment, commercial, and activity centers; the land use proposed; the access/roadway connections assumed; the roadway network; and the most recent traffic counts conducted at the intersection of Marksheffel/Fontaine.

When the external trip distribution percentages (from Figure 6) are applied to the trip generation estimates (from Table 3), the resulting site-generated traffic volumes can be determined. Figure 6 show the short-term site-generated traffic volume estimates. The Phase 1 site-generated traffic volumes assume all trips generated by Lorson Ranch East Filing 2 have origins and destinations outside of Lorson Ranch.

The short-term site-generated traffic volumes assume Lorson Boulevard has been constructed from Marksheffel Road east across both the main Jimmy Camp Creek bed and the east tributary to Lamprey Drive.

PROJECTED SHORT-TERM TOTAL TRAFFIC

Figure 7 shows the short-term total traffic volumes. These volumes are the sum of the short-term background traffic volumes (from Figure 4) plus the short-term site-generated traffic volumes (from Figure 6).

2040 TOTAL TRAFFIC

Please refer to Preliminary Plan Traffic Impact Study for the 2040 total traffic volumes and level of service analysis.

PROJECTED LEVELS OF SERVICE

Explain differences in the Synchro sheets from previous reports. Do these differences carry through to 2040?

The intersections of Marksheffel/Lorson, Marksheffel Road/Fontaine Boulevard, Fontaine/Lamprey, Fontaine/Edisto have been analyzed to determine the projected levels of service for the short-term background and total traffic volumes based on the signalized method of analysis from Synchro and the unsignalized method of analysis procedures outlined in the *Highway Capacity Manual, 2010 Edition* by the Transportation Research Board. The level of service reports are attached. The results of the analysis are shown in Figures 4 and 7.

Marksheffel/Fontaine

The signal-controlled Marksheffel Road/Fontaine Boulevard intersection is projected to operate at a level of service C or better for all movements based on the short-term background and total traffic conditions.

Marksheffel/Lorson

Based on the projected short-term total traffic volumes, the intersection of Marksheffel/Lorson is projected to operate at LOS C or better for all approaches during the peak hours as a Stop-sign-controlled intersection (Stop-sign on the westbound approach).

Fontaine/Lamprey

Based on the projected short-term total traffic volumes, the intersection of Fontaine/Lamprey is projected to operate at LOS A for all approaches during the peak hours as a one-lane modern roundabout.

Fontaine/Edisto

The intersection of Fontaine Boulevard/Edisto Drive is projected to operate at level of service C or better for all movements as a Stop-sign-controlled intersection based on the projected short-term total traffic volumes.

TRAFFIC SIGNAL WARRANT ANALYSIS

The intersection of Marksheffel/Lorson was analyzed to determine if a Four-Hour Vehicular Volume Traffic Signal Warrant will be met or close to being met based on the projected short-term total traffic volumes. The results of the analysis are shown in Figure 8. As shown in the figure, this intersection is projected to meet the thresholds for a Four-Hour Vehicular Volume Traffic Signal Warrant during the morning and afternoon peak hours. This analysis using the peak hours is intended to provide an indication that a warrant may be met or is close to being met. In order for a Four-Hour Traffic Signal Warrant to be satisfied, the volume threshold would need to be met for two additional hours of the day. For example, the four-hour warrant would be satisfied with the volume thresholds met for the one hour in the morning, two hours (instead of the one-hour peak) during the afternoon peak period, and an hour during the mid-afternoon. The satisfaction of warrants does not indicate that a signal must be installed. As noted in the Level of Service section above, all movements at this intersection are projected to operate at a satisfactory level of service as a stop-sign-controlled intersection based on the projected short-term total traffic volumes. The decision to require a signal to be installed at this location rests with El Paso County.

TRAFFIC SIGNAL ESCROW AMOUNTS

See comment
letter.

The Lorson Ranch Preliminary Plan TIS estimated a fair share contribution towards a future signal at the intersection of Marksheffel/Lorson; however, traffic generated by the lots within Lorson Ranch East Filing 2 are ~~not~~ projected to contribute to the westbound left-turn movement at this intersection. This filing should therefore not be required to contribute toward the signal.

ROADWAY CLASSIFICATIONS

As shown on Figure 9, all of the internal streets within Lorson Ranch East Filing 2 should be classified as either Urban Local (Low Volume) or Urban Local. This is consistent with the recommendations shown in Figure 15 of the Preliminary Plan TIS.

ROADWAY IMPROVEMENT FEE PROGRAM

This project will be required to participate in the El Paso County Road Improvement Fee Program. Lorson Ranch East Filing 2 will join the ten-mil PID. The ten-mil PID building permit fee portion associated with this option is \$923 per single-family dwelling unit. Based on 196 lots, the total building permit fee would be \$180,908.

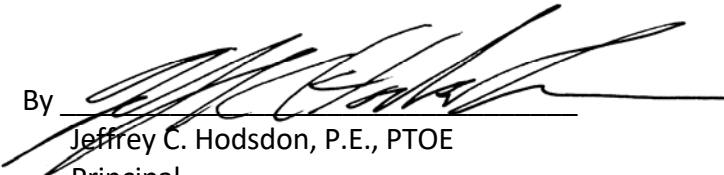
* * * * *

Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By



Jeffrey C. Hodsdon, P.E., PTOE
Principal

JCH:KDF:bjwb

Enclosures: Tables 2-3
Figures 1-9
Traffic Count Reports
Level of Service Reports

**Table 2
Lorson Ranch Subdivision Status
Relative to Dwelling Unit Cap**

| Subdivision | Plats Already Recorded OR Planned for Recording in the Short Term | Recorded Plats | Number of Building Permits Issued |
|----------------------------------|--|-----------------------|--|
| Townhomes | 46 | 46 | 46 |
| Pioneer Landing Filing #1 | 118 | 118 | 118 |
| Ponderosa Filings #1 & #2 | 204 | 204 | 204 |
| Allegiant | 97 | 97 | 97 |
| Meadows Filing #2 | 109 | 109 | 109 |
| Meadows Filing #1 | 97 | 97 | 97 |
| Meadows Filing #3 | 138 | 138 | 138 |
| Meadows Filing #4 | 236 | 236 | 234 |
| Buffalo Crossing | 204 | 204 | 204 |
| Pioneer Landing Filing #2 | 158 | 158 | 158 |
| Pioneer Landing Filing #3 | 12 | 12 | 2 |
| Subtotal | 1,419 | 1,419 | 1,407 |
| Lorson Ranch East Filing #1 | 303 | 0 | 0 |
| Lorson Ranch East Filing #2 | 196 | 0 | 0 |
| Total | 1,918 | 1,419 | 1,407 |
| Current Dwelling Unit Cap | | | 1,750 |

Source: LSC Transportation Consultants, Inc. 6/28/2019

**Table 3
Trip Generation Estimate
Lorson Ranch East Filing No. 2**

| Land Use Code | Land Use Description | Trip Generation Units | Trip Generation Rates ⁽¹⁾ | | | | | | Total Trips Generated | | | |
|---------------|--------------------------------|-----------------------|--------------------------------------|-------------------|------|---------------------|------|-------------------------|-----------------------|-----|---------------------|-----|
| | | | Average Weekday Traffic | Morning Peak Hour | | Afternoon Peak Hour | | Average Weekday Traffic | Morning Peak Hour | | Afternoon Peak Hour | |
| | | | | In | Out | In | Out | | In | Out | In | Out |
| 210 | Single-Family Detached Housing | 196 DU ⁽²⁾ | 9.44 | 0.19 | 0.56 | 0.62 | 0.37 | 1,850 | 36 | 109 | 122 | 72 |

Notes:

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

(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.

**Table 4
Lorson/Marksheffel Future Traffic Signal Contributions
Lorson Ranch East**

| Development | Westbound Left-Turn Volume | | | Signal Contribution | |
|---|----------------------------|------------|------------|---------------------|------------------|
| | AM | PM | AM+PM | % | \$ |
| Carriage Meadows South at Lorson Ranch Filing No. 1 | 65 | 43 | 108 | 38.4% | \$115,302 |
| Future Townhomes SE Carriage Meadows/Fontaine (Tract O) | 11 | 5 | 16 | 5.7% | \$17,082 |
| South Retail (Tract N) | 3 | 9 | 12 | 4.3% | \$12,811 |
| Lorson Ranch East Phase 1 | 53 | 35 | 88 | 31.3% | \$93,950 |
| Lorson Ranch East Future Phases | 34 | 23 | 57 | 20.3% | \$60,854 |
| | 166 | 115 | 281 | | \$300,000 |

Source: LSC Transportation Consultants, Inc.

