See comment letter.

LSC TRANSPORTATION CONSULTANTS, INC.
545 East Pikes Peak Avenue, Suite 210
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Lorson Ranch Sketch Plan Amendment 2
Traffic Impact and Access Analysis
(LSC #184890)
December 17, 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 12/16/18

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December 17, 2018

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

RE: Lorson Ranch Sketch Plan Amendment 2
El Paso County, Colorado
Traffic Impact and Access Analysis
LSC #184890

Dear Mr. Mark:

LSC Transportation Consultants, Inc. has prepared this traffic impact analysis for the currently proposed amendment to the Lorson Ranch Sketch Plan. Lorson Ranch is located east of the intersection of Marksheffel Road and Fountain Boulevard in El Paso County, Colorado. The site location is shown on Figure 1.

LSC prepared a Traffic Technical Memorandum for Lorson Ranch dated April 15, 2016. Since completion of that report LSC has prepared several traffic impact studies and transportation memorandums for developments within Lorson Ranch. These reports include:

- *Carriage Meadows South at Lorson Ranch Filing No 1 Updated Traffic Impact and Access Analysis*, August 14, 2017
- *Lorson Ranch East Updated Traffic Impact and Access Analysis,* November 9, 2017 (Revised January 8, 2018)
    - *Lorson Ranch East Filing No 1 Transportation Memorandum,* May 2, 2018
    - *Lorson Ranch East Filing No 2 Transportation Memorandum*, September 24, 2018
- *Carriage Meadows North at Lorson Ranch Filing No 1 Updated Traffic Impact Analysis*, January 29, 2018
- *Lorson Ranch PK-8 School Traffic Impact and Access Analysis,* March 11, 2018
- *Creekside at Lorson Ranch Filing No 1 Traffic Impact and Access Analysis*, October 25, 2018

REPORT CONTENTS

This report contains the following:

- $ Recent/current street and traffic conditions in the vicinity of the site and the recent reports completed by LSC for Lorson Ranch for identification of existing and planned 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 2040 background traffic volumes.
- $ The projected average weekday and peak-hour vehicle trips to be generated by all of the existing and planned future land uses within Lorson Ranch and a comparison to the estimate assumed in the 2016 Sketch Plan report.
- $ The assignment of the projected trips to the existing and planned street system.
- $ The resulting 2040 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/Fontaine Boulevard and Marksheffel Road/Lorson Boulevard.
- $ Recommendations for street functional classification and traffic controls for the key street segments and intersections in the vicinity of the site.

SITE DEVELOPMENT AND LAND USE

The sketch plan area is shown in Figure 1. At buildout, the Lorson Ranch Sketch Plan is approved for up to 6,500 residential dwelling units and up to 70 acres of commercial land use. With this amendment, these would still apply. The purpose of the Lorson Ranch Sketch Plan Amendment No. 2 is to revise and increase the existing approved land use designations on several of the remaining undeveloped areas within Lorson Ranch to increase the permitted density, most notably in the far eastern portions of the Lorson Ranch development. The total number of dwelling units is not planned to be changed, however, this amendment will allow for smaller single-family units such as patio homes, cluster homes, courtyard homes, and duplexes and more multifamily dwelling units such as townhomes and apartments. The proposed Sketch Plan Amendment 2 is attached.

LAND USES ASSUMED IN THE TRAFFIC ANALYSIS

Table 1 shows the land use assumptions assumed in this report and a comparison to the land uses assumed in the *Lorson Ranch Sketch Plan Traffic Technical Memorandum* by LSC dated April 15, 2016. Figure 2 shows the land use zones used for comparison purposes.

Residential Land Uses

Although the previous Lorson Ranch Sketch Plan Amendment allowed for up to 6,500 residential dwelling units the analysis assumed in the *Lorson Ranch Sketch Plan Traffic Technical Memorandum* by LSC dated April 15, 2016 was based on an actual anticipated buildout of 5,301

dwelling units. This number reflected the anticipated buildout accounting for the proposed maximum number of dwelling units that could be developed east of Jimmy Camp Creek in order to keep the future creek crossing structures on Fontaine Boulevard as two lanes. This report is also based on a total buildout of 5,301 dwelling units. Although the total number of dwelling units assumed in this report has not changed, the percentage of multifamily dwelling units has been increased. The 2016 technical memorandum assumed 118 multifamily dwelling units and 5,183 single-family dwelling units. Based on the currently proposed Sketch Plan amendment this report assumes 894 multifamily dwelling units and 4,407 single-family dwelling units.

School Land Uses

Needs to be based on the total allowed by the SKP since the purpose is to shift density to the east.

The Sketch Plan includes a 25-acre school site located northeast of the future intersection of Fontaine Boulevard and Lamprey Drive. The size and location of the school site are consistent with what was assumed in the 2016 traffic technical memorandum, however, the number of students assumed to attend the school has been updated based on the *Lorson Ranch PK-8 School Traffic Impact and Access Analysis* by LSC dated May 11, 2018.

Commercial Land Uses

Although the Lorson Ranch Sketch Plan is approved for up to 70 acres of commercial development, the currently approved amendment and the currently proposed Amendment 2 both show only about 25.3 acres used for commercial uses. The commercial parcels will be located adjacent to Marksheffel Road north and south of Fontaine Boulevard, as shown in the attached Sketch Plan exhibit. This is consistent with what was assumed in the 2016 traffic technical memorandum. A site-specific traffic study would address whatever commercial land use is proposed. The timing and type of commercial development will depend on market demand.

Land use assumptions are shown as part of Table 1.

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 55 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 the Lorson Ranch East development Fontaine Boulevard will be extended east from Old Glory Drive. In the interim, an Urban Non-Residential Collector Street will be constructed east of Stingray Lane as development progresses. 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 extend from Marksheffel Road about one-half mile south of Fontaine Boulevard. 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. 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.

Existing Traffic Volumes

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

Existing 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 2 shows the level of service delay ranges.

existing and

Table 2
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 existing 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.

2040 BASELINE TRAFFIC

Figure 4 shows the projected 2040 baseline traffic volumes. The 2040 baseline traffic volumes are based on traffic volumes shown in the *Marksheffel Road South Corridor Preservation Plan* dated July 2014. The 2040 baseline volumes assume Meridian Road has not been extended south to Fontaine Boulevard. The baseline traffic volumes exclude existing traffic currently generated by land uses within Lorson Ranch and traffic projected to be generated by future land uses.

TRIP GENERATION

Estimates of the traffic volumes expected to be generated by all of the existing, approved, and proposed land uses within Lorson Ranch 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. Table 3 also shows a comparison of the trip generation estimate for this same area assumed in the *Lorson Ranch Sketch Plan Traffic Technical Memorandum* by LSC dated April 15, 2016. The estimate contained in the Sketch Plan memorandum was made using the 9th edition of the *Trip Generation* manual.

These estimates are not intended to represent the overall maximum trip generation allowed under the Lorson Ranch approvals (6,500 dwelling units and 25.3 acres of commercial). Rather these estimates reflect the anticipated buildout land uses accounting for the proposed maximum number of dwelling units that could be developed east of Jimmy Camp Creek in order to keep the future creek crossing structures, the proposed Lorson Boulevard, and the Fontaine extension as

They need to be if the Sketch Plan is reserving the right to develop 6500 DU by shifting density to the undeveloped ares to the east.

two lanes (with right-of-way widths as recommended in this study and shown on the Sketch Plan amendment).

The table presents the raw unadjusted ITE trip generation for the land uses then adjusted trip generation to account for internal trips within Lorson Ranch and pass-by trips associated with planned commercial uses. A percentage of the trips generated by the commercial parcels would be "pass-by trips." A pass-by trip is one made by a motorist who would already be on an adjacent roadway regardless of the proposed development, but who stops in at the site while passing by. The motorist would then continue on his or her way to a final destination in the original direction. The pass-by percentages shown were based on the *Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition, 2017* by ITE.