$303/826=29%=>\$86,003$

$196/523 \times \$68,801 => \$25,784$



Approximate Scale
Scale: 1" = 3,000'

Figure 1
**Vicinity
Map**

Lorson Ranch East Filing 2 (LSC #184540)

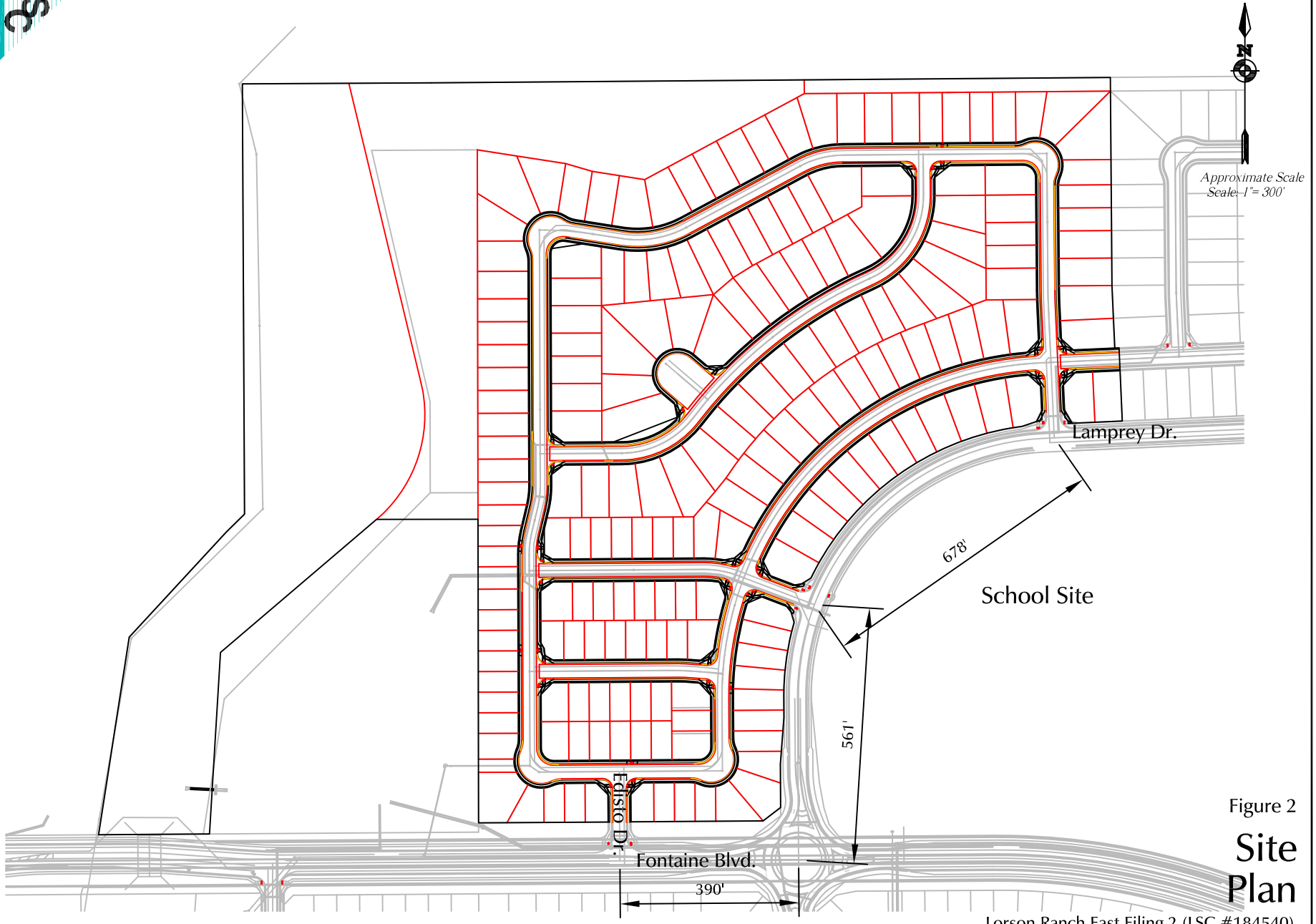
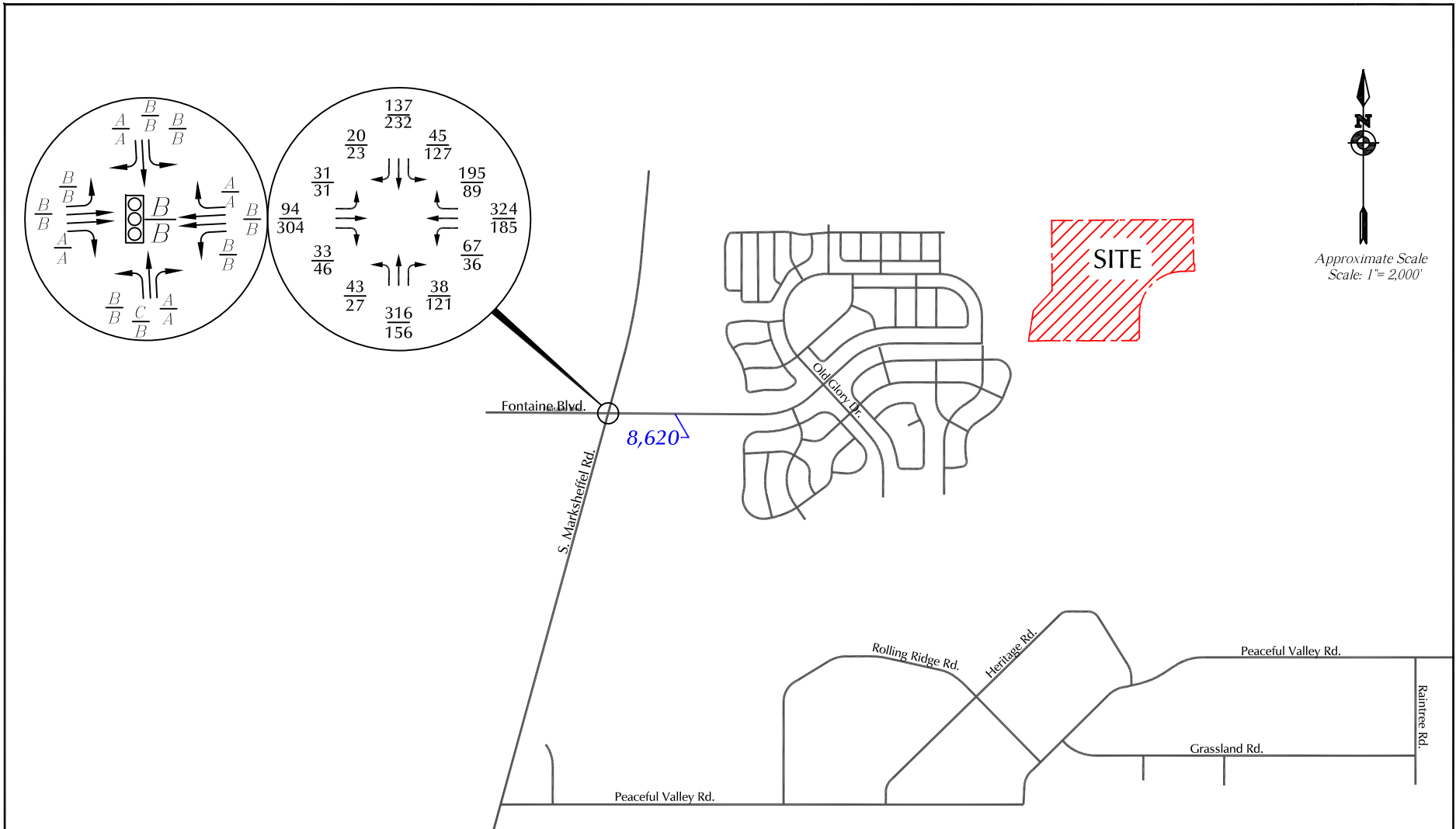