The internal portion of the total trips for each traffic analysis zone has been paired with internal trips from other traffic analysis zones. Appendix Table 1 shows the internal trip assumptions and calculations.

As shown in Table 3, at buildout Lorson Ranch is projected to generated about 46,083 new external 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. This includes trips estimated to be generated by all land uses within the Lorson Ranch Sketch Plan area including existing land uses. The *Lorson Ranch Sketch Plan Traffic Technical Memorandum* by LSC dated April 15, 2016 assumed Lorson Ranch would generate about 1,801 more vehicle-trips than are currently estimated. The reduction in the estimated number of vehicle-trips is due partly to a change in trip generation rates from the 9th edition to the 10th edition and partly due to an increase in the number of multifamily dwelling units, which have a lower trip generation rate.

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.

Figure 6 shows the long-term site-generated traffic volume estimates. These estimates include traffic generated by existing land uses within Lorson Ranch. These volumes were determined by first assigning the internal vehicle-trips to the street network based on the location of the planned school site located northeast of the intersection of Fontaine Boulevard and Lamprey Drive and the future retail sites located near the intersection of Fontaine Boulevard and Carriage Meadows Drive.

The external vehicle-trips were then assigned to the street network by applying the trip distribution percentages (from Figure 5) to the external trip generation estimates. The internal

and external site-generated traffic volumes were then summed to determine the total site-generated traffic volumes.

PROJECTED TOTAL TRAFFIC

Figure 7 shows the 2040 total traffic volumes. These volumes are the sum of the 2040 background traffic volumes (from Figure 4) plus the site-generated traffic volumes (from Figure 6).

PROJECTED LEVELS OF SERVICE

The intersections of Marksheffel Road/Fontaine Boulevard and Marksheffel Road/Lorson Boulevard have been analyzed to determine the projected levels of service for the 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, 6th Edition* by the Transportation Research Board. The level of service reports are attached. The results of the analysis are shown in Figure 7.

Marksheffel/Fontaine

The signal-controlled Marksheffel Road/Fontaine Boulevard intersection is projected to continue to operate at level of service D or better for all movements based on the short-term total traffic volumes. By 2040 this intersection is projected to operate at an overall LOS D or better during the peak hours; however, the southbound left-turn and westbound left-turn movements are projected to operate at LOS E during the afternoon peak.

Marksheffel/Lorson

Based on the projected 2040 total traffic volumes, the westbound left-turn movement at the intersection of Marksheffel/Lorson is projected to operate at LOS F during the morning and afternoon peak hours if this intersection remains a conventional, stop-sign-controlled, full-movement intersection. Assuming a conventional, signal-controlled intersection, all movements are projected to operate at LOS B or better during the peak hours based on the 2040 total traffic volumes. Alternative intersection control such as a “channelized T” type intersection or a modern roundabout has been considered for this intersection. Please see Appendix A for a detailed analysis of these alternate options.

ROADWAY CLASSIFICATIONS

Figure 8 presents the recommended buildout roadway classifications for the Sketch Plan. These have been based in-part on the projected buildout site-generated traffic volumes shown on Figure 6. Note: Corridor preservation per the MTCP 2060 plan will be needed for Fontaine and this will need to be shown on any plans for development submitted that are adjacent to Fontaine.

FONTAINE BOULEVARD TRANSPORTATION CORRIDOR PRESERVATION

The MTCP Corridor Preservation Plan shows Fontaine as a potential future four-lane Principal Arterial. The ECM standard right-of-way for a four-lane Principal is 130 feet, however, "corridor preservation" means that adjacent developments would not need to dedicate right-of-way necessary to achieve this 130 feet, but rather just preserve land in the Fontaine roadway corridor in a "no build" area. The intent of a preservation area would be to include plat notes and restrictions to facilitate an easier acquisition process and with lower cost (when compared to the cost of acquiring land for right-of-way upon which structures and other property improvements have been built) in the future by the County to achieve the ultimate 130 feet (if ever needed). Clear notes would need to be added to the plats adjacent to Fontaine indicating specific strips of land or tracts designated as "transportation corridor potential future right-of-way."

ROADWAY IMPROVEMENT FEE PROGRAM

The developments within Lorson Ranch will be required to participate in the El Paso County Road Improvement Fee Program. The fee will be determined with each Lorson Ranch development application.

CONCLUSIONS AND RECOMMENDATIONS

Trip Generation

- At buildout Lorson Ranch is projected to generated about 46,083 new external 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. This includes trips estimated to be generated by all land uses within the Lorson Ranch Sketch Plan area including existing land uses. The *Lorson Ranch Sketch Plan Traffic Technical Memorandum* by LSC dated April 15, 2016 assumed Lorson Ranch would generate about 1,801 more vehicle-trips than are currently estimated. The reduction in the estimated number of vehicle-trips is due partly to a change in trip generation rates from the 9th edition to the 10th edition and partly due to an increase in the number of multifamily dwelling units, which have a lower trip generation rate.

Projected Levels of Service

- The signal-controlled Marksheffel Road/Fontaine Boulevard intersection is projected to operate at an overall level of service D or better based on the 2040 background and total traffic conditions. The southbound left-turn and westbound left-turn movements are projected to operate at LOS E during the afternoon peak hour based on both the background and total traffic volumes.

- This report includes discussion and general analysis of intersection traffic control/intersection type alternatives for Lorson Boulevard/Marksheffel Road.

* * * * *

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 1 and 3
Appendix Table 1
Figures 1-8
Current Sketch Plan Amendment
Traffic Count Reports
Level of Service Reports
Appendix A – Marksheffel/Lorson Traffic Control Analysis

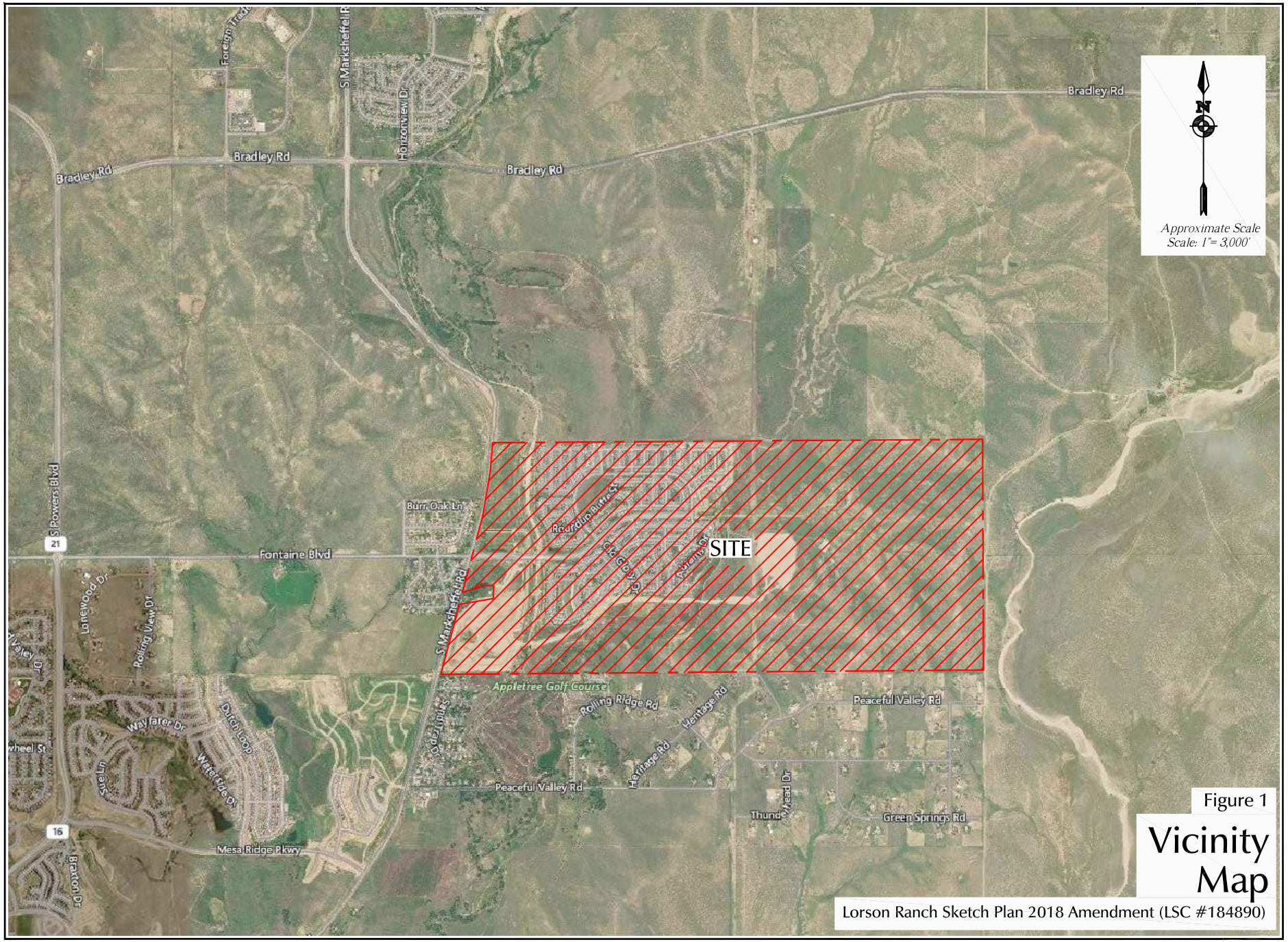


Figure 1

Vicinity Map

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)

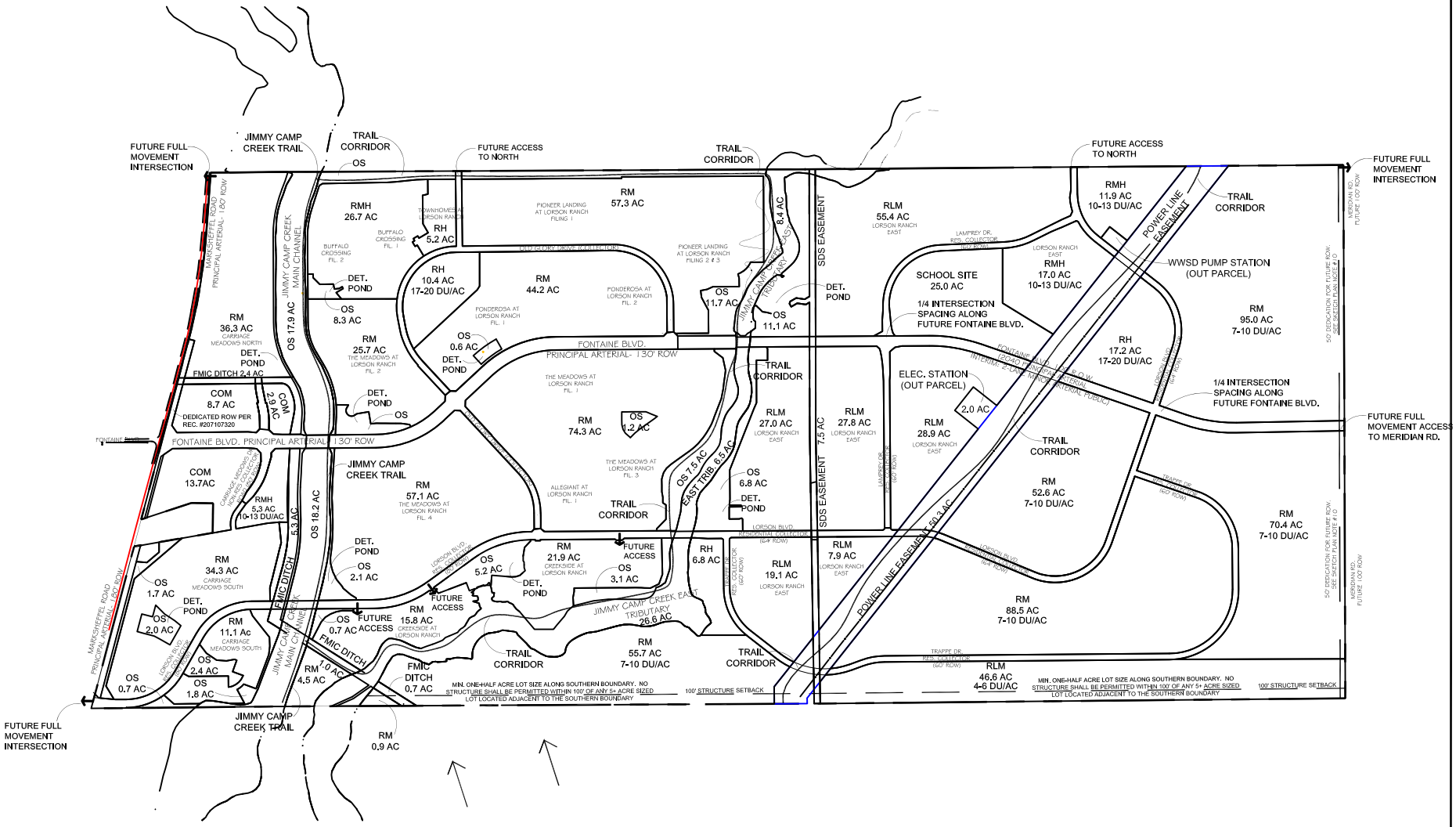
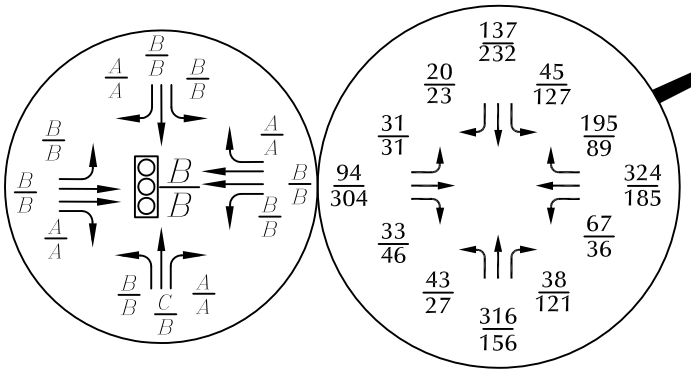
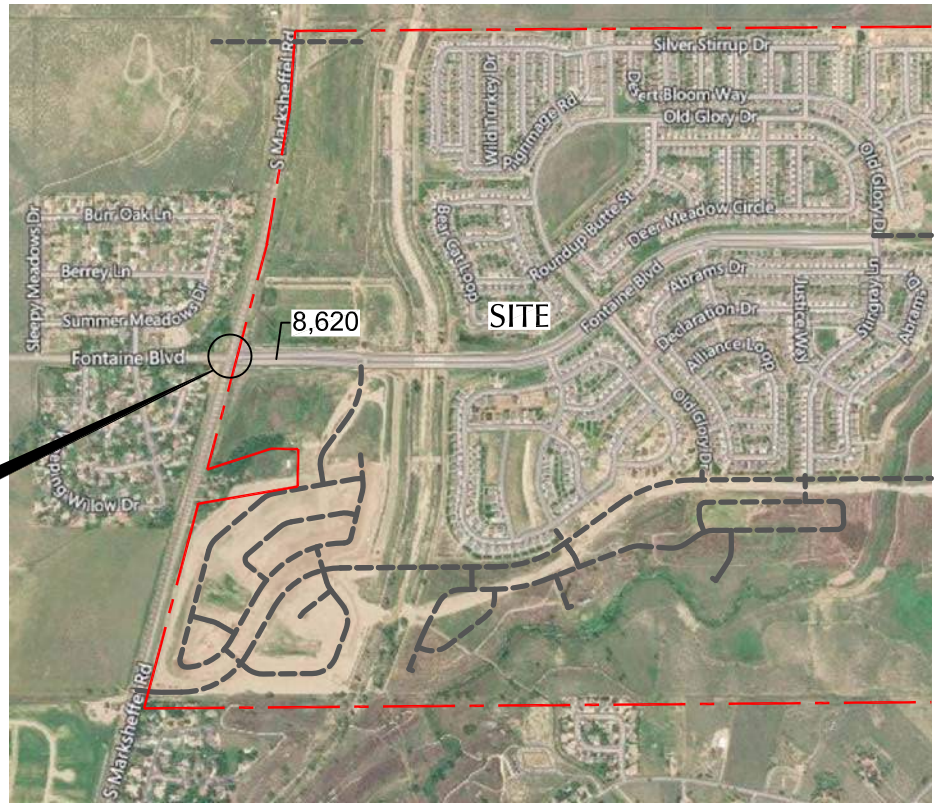