Figure 2
Site Plan



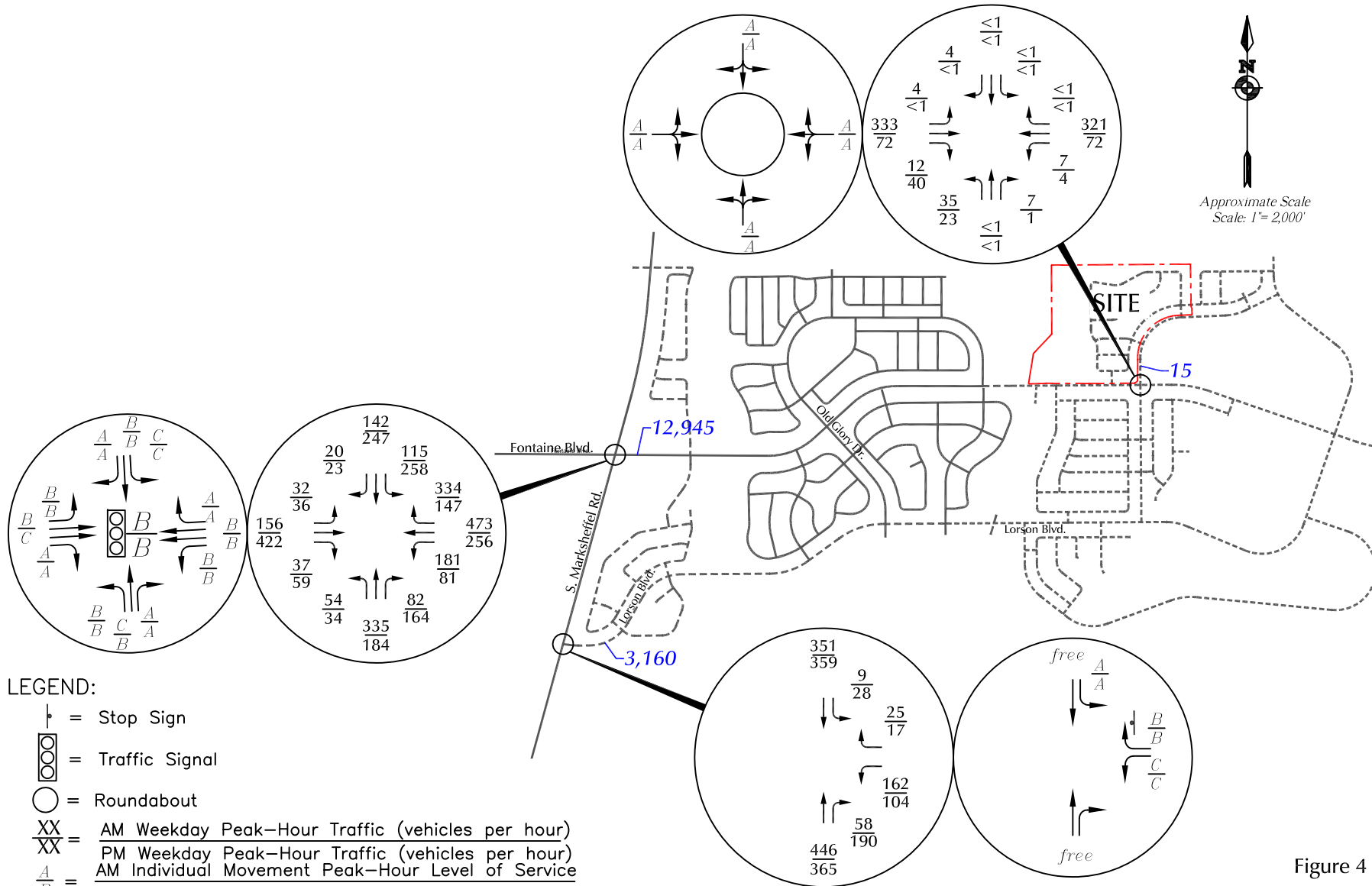
Approximate Scale
Scale: 1" = 2,000'

LEGEND:

$\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour) Based on counts by LSC March 2018
 $\frac{XX}{XX}$ = PM Weekday Peak-Hour Traffic (vehicles per hour)
 X,XXX = Average Weekday Traffic (vehicles per day)(Estimates by LSC)



Figure 3
Existing Traffic Volumes
 Lorson Ranch East Filing 2 (LSC #184540)



LEGEND:

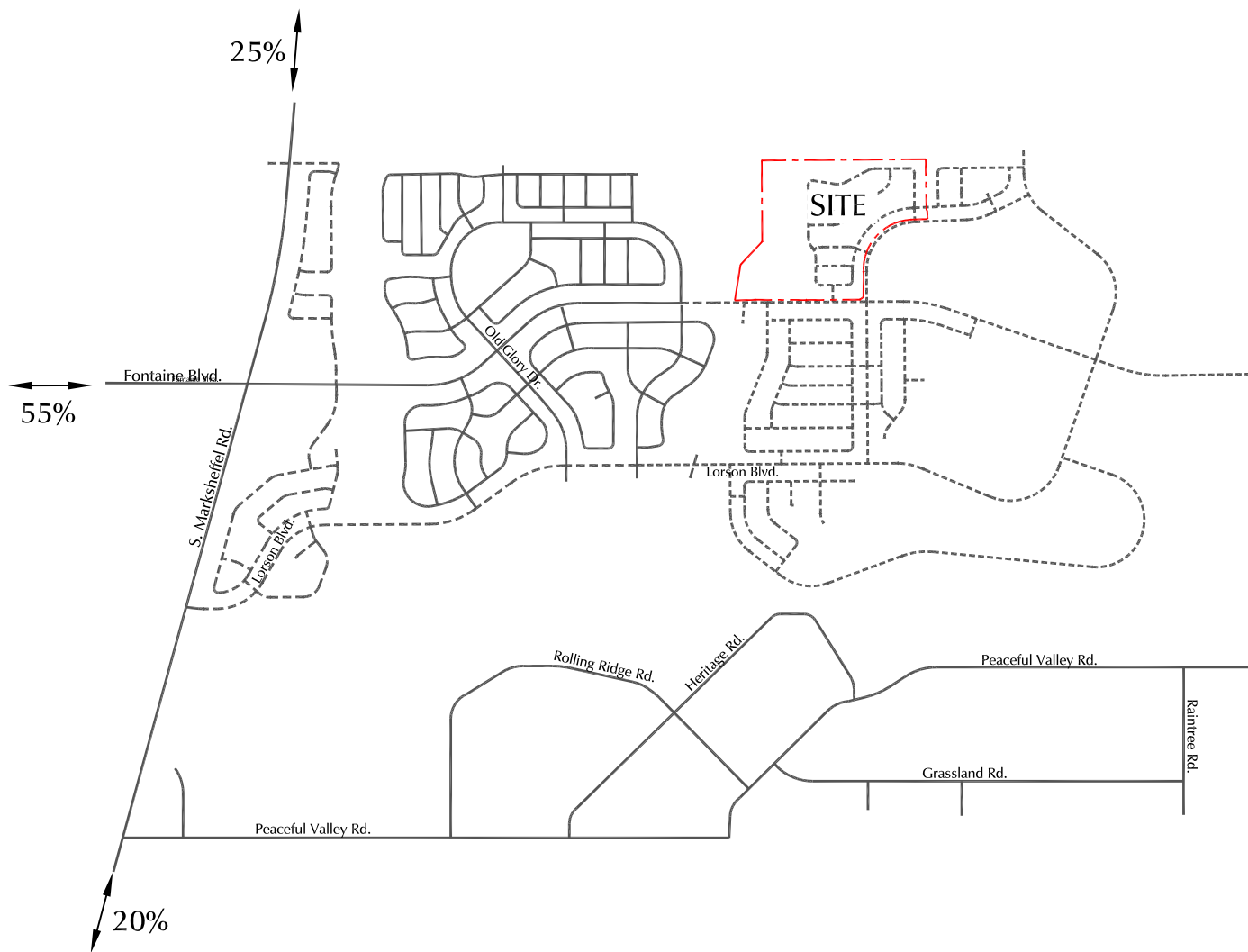
- = Stop Sign
- = Traffic Signal
- = Roundabout
- $\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour)
PM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
PM Individual Movement Peak-Hour Level of Service
- $\frac{C}{D}$ = AM Entire Intersection Peak-Hour Level of Service
PM Entire Intersection Peak-Hour Level of Service


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

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

Figure 4

Lorson Ranch East Filing 2 (LSC #184540)




 Approximate Scale
 Scale: 1" = 3,000'

LEGEND:



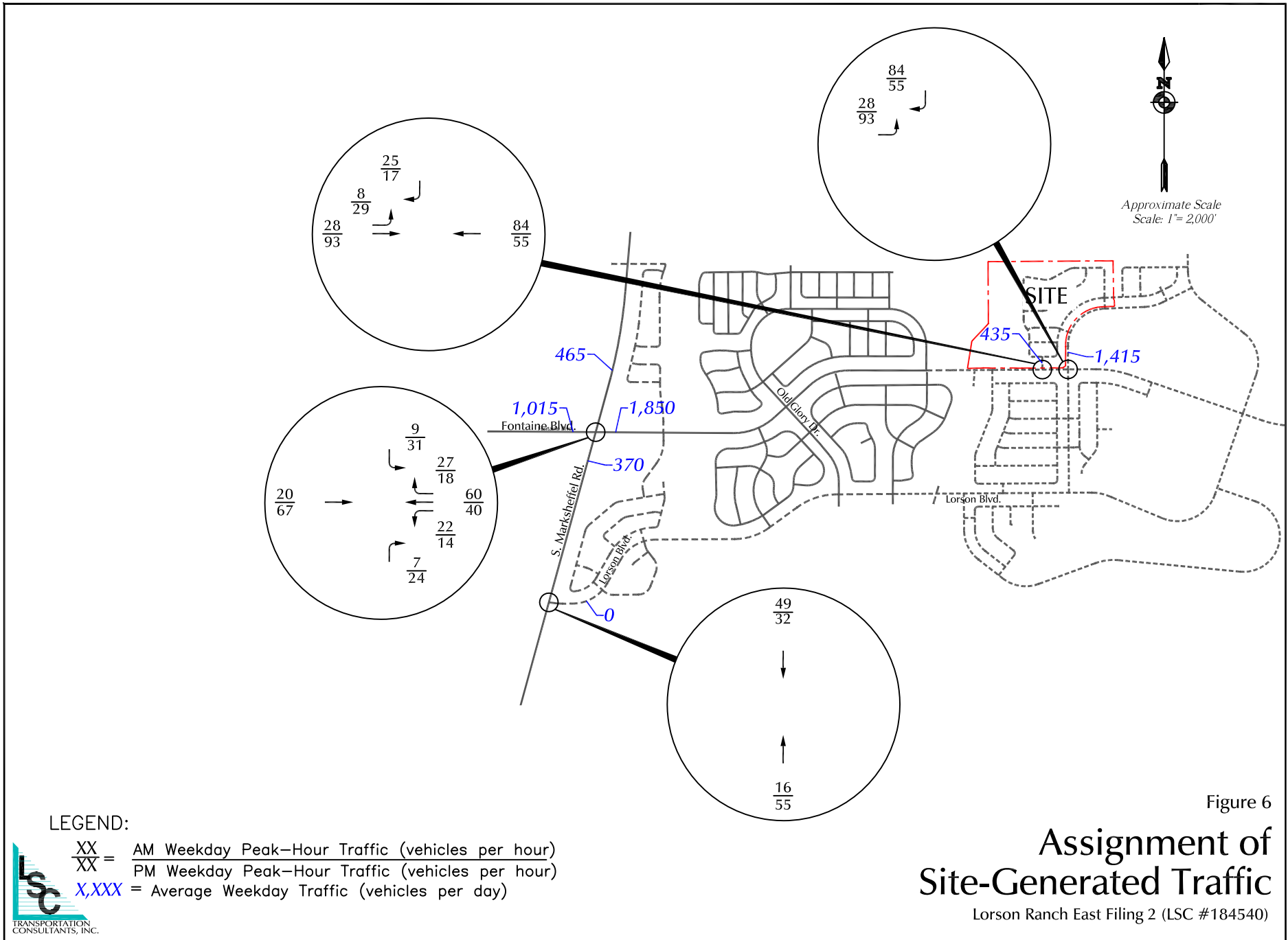
 35% = Percent Directional Distribution


Figure 5
**Directional Distribution
 of Site-Generated Traffic**
 Lorson Ranch East Filing 2 (LSC #184540)



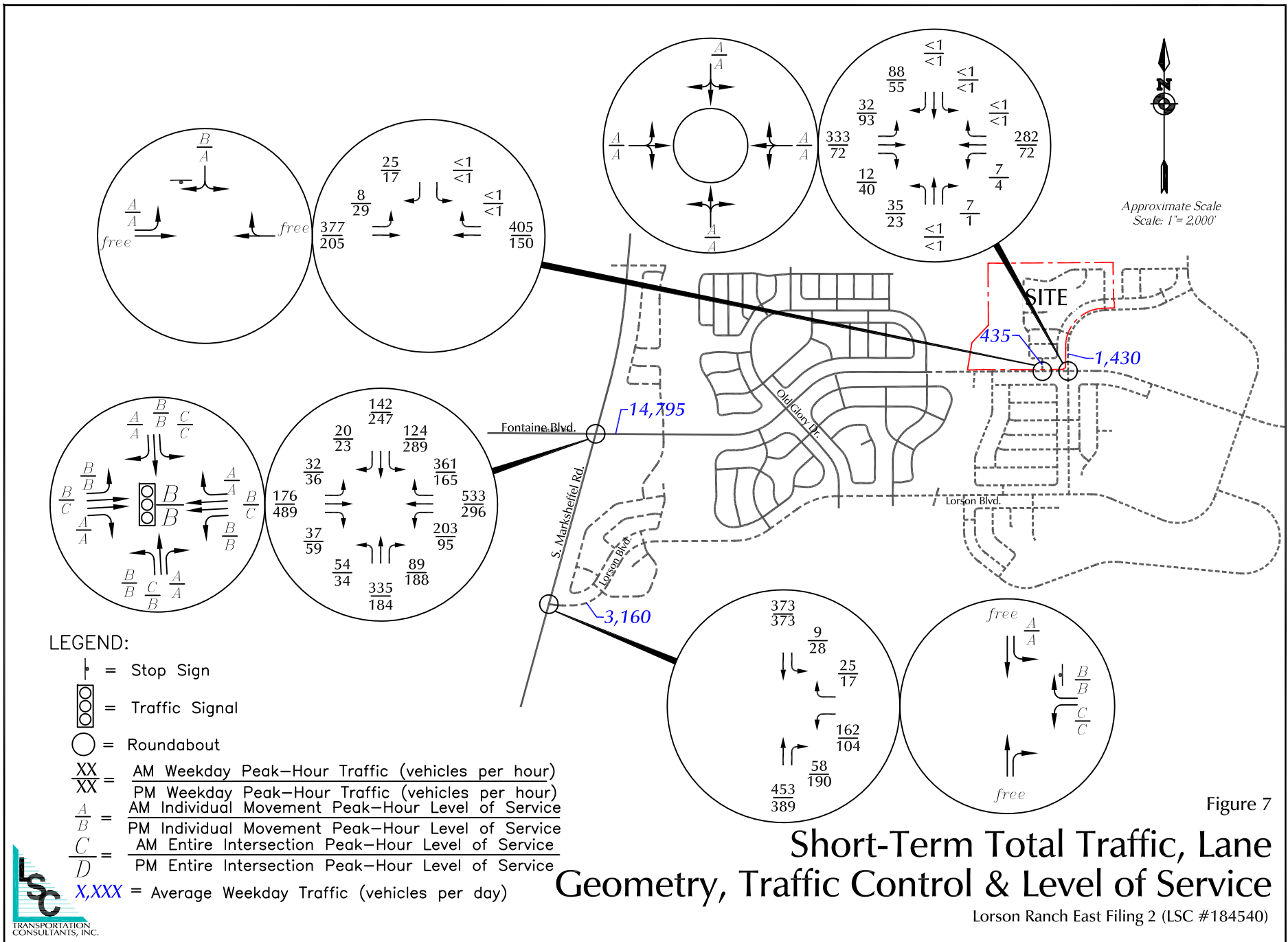
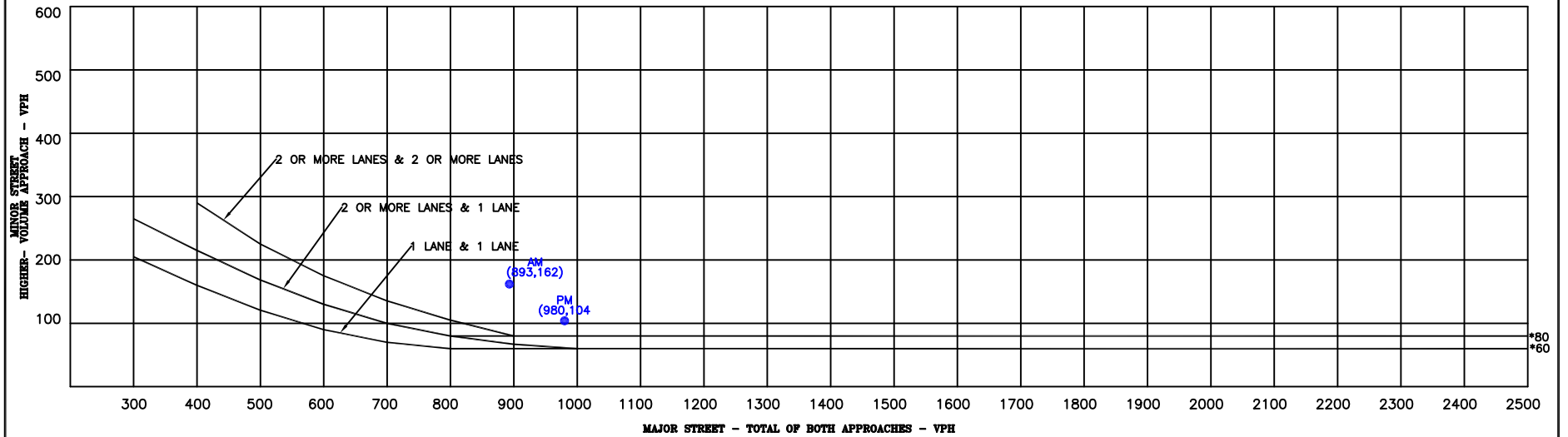


Figure 7

Figure 4C-2. Warrant 2 Four-Hour Vehicular Volume (70% Factor)
 (Community Less than 10,000 population or above 40 mph on Major Street)



* Note: 80 vph applies as the lower threshold volumes for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