Figure 2

Sketch Plan (Proposed Amendment)

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)





Approximate Scale
Scale: 1"= 1,500'

LEGEND:

= Stop Sign

= Traffic Signal

$\frac{XX}{XX}$ = $\frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$ Based on counts by LSC March 2018

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

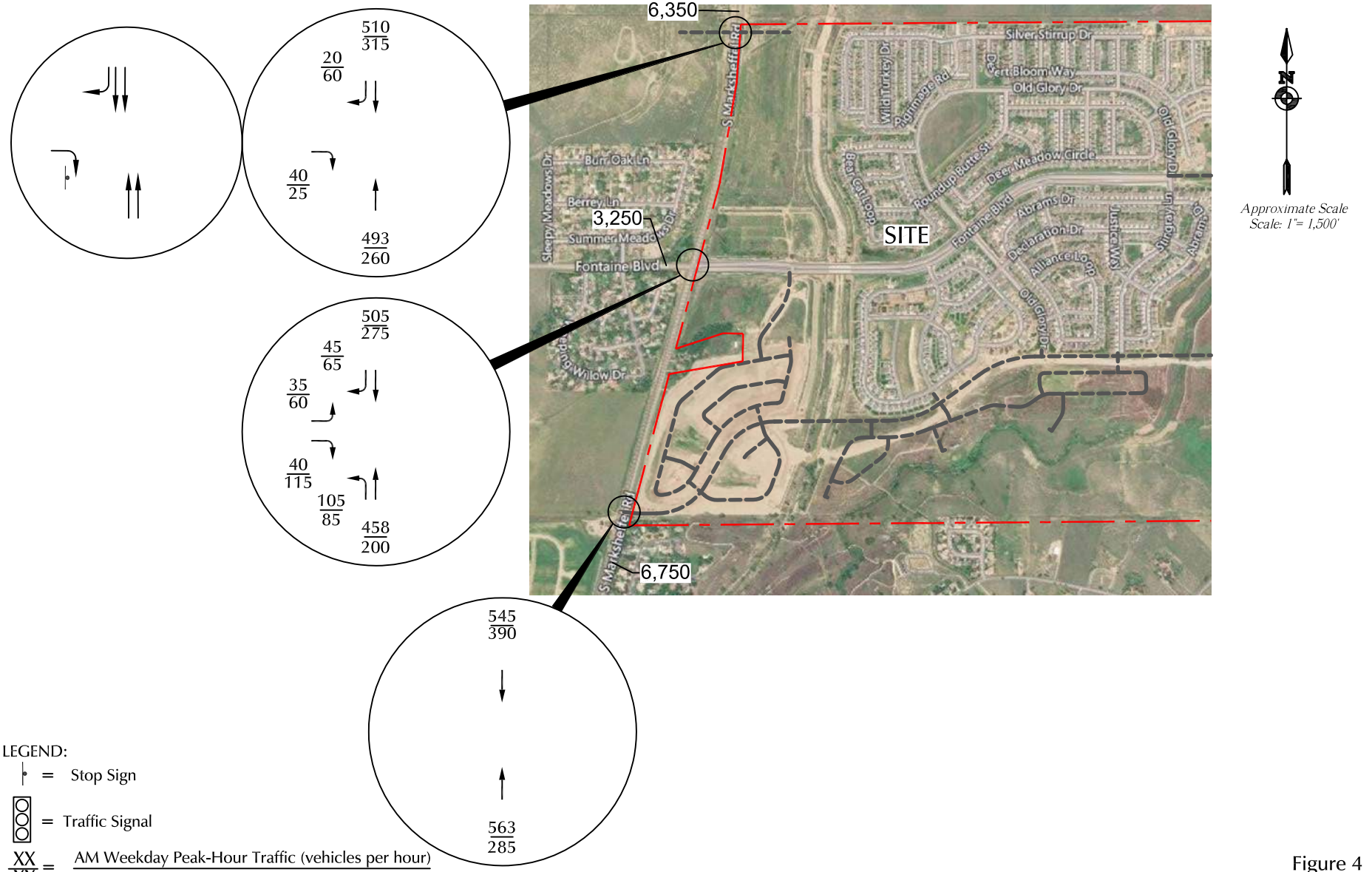
$\frac{C}{C}$ = $\frac{\text{AM Entire Intersection Peak-Hour Level of Service}}{\text{PM Entire Intersection Peak-Hour Level of Service}}$

X,XXX= Average Daily Traffic (vehicles per day) (Estimates by LSC)

Figure 3

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

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)



LEGEND:

= Stop Sign

= Traffic Signal

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

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

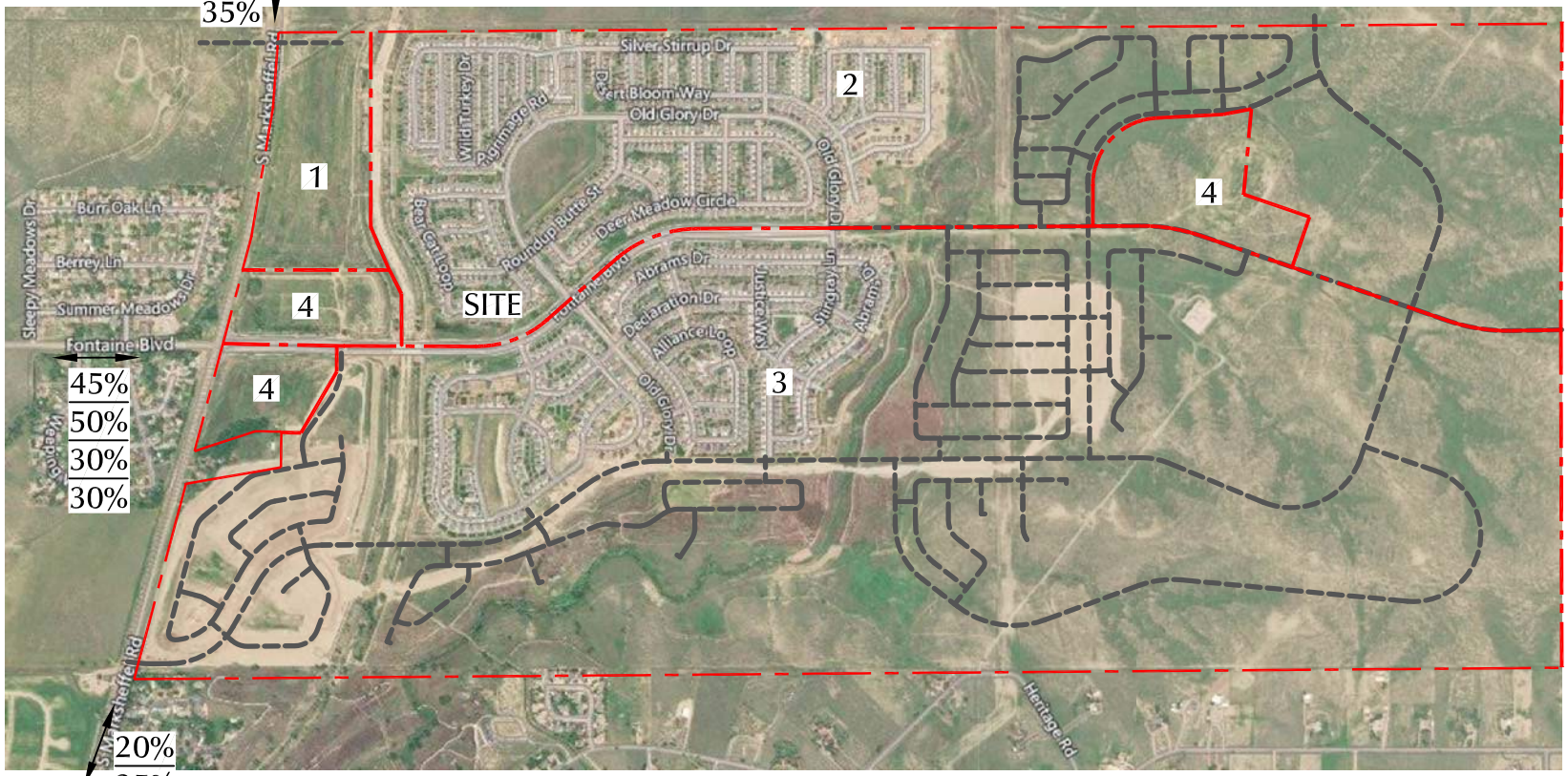
$\frac{C}{C}$ = $\frac{\text{AM Entire Intersection Peak-Hour Level of Service}}{\text{PM Entire Intersection Peak-Hour Level of Service}}$

X,XXX= Average Daily Traffic (vehicles per day) (Estimates by LSC)

Figure 4

2040 Baseline Traffic, Lane Geometry, Traffic Control and Level of Service

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)



N

Approximate Scale
Scale: 1"= 1,500'

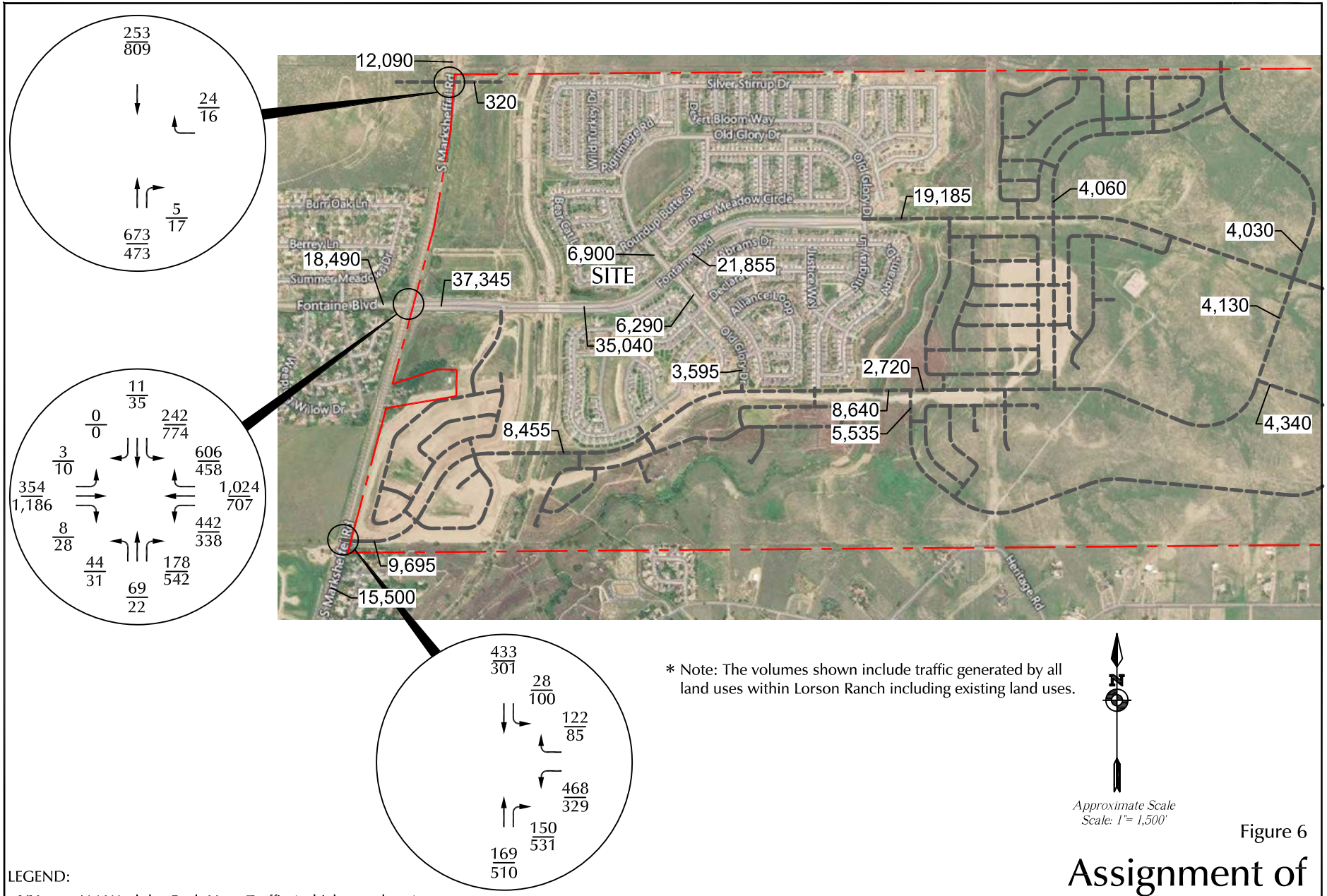
LEGEND:

XX% / XX% / XX% / XX% = Zone 1 (Residential) Percent Directional Distribution / Zone 2 (Residential) Percent Directional Distribution / Zone 3 (Residential) Percent Directional Distribution / Zone 4 (Non-Residential) Percent Directional Distribution

Figure 5

Directional Distribution of Site-Generated Traffic

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)



* Note: The volumes shown include traffic generated by all land uses within Lorson Ranch including existing land uses.

Approximate Scale
Scale: 1"= 1,500'