● Short-Term Total Traffic

Figure 8

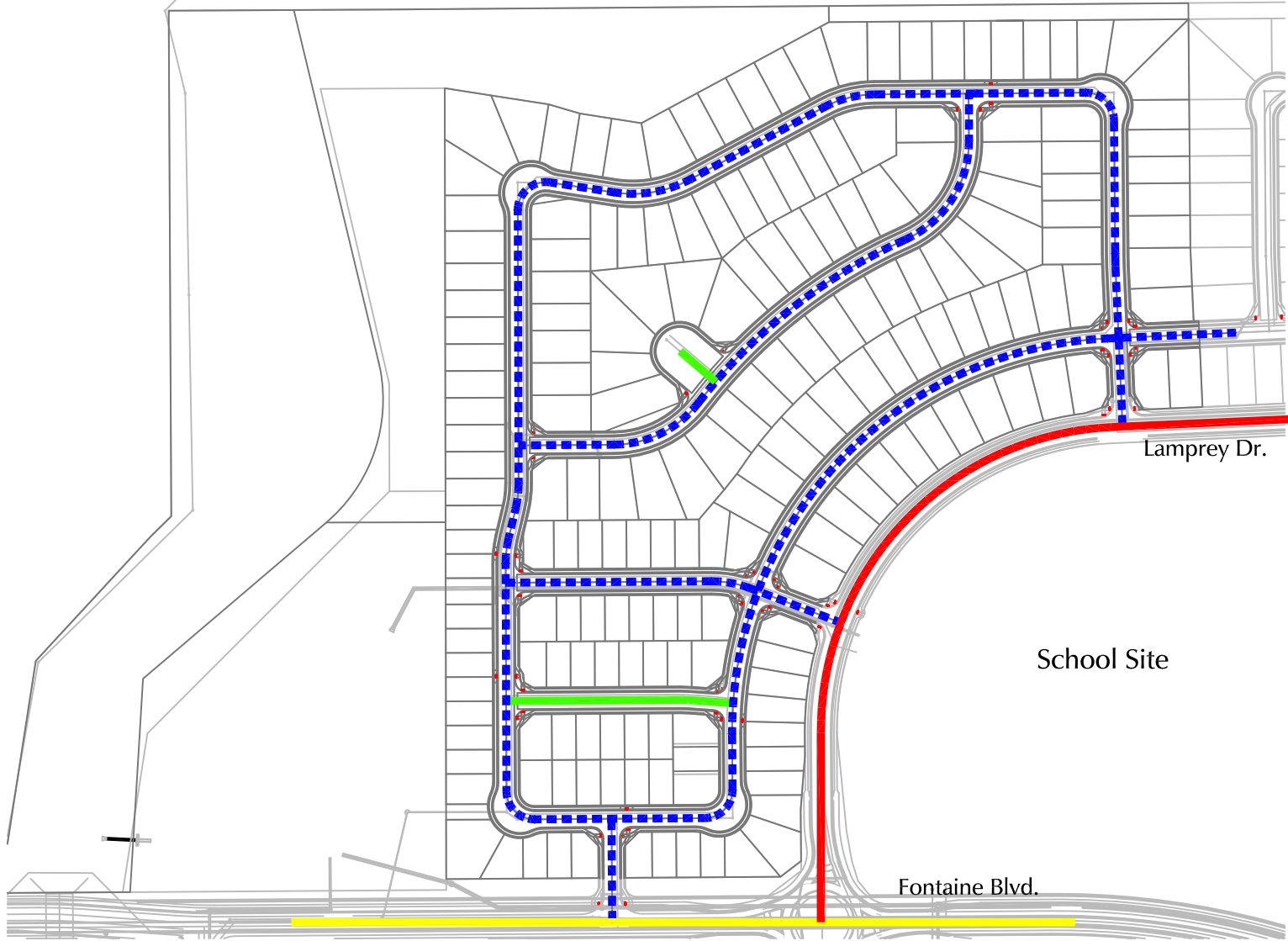
Signal Warrant Analysis Marksheffel/Lorson

Lorson Ranch East Filing 2 (LSC #184540)





Approximate Scale
Scale: 1" = 300'



LEGEND:

- = Four-Lane Principal Arterial
- = Four-Lane Principal Arterial (Ultimate Classification)
Interim/Lorson Ranch Buildout 2-Lane Urban Non-Residential Collector
Street in a 100-foot R.O.W.
- = Urban Local (Low Volume)
- - - = Urban Local
- = Urban Residential Collector (60' R.O.W.)

Figure 9

Recommended Classifications

Lorson Ranch East Filing 2 (LSC #184540)

COUNTER MEASURES INC.

1889 YORK STREET
DENVER, COLORADO
303-333-7409

File Name : Marksheffel Rd - Fontaine Blvd AM
Site Code : 00174850
Start Date : 3/1/2018
Page No : 1

N/S STREET:
E/W STREET:
CITY:
COUNTY:

Groups Printed- VEHICLES

| Start Time | Marksheffel Rd Southbound | | | | Fontaine Blvd Westbound | | | | Marksheffel Rd Northbound | | | | Fontaine Blvd Eastbound | | | | Int. Total |
|-------------|---------------------------|------|-------|------|-------------------------|------|-------|------|---------------------------|------|-------|------|-------------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 06:30 AM | 5 | 30 | 4 | 0 | 21 | 74 | 38 | 0 | 10 | 80 | 7 | 0 | 8 | 18 | 6 | 0 | 301 |
| 06:45 AM | 7 | 37 | 2 | 0 | 15 | 104 | 45 | 0 | 8 | 72 | 8 | 0 | 4 | 22 | 6 | 0 | 330 |
| Total | 12 | 67 | 6 | 0 | 36 | 178 | 83 | 0 | 18 | 152 | 15 | 0 | 12 | 40 | 12 | 0 | 631 |
| 07:00 AM | 9 | 28 | 4 | 0 | 20 | 86 | 65 | 0 | 12 | 96 | 11 | 0 | 15 | 18 | 8 | 0 | 372 |
| 07:15 AM | 14 | 32 | 7 | 0 | 12 | 84 | 45 | 0 | 9 | 74 | 11 | 0 | 5 | 29 | 12 | 0 | 334 |
| 07:30 AM | 15 | 40 | 7 | 0 | 20 | 50 | 40 | 0 | 14 | 74 | 8 | 0 | 7 | 25 | 7 | 0 | 307 |
| 07:45 AM | 14 | 20 | 2 | 0 | 13 | 59 | 25 | 0 | 5 | 42 | 12 | 0 | 7 | 38 | 5 | 0 | 242 |
| Total | 52 | 120 | 20 | 0 | 65 | 279 | 175 | 0 | 40 | 286 | 42 | 0 | 34 | 110 | 32 | 0 | 1255 |
| 08:00 AM | 13 | 37 | 2 | 0 | 20 | 93 | 38 | 0 | 8 | 53 | 10 | 0 | 6 | 32 | 3 | 0 | 315 |
| 08:15 AM | 6 | 34 | 4 | 0 | 18 | 96 | 23 | 0 | 12 | 39 | 6 | 0 | 5 | 22 | 9 | 0 | 274 |
| Grand Total | 83 | 258 | 32 | 0 | 139 | 646 | 319 | 0 | 78 | 530 | 73 | 0 | 57 | 204 | 56 | 0 | 2475 |
| Apprch % | 22.3 | 69.2 | 8.6 | 0.0 | 12.6 | 58.5 | 28.9 | 0.0 | 11.5 | 77.8 | 10.7 | 0.0 | 18.0 | 64.4 | 17.7 | 0.0 | |
| Total % | 3.4 | 10.4 | 1.3 | 0.0 | 5.6 | 26.1 | 12.9 | 0.0 | 3.2 | 21.4 | 2.9 | 0.0 | 2.3 | 8.2 | 2.3 | 0.0 | |

COUNTER MEASURES INC.

1889 YORK STREET
DENVER.COLORADO
303-333-7409

File Name : Marksheffel Rd - Fontaine Blvd PM
Site Code : 00174850
Start Date : 3/1/2018
Page No : 1

N/S STREET:
E/W STREET:
CITY:
COUNTY:

Groups Printed- VEHICLES

| Start Time | Marksheffel Rd Southbound | | | | Fontaine Blvd Westbound | | | | Marksheffel Rd Northbound | | | | Marksheffel Blvd Eastbound | | | | Int. Total |
|-------------|---------------------------|------|-------|------|-------------------------|------|-------|------|---------------------------|------|-------|------|----------------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| 04:00 PM | 31 | 70 | 8 | 0 | 5 | 35 | 16 | 0 | 4 | 46 | 19 | 0 | 11 | 68 | 12 | 0 | 325 |
| 04:15 PM | 42 | 74 | 11 | 0 | 4 | 40 | 19 | 0 | 4 | 51 | 21 | 0 | 10 | 77 | 10 | 0 | 363 |
| 04:30 PM | 35 | 59 | 12 | 0 | 8 | 45 | 20 | 0 | 11 | 46 | 23 | 0 | 10 | 70 | 14 | 0 | 353 |
| 04:45 PM | 30 | 67 | 15 | 0 | 6 | 34 | 14 | 0 | 4 | 35 | 34 | 0 | 13 | 72 | 8 | 0 | 332 |
| Total | 138 | 270 | 46 | 0 | 23 | 154 | 69 | 0 | 23 | 178 | 97 | 0 | 44 | 287 | 44 | 0 | 1373 |
| 05:00 PM | 27 | 54 | 8 | 0 | 6 | 40 | 22 | 0 | 4 | 37 | 35 | 0 | 6 | 54 | 18 | 0 | 311 |
| 05:15 PM | 30 | 60 | 4 | 0 | 8 | 44 | 22 | 0 | 7 | 42 | 26 | 0 | 12 | 76 | 12 | 0 | 343 |
| 05:30 PM | 33 | 65 | 6 | 0 | 9 | 42 | 25 | 0 | 9 | 41 | 23 | 0 | 4 | 103 | 10 | 0 | 370 |
| 05:45 PM | 37 | 53 | 5 | 0 | 13 | 59 | 20 | 0 | 7 | 36 | 37 | 0 | 9 | 71 | 6 | 0 | 353 |
| Total | 127 | 232 | 23 | 0 | 36 | 185 | 89 | 0 | 27 | 156 | 121 | 0 | 31 | 304 | 46 | 0 | 1377 |
| Grand Total | 265 | 502 | 69 | 0 | 59 | 339 | 158 | 0 | 50 | 334 | 218 | 0 | 75 | 591 | 90 | 0 | 2750 |
| Apprch % | 31.7 | 60.0 | 8.3 | 0.0 | 10.6 | 61.0 | 28.4 | 0.0 | 8.3 | 55.5 | 36.2 | 0.0 | 9.9 | 78.2 | 11.9 | 0.0 | |
| Total % | 9.6 | 18.3 | 2.5 | 0.0 | 2.1 | 12.3 | 5.7 | 0.0 | 1.8 | 12.1 | 7.9 | 0.0 | 2.7 | 21.5 | 3.3 | 0.0 | |

Timings

1: Marksheffel Rd & Fontaine Blvd

Existing Traffic

AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 31 | 94 | 33 | 67 | 324 | 195 | 43 | 316 | 38 | 45 | 137 | 20 |
| Future Volume (vph) | 31 | 94 | 33 | 67 | 324 | 195 | 43 | 316 | 38 | 45 | 137 | 20 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 24.4 | 20.2 | 20.2 | 27.0 | 24.9 | 24.9 | 21.8 | 21.8 | 21.8 | 21.8 | 21.8 | 21.8 |
| Actuated g/C Ratio | 0.37 | 0.31 | 0.31 | 0.41 | 0.38 | 0.38 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| v/c Ratio | 0.07 | 0.09 | 0.06 | 0.15 | 0.28 | 0.30 | 0.13 | 0.61 | 0.07 | 0.18 | 0.22 | 0.03 |
| Control Delay | 11.2 | 18.3 | 0.2 | 11.6 | 16.5 | 4.6 | 17.0 | 24.0 | 0.2 | 18.5 | 17.7 | 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 | 11.2 | 18.3 | 0.2 | 11.6 | 16.5 | 4.6 | 17.0 | 24.0 | 0.2 | 18.5 | 17.7 | 0.1 |
| LOS | B | B | A | B | B | A | B | C | A | B | B | A |
| Approach Delay | | 13.1 | | | 12.0 | | | 21.0 | | | 16.1 | |
| Approach LOS | | B | | | B | | | C | | | B | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 65.3

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 15.5

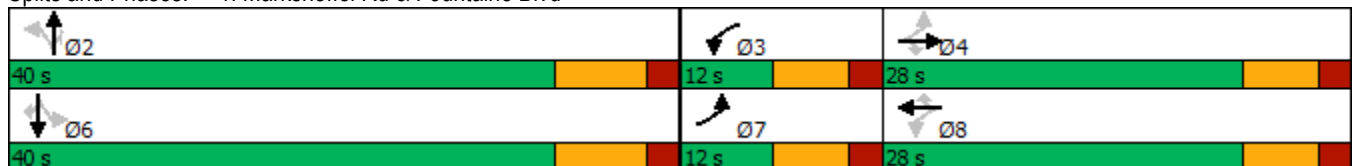
Intersection LOS: B

Intersection Capacity Utilization 74.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



Explain in the report how and why this has changed from the previous 2 reports.

Timings

1: Marksheffel Rd & Fontaine Blvd

Existing Traffic

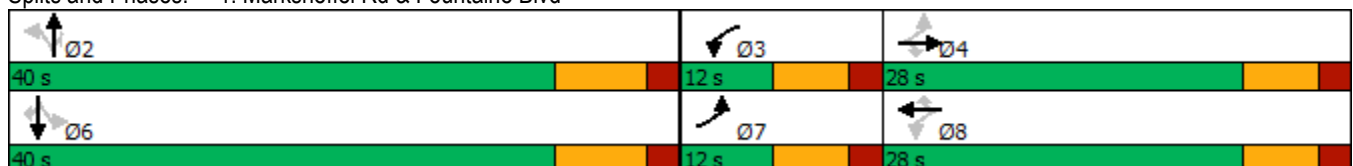
PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 31 | 304 | 46 | 36 | 185 | 89 | 27 | 156 | 121 | 127 | 232 | 23 |
| Future Volume (vph) | 31 | 304 | 46 | 36 | 185 | 89 | 27 | 156 | 121 | 127 | 232 | 23 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 22.2 | 20.2 | 20.2 | 22.2 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 | 20.2 |
| Actuated g/C Ratio | 0.38 | 0.34 | 0.34 | 0.38 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| v/c Ratio | 0.08 | 0.31 | 0.09 | 0.08 | 0.15 | 0.14 | 0.07 | 0.24 | 0.19 | 0.33 | 0.39 | 0.04 |
| Control Delay | 10.1 | 16.2 | 0.3 | 10.2 | 15.2 | 1.5 | 16.1 | 16.8 | 4.0 | 18.9 | 18.4 | 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 | 10.1 | 16.2 | 0.3 | 10.2 | 15.2 | 1.5 | 16.1 | 16.8 | 4.0 | 18.9 | 18.4 | 0.1 |
| LOS | B | B | A | B | B | A | B | B | A | B | B | A |
| Approach Delay | | 13.8 | | | 10.7 | | | 11.6 | | | 17.5 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 58.8
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.39
 Intersection Signal Delay: 13.7
 Intersection LOS: B
 Intersection Capacity Utilization 77.5%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



Explain in the report how and why this has changed from the previous 2 reports.

Timings

Short-Term Background Traffic

1: Marksheffel Rd & Fontaine Blvd

AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 32 | 156 | 37 | 181 | 473 | 334 | 54 | 335 | 82 | 115 | 142 | 20 |
| Future Volume (vph) | 32 | 156 | 37 | 181 | 473 | 334 | 54 | 335 | 82 | 115 | 142 | 20 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 26.0 | 20.5 | 20.5 | 30.1 | 28.1 | 28.1 | 22.6 | 22.6 | 22.6 | 22.6 | 22.6 | 22.6 |
| Actuated g/C Ratio | 0.38 | 0.30 | 0.30 | 0.43 | 0.41 | 0.41 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| v/c Ratio | 0.09 | 0.16 | 0.07 | 0.41 | 0.38 | 0.45 | 0.16 | 0.67 | 0.16 | 0.57 | 0.25 | 0.04 |
| Control Delay | 12.0 | 19.3 | 0.2 | 15.9 | 17.8 | 4.7 | 17.5 | 26.0 | 2.1 | 31.0 | 18.2 | 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 | 12.0 | 19.3 | 0.2 | 15.9 | 17.8 | 4.7 | 17.5 | 26.0 | 2.1 | 31.0 | 18.2 | 0.1 |
| LOS | B | B | A | B | B | A | B | C | A | C | B | A |
| Approach Delay | | 15.1 | | | 13.0 | | | 20.9 | | | 22.2 | |
| Approach LOS | | B | | | B | | | C | | | C | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.2

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.4

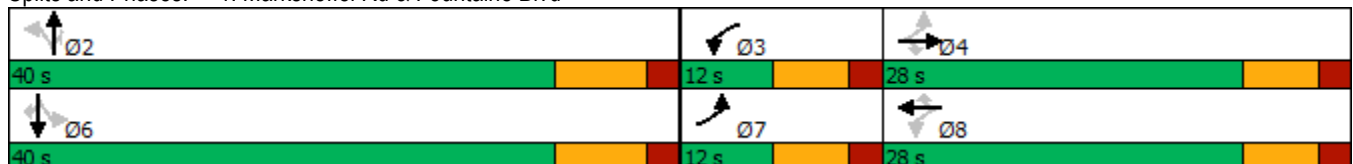
Intersection LOS: B

Intersection Capacity Utilization 84.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.3 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 162 | 25 | 446 | 58 | 9 | 351 |
| Future Vol, veh/h | 162 | 25 | 446 | 58 | 9 | 351 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | - | 250 | 250 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 15 |
| Peak Hour Factor | 92 | 92 | 83 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 176 | 27 | 537 | 63 | 10 | 382 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 939 | 537 | 0 | 0 | 600 |
| Stage 1 | 537 | - | - | - | - |
| Stage 2 | 402 | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | - | - | 4.12 |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | - | - | 2.218 |
| Pot Cap-1 Maneuver | 293 | 544 | - | - | 977 |
| Stage 1 | 586 | - | - | - | - |
| Stage 2 | 676 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 290 | 544 | - | - | 977 |
| Mov Cap-2 Maneuver | 414 | - | - | - | - |
| Stage 1 | 580 | - | - | - | - |
| Stage 2 | 676 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 18.9 | 0 | 0.2 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|------|------|
| Capacity (veh/h) | - | - | 414 | 544 | 977 |
| HCM Lane V/C Ratio | - | - | 0.425 | 0.05 | 0.01 |
| HCM Control Delay (s) | - | - | 20 | 12 | 8.7 |
| HCM Lane LOS | - | - | C | B | A |
| HCM 95th %tile Q(veh) | - | - | 2.1 | 0.2 | 0 |

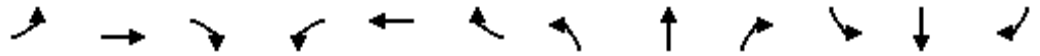
| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 5.5 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 461 | 362 | 46 | 4 |
| Demand Flow Rate, veh/h | 470 | 369 | 47 | 4 |
| Vehicles Circulating, veh/h | 9 | 42 | 457 | 407 |
| Vehicles Exiting, veh/h | 402 | 462 | 22 | 4 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 5.8 | 5.2 | 4.8 | 4.0 |
| Approach LOS | A | A | A | A |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 470 | 369 | 47 | 4 |
| Cap Entry Lane, veh/h | 1367 | 1322 | 866 | 911 |
| Entry HV Adj Factor | 0.981 | 0.981 | 0.979 | 1.000 |
| Flow Entry, veh/h | 461 | 362 | 46 | 4 |
| Cap Entry, veh/h | 1341 | 1297 | 847 | 911 |
| V/C Ratio | 0.344 | 0.279 | 0.054 | 0.004 |
| Control Delay, s/veh | 5.8 | 5.2 | 4.8 | 4.0 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 2 | 1 | 0 | 0 |