Figure 6

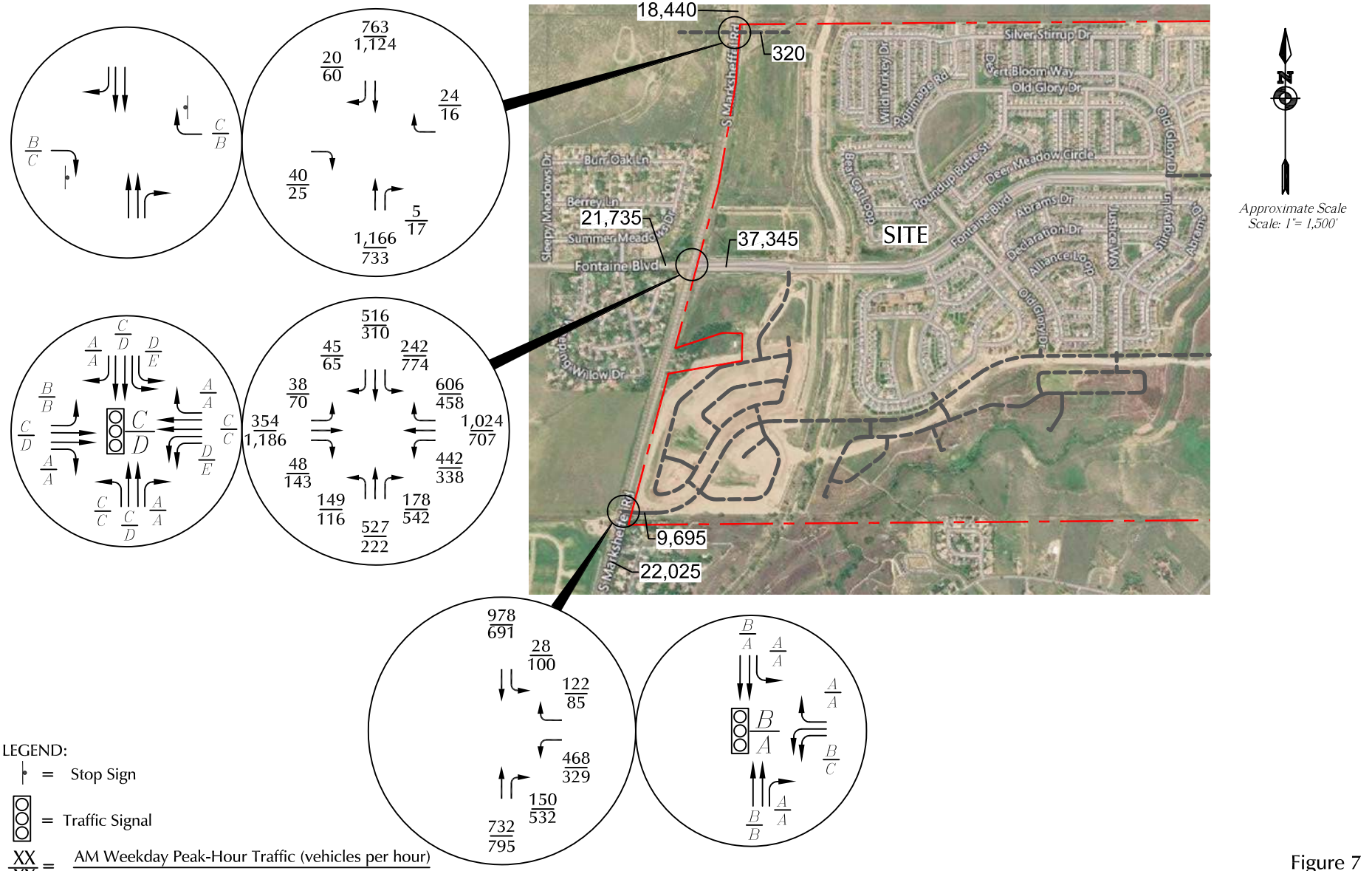
Assignment of Lorson Ranch Generated Traffic*

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)

LEGEND:

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

X,XXX= Average Daily Traffic (vehicles per day) Estimates by LSC unless otherwise noted.



LEGEND:

= Stop Sign

= Traffic Signal

XX/XX = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour)

A/B = AM Individual Movement Peak-Hour Level of Service / PM Individual Movement Peak-Hour Level of Service

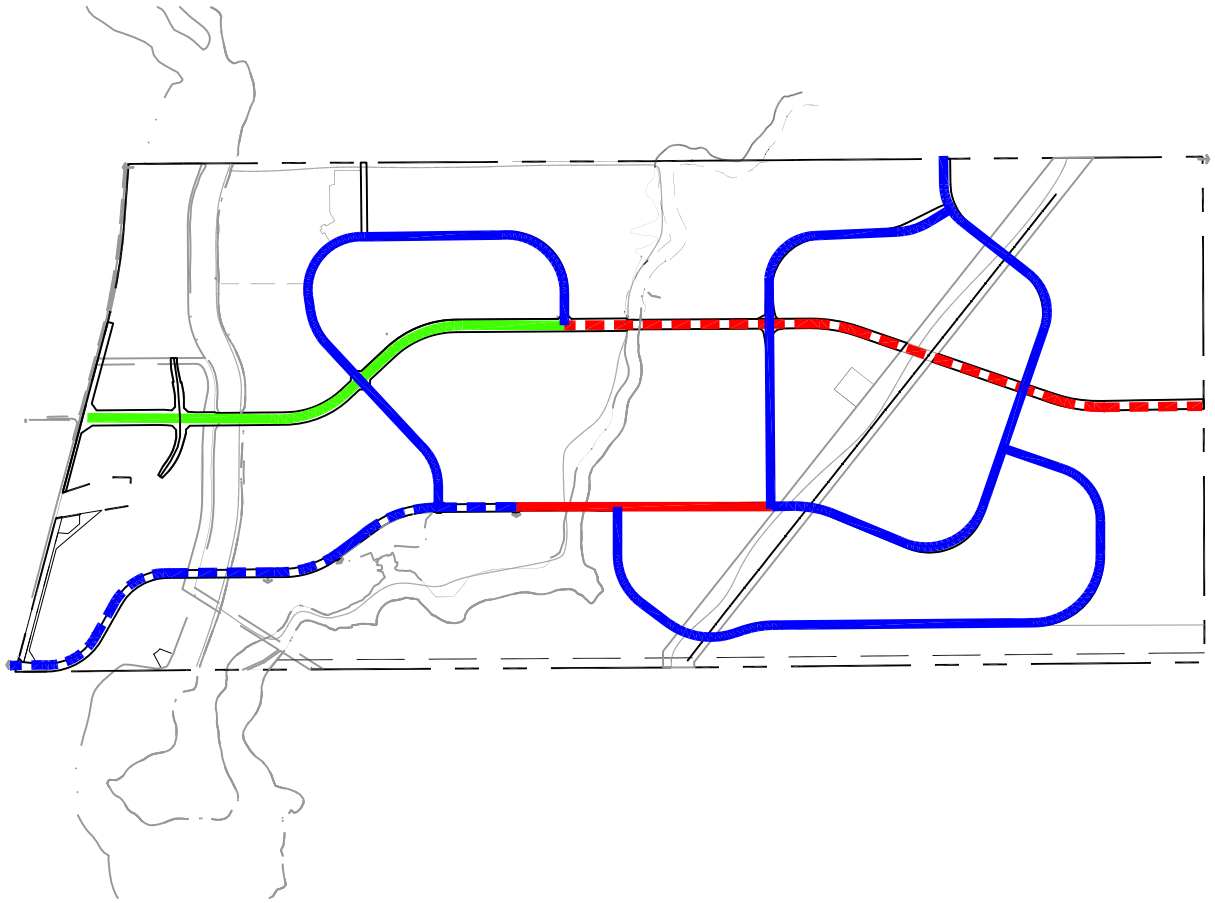
C/C = AM Entire Intersection Peak-Hour Level of Service / PM Entire Intersection Peak-Hour Level of Service

X,XXX= Average Daily Traffic (vehicles per day) (Estimates by LSC)

Figure 7

2040 Total Traffic, Lane Geometry, Traffic Control and Level of Service

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)



Approximate Scale
Scale: 1"= 2,000'

LEGEND:

- = 4 Lane Principal Arterial
- = 4 Lane Principal Arterial (Ultimate Classification) Interim/Lorson Ranch Buildout 2–Lane Urban Non–Residential Collector
- = Urban Non–Residential Collector (80'ROW) w/ Modified Street Cross–Section Per Deviation #DEV–17–008
- = Urban Residential Collector (64' to 72' ROW)
- = Urban Residential Collector (60' ROW).

Figure 8

Recommended Classifications

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)

Table 1
Lorson Ranch Sketch Plan Amendment 2
Land Use Comparison

SDS/CSU OR powerlines?

Land Use Zone	Decription	Lorson Ranch Sketch Plan Traffic Technical Memorandum 4/15/2016			Currant Land Use Assumption			Change		
		Single-Family DUs[1]	Multi-family DUs	Total DUs	Single-Family DUs	Multi-family DUs	Total DUs	Single-Family DUs	Multi-family DUs	Total DUs
1	Adjacent to Marksheffel (Carriage Meadows North and South)	434	72	506	389	56	445	-45	-16	-61
2	Between the Creeks and North of Lorson Blvd	1,405	46	1,451	1,373	195	1,568	-32	149	117
3	Between the Creeks and South of Lorson Blvd (Creekside at Lorson Ranch Fil 1)	449	0	449	235	0	235	-214	0	-214
4	Lorson Ranch East	783	0	783	826	0	826	43	0	43
5	Between the Lorson Ranch East and the DSD Easment North of Fontaine	131	0	131	0	299	299	-131	299	168
6	Between the East Tributory and Lorson Ranch East South of Lorson	556	0	556	215	97	312	-341	97	-244
7	East of the DSD Easment and North of Fontaine	498	0	498	369	247	616	-129	247	118
8	East of the DSD Easment and South of Fontaine	927	0	927	1,001	0	1,001	74	0	74
	TOTAL	**5,183**	**118**	**5,301**	**4,408**	**894**	**5,302**	**-775**	**776**	**1**

Notes:
(1) DU = dwelling Unit

LSC Transportation Consultants, Inc.

6,500 now?

Table 3
Lorson Ranch Sketch Plan Amendment 2
Trip Generation Estimate

Land Use Data						Trip Generation Rates[1]					Raw ITE Trip Generation (Individual Driveway Trips)					School Internal Trips[2]					Retail Internal Trips[2]					Pass-by[3]	Pass-by Trips					Total New External Trips				
							AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour				AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour	
Traffix Zone	Name	ITE Land Use	ITE Code	Quantity	Unit	Daily	In	Out	In	Out	Daily	In	Out	In	Out	Daily	In	Out	In	Out	Daily	In	Out	In	Out	(%)	Daily	In	Out	In	Out	Daily	In	Out	In	Out
RESIDENTIAL																																				
All Residential North of Lorson Boulevard "Between the Creeks"																																				
8	Ponderosa	Single-Family Detached Housing	210	102	DU[4]	9.44	0.19	0.56	0.62	0.37	963	19	57	64	37	27	2	5	1	1	103	0	2	5	2	0%	0	0	0	0	0	833	17	50	58	34
9	Ponderosa	Single-Family Detached Housing	210	102	DU	9.44	0.19	0.56	0.62	0.37	963	19	57	64	37	27	2	5	1	1	103	0	2	5	2	0%	0	0	0	0	0	833	17	50	58	34
10	Meadows Fil 1	Single-Family Detached Housing	210	97	DU	9.44	0.19	0.56	0.62	0.37	916	18	54	60	36	26	2	5	1	1	98	0	2	5	2	0%	0	0	0	0	0	792	16	47	54	33
11	Meadows Fil 3	Single-Family Detached Housing	210	51	DU	9.44	0.19	0.56	0.62	0.37	481	9	28	32	19	14	1	2	1	0	51	0	1	3	1	0%	0	0	0	0	0	416	8	25	28	18
12	Meadows Fil 3	Single-Family Detached Housing	210	87	DU	9.44	0.19	0.56	0.62	0.37	821	16	48	54	32	23	2	4	1	0	87	0	1	4	2	0%	0	0	0	0	0	711	14	43	49	30
3	The Meadows Fil 2	Single-Family Detached Housing	210	109	DU	9.44	0.19	0.56	0.62	0.37	1,029	20	60	68	40	29	3	5	1	1	110	1	2	5	3	0%	0	0	0	0	0	890	16	53	62	36
13	Allegiant Fil 1	Single-Family Detached Housing	210	97	DU	9.44	0.19	0.56	0.62	0.37	916	18	54	60	36	26	2	5	1	1	98	0	2	5	2	0%	0	0	0	0	0	792	16	47	54	33
5	Buffalo Crossing	Single-Family Detached Housing	210	204	DU	9.44	0.19	0.56	0.62	0.37	1,926	38	113	127	75	54	5	10	2	1	205	1	3	10	5	0%	0	0	0	0	0	1,667	32	100	115	69
	Townhomes at Lorson Ranch	Multifamily Housing	210	46	DU	7.32	0.11	0.35	0.35	0.21	337	5	16	16	10	10	1	2	0	0	36	0	1	2	1	0%	0	0	0	0	0	291	4	13	14	9
6	Pioneer Landing	Single-Family Detached Housing	210	59	DU	9.44	0.19	0.56	0.62	0.37	557	11	33	37	22	16	1	3	1	0	59	0	1	3	1	0%	0	0	0	0	0	482	10	29	33	21
7	Pioneer Landing	Single-Family Detached Housing	210	59	DU	9.44	0.19	0.56	0.62	0.37	557	11	33	37	22	16	1	3	1	0	59	0	1	3	1	0%	0	0	0	0	0	482	10	29	33	21
15	Meadows Future Fil 4 West	Single-Family Detached Housing	210	110	DU	9.44	0.19	0.56	0.62	0.37	1,038	20	61	69	40	29	3	5	1	1	111	1	2	5	3	0%	0	0	0	0	0	898	16	54	63	36
16	Meadows Future Fil 4 East	Single-Family Detached Housing	210	126	DU	9.44	0.19	0.56	0.62	0.37	1,189	23	70	79	46	34	3	6	1	1	127	1	2	6	3	0%	0	0	0	0	0	1,028	19	62	72	42
18	Ponderosa Future Fil	Multifamily Housing	210	149	DU	7.32	0.11	0.35	0.35	0.21	1,091	16	53	53	31	31	3	5	1	1	116	1	2	6	3	0%	0	0	0	0	0	944	12	46	46	27
39	Pioneer Landing Fil 2	Single-Family Detached Housing	210	170	DU	9.44	0.19	0.56	0.62	0.37	1,605	31	94	106	62	45	4	8	2	1	171	1	3	8	4	0%	0	0	0	0	0	1,389	26	83	96	57
	Total All Residential "Between the Creeks"			**1,568**	**DU**						**14,389**	**274**	**831**	**926**	**545**	**407**	**35**	**73**	**16**	**10**	**1,534**	**6**	**27**	**75**	**35**							**12,448**	**233**	**731**	**835**	**500**
Residential Adjacent to Marksheffel																																				
1	Carriage Meadows North	Single-Family Detached Housing	210	155	DU	9.44	0.19	0.56	0.62	0.37	1,463	29	86	97	57	41	4	7	2	1	156	1	2	8	4	0%	0	0	0	0	0	1,266	24	77	87	52
147	Future Multifamily	Multifamily Housing	210	56	DU	7.32	0.11	0.35	0.35	0.21	410	6	20	20	12	12	1	2	0	0	44	0	1	2	1	0%	0	0	0	0	0	354	5	17	18	11
47	Carriage Meadows South	Single-Family Detached Housing	210	86	DU	9.44	0.19	0.56	0.62	0.37	812	16	48	54	32	23	2	4	1	0	87	0	1	4	2	0%	0	0	0	0	0	702	14	43	49	30
247		Single-Family Detached Housing	210	51	DU	9.44	0.19	0.56	0.62	0.37	481	9	28	32	19	14	1	2	1	0	51	0	1	3	1	0%	0	0	0	0	0	416	8	25	28	18
347		Single-Family Detached Housing	210	97	DU	9.44	0.19	0.56	0.62	0.37	916	18	54	60	36	26	2	5	1	1	98	0	2	5	2	0%	0	0	0	0	0	792	16	47	54	33
	Total All Residential Adjacent to Marksheffel			**445**	**DU**						**4,082**	**78**	**236**	**263**	**156**	**116**	**10**	**20**	**5**	**2**	**436**	**1**	**7**	**22**	**10**							**3,530**	**67**	**209**	**236**	**144**
	Total All Residential "Between the Creeks" and Adjacent to Marksheffel			**2,013**	**DU**						**18,471**	**352**	**1,067**	**1,189**	**701**	**523**	**45**	**93**	**21**	**12**	**1,970**	**7**	**34**	**97**	**45**							**15,978**	**300**	**940**	**1,071**	**644**
Lorson Ranch East																																				
42	North of Fontaine	Single-Family Detached Housing	210	277	DU	9.44	0.19	0.56	0.62	0.37	2,615	51	154	173	101	74	6	13	3	2	279	1	4	14	6	0%	0	0	0	0	0	2,262	44	137	156	93
37	East of Lamprey	Single-Family Detached Housing	210	122	DU	9.44	0.19	0.56	0.62	0.37	1,152	23	68	76	45	33	3	6	1	1	123	1	2	6	3	0%	0	0	0	0	0	996	19	60	69	41
27	West of Lamprey	Single-Family Detached Housing	210	303	DU	9.44	0.19	0.56	0.62	0.37	2,860	56	168	189	111	81	7	14	3	2	305	1	5	15	7	0%	0	0	0	0	0	2,474	48	149	171	102
127	South of Lorson - West	Single-Family Detached Housing	210	76	DU	9.44	0.19	0.56	0.62	0.37	717	14	42	47	28	20	2	4	1	0	76	0	1	4	2	0%	0	0	0	0	0	621	12	37	42	26
227	South of Lorson - East	Single-Family Detached Housing	210	48	DU	9.44	0.19	0.56	0.62	0.37	453	9	27	30	18	13	1	2	0	0	48	0	1	2	1	0%	0	0	0	0	0	392	8	24	28	17
	Total Lorson Ranch East			**826**	**DU**						**7,797**	**153**	**459**	**515**	**303**	**221**	**19**	**39**	**8**	**5**	**831**	**3**	**13**	**41**	**19**							**6,745**	**131**	**407**	**466**	**279**
	Total All Residential "Between the Creeks", Adjacent to Marksheffel & Lorson Ranch East			**2,839**	**DU**						**26,268**	**505**	**1,526**	**1,704**	**1,004**	**744**	**64**	**132**	**29**	**17**	**2,801**	**10**	**47**	**138**	**64**							**22,723**	**364**	**1,138**	**1,301**	**779**
Creekside at Lorson Ranch Filing No. 1																																				
26	Creekside East	Single-Family Detached Housing	210	97	DU	9.44	0.19	0.56	0.62	0.37	916	18	54	60	36	26	2	5	1	1	98	0	2	5	2	0%	0	0	0	0	0	792	16	47	54	33
126	Creekside West	Single-Family Detached Housing	210	138	DU	9.44	0.19	0.56	0.62	0.37	1,303	26	77	86	51	37	3	7	1	1	139	1	2	7	3	0%	0	0	0	0	0	1,127	22	68	78	47
	Creekside at Lorson Ranch Filing No. 1			**235**	**DU**						**2,219**	**44**	**131**	**146**	**87**	**63**	**5**	**12**	**2**	**2**	**237**	**1**	**4**	**12**	**5**							**1,919**	**38**	**115**	**132**	**80**
	Short-Term Total			**3,074**	**DU**						**28,487**	**549**	**1,657**	**1,850**	**1,091**	**807**	**69**	**144**	**31**	**19**	**3,038**	**11**	**51**	**150**	**69**							**24,642**	**469**	**1,462**	**1,669**	**1,003**
All Other Future Residential West of the Power Line																																				
43	North of Fontaine and South of Lamprey	Multifamily Housing	210	176	DU	7.32	0.11	0.35	0.35	0.21	1,288	19	62	62	36	36	3	6	1	1	137	1	2	7	3	0%	0	0	0	0	0	1,115	15	54	54	32
45	North of Fontaine and NE Lamprey/Lorson	Multifamily Housing	210	123	DU	7.32	0.11	0.35	0.35	0.21	900	13	44	43	25	25	2	5	1	1	96	0	2	5	2	0%	0	0	0	0	0	779	11	37	37	22
327	South of Lorson and west of Trappe	Multifamily Housing	210	97	DU	7.32	0.11	0.35	0.35	0.21	710	10	34	34	20	20	2	4	1	0	76	0	1	4	2	0%	0	0	0	0	0	614	8	29	29	18
		Single-Family Detached Housing	210	215	DU	9.44	0.19	0.56	0.62	0.37	2,030	40	119	134	79	57	5	10	2	1	216	1	3	11	5	0%	0	0	0	0	0	1,757	34	106	121	73
	Other Future Residential Between the Power Line			**611**	**DU**						**4,928**	**82**	**259**	**273**	**160**	**138**	**12**	**25**	**5**	**3**	**525**	**2**	**8**	**27**	**12**							**4,265**	**68**	**226**	**241**	**145**
	Total from Marksheffel to The Power Line			**3,450**	**DU**						**33,415**	**631**	**1,916**	**2,123**	**1,251**	**945**	**81**	**169**	**36**	**22**	**3,563**	**13**	**59**	**177**	**81**							**28,907**	**537**	**1,688**	**1,910**	**1,148**
Future Residential Uses East of the Power Line																																				
30	South of Trappe Dr	Single-Family Detached Housing	210	282	DU	9.44	0.19	0.56	0.62	0.37	2,662	52	157	176	103	75	6	13	3	2	284	1	4	14	6	0%	0	0	0	0	0	2,303	45	140	159	95
35	Southeast of Lorson/Fontaine	Single-Family Detached Housing	210	280	DU	9.44	0.19	0.56	0.62	0.37	2,643	52	155	175	103	75	6	13	3	2	282	1	4	14	6	0%	0	0	0	0	0	2,286	45	138	158	95
36	Southwest of Lorson/Fontaine	Single-Family Detached Housing	210	204	DU	9.44	0.19	0.56	0.62	0.37	1,926	38	113	127	75	54	5	10	2	1	205	1	3	10	5	0%	0	0	0	0	0	1,667	32	100	115	69
44	Northwest Lorson/Fontaine	Multifamily Housing	210	247	DU	7.32	0.11	0.35	0.35	0.21	1,808	26	87	87	51	51	4	9	2	1	193	1	3	9	4	0%	0	0	0	0	0	1,564	21	75	76	46
46	Northeast Lorson/Fontaine	Single-Family Detached Housing	210	369	DU	9.44	0.19	0.56	0.62	0.37	3,483	68	205	230	135	98	8	17	4	2	371	2	6	18	8	0%	0	0	0	0	0	3,014	58	182	208	125
136	Between Trappe and Lorson	Single-Family Detached Housing	210	235	DU	9.44	0.19	0.56	0.62	0.37	2,218	43	130	147	86	63	5	11	2	1	236	1	4	12	5	0%	0	0	0	0	0	1,919	37	115	133	80
	Total East of the Power Line			**1,617**	**DU**						**14,740**	**279**	**847**	**942**	**553**	**416**	**34**	**73**	**16**	**9**	**1,571**	**7**	**24**	**77**	**34**							**12,753**	**238**	**750**	**849**	**510**
	Total Residential			**5,302**	**DU**						**48,155**	**910**	**2,763**	**3,065**	**1,804**	**1,361**	**115**	**242**	**52**	**31**	**5,134**	**20**	**83**	**254**	**115**							**41,660**	**775**	**2,438**	**2,759**	**1,658**
NON-RESIDENTIAL				1001																																
34	K-8 School	Elementary School	520	690	Students	1.89	0.36	0.31	0.07	0.08	1,304	250	213	51	53	913	175	85	20	37	0	0	0	0	0	0%	0	0	0	0	0	391	75	128	31	16
		Middle School/Junior High School	522	300	Students	2.13	0.31	0.27	