Timings

Short-Term Background Traffic

1: Marksheffel Rd & Fontaine Blvd

PM Peak Hour



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖ | ↗ | ↘ | ↖ | ↗ | ↘ | ↖ | ↗ | ↘ | ↖ | ↗ | ↘ |
| Traffic Volume (vph) | 36 | 422 | 59 | 81 | 256 | 147 | 34 | 184 | 164 | 258 | 247 | 23 |
| Future Volume (vph) | 36 | 422 | 59 | 81 | 256 | 147 | 34 | 184 | 164 | 258 | 247 | 23 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 24.8 | 20.6 | 20.6 | 26.1 | 23.0 | 23.0 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 |
| Actuated g/C Ratio | 0.37 | 0.30 | 0.30 | 0.39 | 0.34 | 0.34 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 |
| v/c Ratio | 0.10 | 0.48 | 0.12 | 0.24 | 0.23 | 0.25 | 0.10 | 0.31 | 0.27 | 0.68 | 0.41 | 0.04 |
| Control Delay | 12.9 | 22.7 | 0.4 | 14.1 | 19.1 | 5.4 | 16.2 | 18.1 | 3.9 | 29.0 | 19.5 | 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 | 12.9 | 22.7 | 0.4 | 14.1 | 19.1 | 5.4 | 16.2 | 18.1 | 3.9 | 29.0 | 19.5 | 0.1 |
| LOS | B | C | A | B | B | A | B | B | A | C | B | A |
| Approach Delay | | 19.5 | | | 14.1 | | | 11.8 | | | 23.3 | |
| Approach LOS | | B | | | B | | | B | | | C | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 67.7

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 17.7

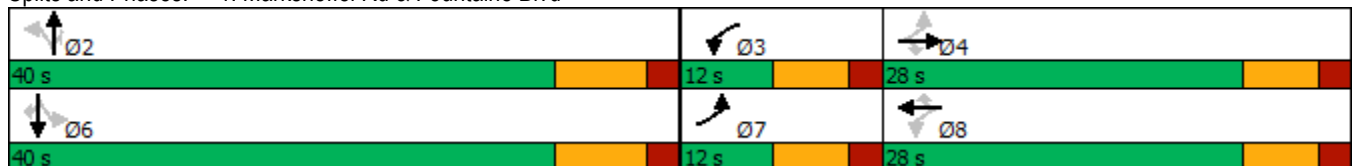
Intersection LOS: B

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 104 | 17 | 365 | 190 | 28 | 359 |
| Future Vol, veh/h | 104 | 17 | 365 | 190 | 28 | 359 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | - | 250 | 250 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 15 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 113 | 18 | 397 | 207 | 30 | 390 |

| Major/Minor | Minor1 | Major1 | Major2 | | | |
|----------------------|--------|--------|--------|---|-------|---|
| Conflicting Flow All | 847 | 397 | 0 | 0 | 604 | 0 |
| Stage 1 | 397 | - | - | - | - | - |
| Stage 2 | 450 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | - | - | 4.12 | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | - | - | 2.218 | - |
| Pot Cap-1 Maneuver | 332 | 652 | - | - | 974 | - |
| Stage 1 | 679 | - | - | - | - | - |
| Stage 2 | 642 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | |
| Mov Cap-1 Maneuver | 322 | 652 | - | - | 974 | - |
| Mov Cap-2 Maneuver | 436 | - | - | - | - | - |
| Stage 1 | 658 | - | - | - | - | - |
| Stage 2 | 642 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 15.3 | 0 | 0.6 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 436 | 652 | 974 |
| HCM Lane V/C Ratio | - | - | 0.259 | 0.028 | 0.031 |
| HCM Control Delay (s) | - | - | 16.1 | 10.7 | 8.8 |
| HCM Lane LOS | - | - | C | B | A |
| HCM 95th %tile Q(veh) | - | - | 1 | 0.1 | 0.1 |

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 3.3 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 121 | 82 | 26 | 0 |
| Demand Flow Rate, veh/h | 124 | 84 | 27 | 0 |
| Vehicles Circulating, veh/h | 4 | 25 | 80 | 109 |
| Vehicles Exiting, veh/h | 105 | 81 | 48 | 0 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 3.4 | 3.2 | 3.1 | 0.0 |
| Approach LOS | A | A | A | - |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 124 | 84 | 27 | 0 |
| Cap Entry Lane, veh/h | 1374 | 1345 | 1272 | 1235 |
| Entry HV Adj Factor | 0.979 | 0.981 | 0.963 | 1.000 |
| Flow Entry, veh/h | 121 | 82 | 26 | 0 |
| Cap Entry, veh/h | 1346 | 1320 | 1225 | 1235 |
| V/C Ratio | 0.090 | 0.062 | 0.021 | 0.000 |
| Control Delay, s/veh | 3.4 | 3.2 | 3.1 | 2.9 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 0 | 0 | 0 | 0 |

Timings

1: Marksheffel Rd & Fontaine Blvd

Short-Term Total Traffic

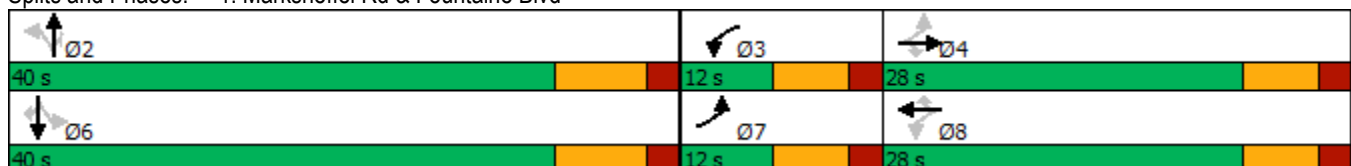
AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 32 | 176 | 37 | 203 | 533 | 361 | 54 | 335 | 89 | 124 | 142 | 20 |
| Future Volume (vph) | 32 | 176 | 37 | 203 | 533 | 361 | 54 | 335 | 89 | 124 | 142 | 20 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 26.2 | 20.6 | 20.6 | 30.3 | 28.2 | 28.2 | 22.6 | 22.6 | 22.6 | 22.6 | 22.6 | 22.6 |
| Actuated g/C Ratio | 0.38 | 0.30 | 0.30 | 0.44 | 0.41 | 0.41 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| v/c Ratio | 0.09 | 0.18 | 0.07 | 0.46 | 0.43 | 0.48 | 0.16 | 0.67 | 0.18 | 0.62 | 0.25 | 0.04 |
| Control Delay | 12.0 | 19.4 | 0.2 | 17.1 | 18.3 | 5.8 | 17.6 | 26.2 | 2.7 | 34.0 | 18.2 | 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 | 12.0 | 19.4 | 0.2 | 17.1 | 18.3 | 5.8 | 17.6 | 26.2 | 2.7 | 34.0 | 18.2 | 0.1 |
| LOS | B | B | A | B | B | A | B | C | A | C | B | A |
| Approach Delay | | 15.5 | | | 13.9 | | | 20.8 | | | 23.8 | |
| Approach LOS | | B | | | B | | | C | | | C | |

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 69.3
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 17.0
 Intersection LOS: B
 Intersection Capacity Utilization 85.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



HCM 6th TWSC
5: Marksheffel Rd & Lorson Blvd

Higher than
Filing 1 report

Short-Term Total Traffic
AM Peak Hour

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.3 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↖ | ↗ | ↑ | ↖ | ↗ | ↑ |
| Traffic Vol, veh/h | 162 | 25 | 453 | 58 | 9 | 373 |
| Future Vol, veh/h | 162 | 25 | 453 | 58 | 9 | 373 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | - | 250 | 250 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 15 |
| Peak Hour Factor | 92 | 92 | 83 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 176 | 27 | 546 | 63 | 10 | 405 |

| Major/Minor | Minor1 | Major1 | Major2 | | | |
|----------------------|--------|--------|--------|---|-------|---|
| Conflicting Flow All | 971 | 546 | 0 | 0 | 609 | 0 |
| Stage 1 | 546 | - | - | - | - | - |
| Stage 2 | 425 | - | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | - | - | 4.12 | - |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | - | - | 2.218 | - |
| Pot Cap-1 Maneuver | 280 | 538 | - | - | 970 | - |
| Stage 1 | 580 | - | - | - | - | - |
| Stage 2 | 659 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | |
| Mov Cap-1 Maneuver | 277 | 538 | - | - | 970 | - |
| Mov Cap-2 Maneuver | 404 | - | - | - | - | - |
| Stage 1 | 574 | - | - | - | - | - |
| Stage 2 | 659 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 19.5 | 0 | 0.2 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|------|-----|
| Capacity (veh/h) | - | - | 404 | 538 | 970 | - |
| HCM Lane V/C Ratio | - | - | 0.436 | 0.051 | 0.01 | - |
| HCM Control Delay (s) | - | - | 20.6 | 12 | 8.7 | - |
| HCM Lane LOS | - | - | C | B | A | - |
| HCM 95th %tile Q(veh) | - | - | 2.2 | 0.2 | 0 | - |

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 5.7 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 491 | 362 | 46 | 94 |
| Demand Flow Rate, veh/h | 501 | 369 | 47 | 96 |
| Vehicles Circulating, veh/h | 9 | 73 | 488 | 407 |
| Vehicles Exiting, veh/h | 494 | 462 | 22 | 35 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 6.1 | 5.5 | 4.9 | 5.0 |
| Approach LOS | A | A | A | A |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 501 | 369 | 47 | 96 |
| Cap Entry Lane, veh/h | 1367 | 1281 | 839 | 911 |
| Entry HV Adj Factor | 0.980 | 0.981 | 0.979 | 0.979 |
| Flow Entry, veh/h | 491 | 362 | 46 | 94 |
| Cap Entry, veh/h | 1340 | 1256 | 821 | 892 |
| V/C Ratio | 0.366 | 0.288 | 0.056 | 0.105 |
| Control Delay, s/veh | 6.1 | 5.5 | 4.9 | 5.0 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 2 | 1 | 0 | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↙ | ↑ | ↘ | | ↙ | |
| Traffic Vol, veh/h | 8 | 377 | 405 | 0 | 0 | 25 |
| Future Vol, veh/h | 8 | 377 | 405 | 0 | 0 | 25 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 275 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 75 | 75 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 503 | 540 | 0 | 0 | 27 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 540 | 0 | - | 0 | 1061 540 |
| Stage 1 | - | - | - | - | 540 - |
| Stage 2 | - | - | - | - | 521 - |
| 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 | 1028 | - | - | - | 248 542 |
| Stage 1 | - | - | - | - | 584 - |
| Stage 2 | - | - | - | - | 596 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1028 | - | - | - | 246 542 |
| Mov Cap-2 Maneuver | - | - | - | - | 246 - |
| Stage 1 | - | - | - | - | 579 - |
| Stage 2 | - | - | - | - | 596 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 0.1 | 0 | 12 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1028 | - | - | - | 542 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.05 |
| HCM Control Delay (s) | 8.5 | - | - | - | 12 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

Timings

1: Marksheffel Rd & Fontaine Blvd

Short-Term Total Traffic

PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 36 | 489 | 59 | 95 | 296 | 165 | 34 | 184 | 188 | 289 | 247 | 23 |
| Future Volume (vph) | 36 | 489 | 59 | 95 | 296 | 165 | 34 | 184 | 188 | 289 | 247 | 23 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 20.0 | 20.0 | 5.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| Minimum Split (s) | 11.5 | 26.5 | 26.5 | 11.5 | 26.5 | 26.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Total Split (s) | 12.0 | 28.0 | 28.0 | 12.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| Total Split (%) | 15.0% | 35.0% | 35.0% | 15.0% | 35.0% | 35.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Lead/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 | None | None | None | None | None |
| Act Effct Green (s) | 25.1 | 20.9 | 20.9 | 26.5 | 23.5 | 23.5 | 25.2 | 25.2 | 25.2 | 25.2 | 25.2 | 25.2 |
| Actuated g/C Ratio | 0.36 | 0.30 | 0.30 | 0.38 | 0.34 | 0.34 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| v/c Ratio | 0.10 | 0.57 | 0.13 | 0.32 | 0.27 | 0.27 | 0.10 | 0.30 | 0.29 | 0.74 | 0.40 | 0.04 |
| Control Delay | 13.6 | 24.7 | 0.4 | 15.9 | 20.1 | 5.3 | 16.0 | 17.8 | 3.8 | 31.8 | 19.1 | 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 | 13.6 | 24.7 | 0.4 | 15.9 | 20.1 | 5.3 | 16.0 | 17.8 | 3.8 | 31.8 | 19.1 | 0.1 |
| LOS | B | C | A | B | C | A | B | B | A | C | B | A |
| Approach Delay | | 21.5 | | | 15.0 | | | 11.1 | | | 24.9 | |
| Approach LOS | | C | | | B | | | B | | | C | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 18.8

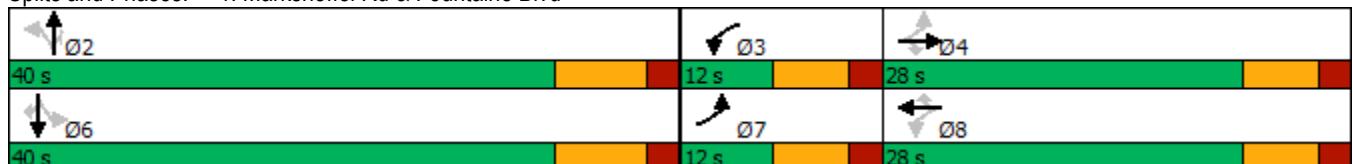
Intersection LOS: B

Intersection Capacity Utilization 78.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Marksheffel Rd & Fontaine Blvd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑ | ↗ | ↘ | ↑ |
| Traffic Vol, veh/h | 104 | 17 | 389 | 190 | 28 | 373 |
| Future Vol, veh/h | 104 | 17 | 389 | 190 | 28 | 373 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | - | 250 | 250 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 15 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 113 | 18 | 423 | 207 | 30 | 405 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 888 | 423 | 0 | 0 | 630 |
| Stage 1 | 423 | - | - | - | - |
| Stage 2 | 465 | - | - | - | - |
| Critical Hdwy | 6.42 | 6.22 | - | - | 4.12 |
| Critical Hdwy Stg 1 | 5.42 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.42 | - | - | - | - |
| Follow-up Hdwy | 3.518 | 3.318 | - | - | 2.218 |
| Pot Cap-1 Maneuver | 314 | 631 | - | - | 952 |
| Stage 1 | 661 | - | - | - | - |
| Stage 2 | 632 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 304 | 631 | - | - | 952 |
| Mov Cap-2 Maneuver | 422 | - | - | - | - |
| Stage 1 | 640 | - | - | - | - |
| Stage 2 | 632 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 15.8 | 0 | 0.6 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 422 | 631 | 952 |
| HCM Lane V/C Ratio | - | - | 0.268 | 0.029 | 0.032 |
| HCM Control Delay (s) | - | - | 16.6 | 10.9 | 8.9 |
| HCM Lane LOS | - | - | C | B | A |
| HCM 95th %tile Q(veh) | - | - | 1.1 | 0.1 | 0.1 |

| Intersection | | | | |
|-----------------------------|-------|-------|-------|-------|
| Intersection Delay, s/veh | 3.8 | | | |
| Intersection LOS | A | | | |
| Approach | EB | WB | NB | SB |
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 222 | 82 | 26 | 60 |
| Demand Flow Rate, veh/h | 227 | 84 | 27 | 61 |
| Vehicles Circulating, veh/h | 4 | 128 | 183 | 109 |
| Vehicles Exiting, veh/h | 166 | 81 | 48 | 103 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 4.0 | 3.6 | 3.5 | 3.4 |
| Approach LOS | A | A | A | A |
| Lane | Left | Left | Left | Left |
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Follow-Up Headway, s | 2.609 | 2.609 | 2.609 | 2.609 |
| Critical Headway, s | 4.976 | 4.976 | 4.976 | 4.976 |
| Entry Flow, veh/h | 227 | 84 | 27 | 61 |
| Cap Entry Lane, veh/h | 1374 | 1211 | 1145 | 1235 |
| Entry HV Adj Factor | 0.980 | 0.981 | 0.963 | 0.984 |
| Flow Entry, veh/h | 222 | 82 | 26 | 60 |
| Cap Entry, veh/h | 1347 | 1188 | 1103 | 1214 |
| V/C Ratio | 0.165 | 0.069 | 0.024 | 0.049 |
| Control Delay, s/veh | 4.0 | 3.6 | 3.5 | 3.4 |
| LOS | A | A | A | A |
| 95th %tile Queue, veh | 1 | 0 | 0 | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.9 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 29 | 205 | 150 | 0 | 0 | 17 |
| Future Vol, veh/h | 29 | 205 | 150 | 0 | 0 | 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 | 275 | - | - | - | 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 | 32 | 223 | 163 | 0 | 0 | 18 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 163 | 0 | - | 0 | 450 163 |
| Stage 1 | - | - | - | - | 163 - |
| Stage 2 | - | - | - | - | 287 - |
| 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 | 1416 | - | - | - | 567 882 |
| Stage 1 | - | - | - | - | 866 - |
| Stage 2 | - | - | - | - | 762 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1416 | - | - | - | 554 882 |
| Mov Cap-2 Maneuver | - | - | - | - | 554 - |
| Stage 1 | - | - | - | - | 846 - |
| Stage 2 | - | - | - | - | 762 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 0.9 | 0 | 9.2 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1416 | - | - | - | 882 |
| HCM Lane V/C Ratio | 0.022 | - | - | - | 0.021 |
| HCM Control Delay (s) | 7.6 | - | - | - | 9.2 |
| HCM Lane LOS | A | - | - | - | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |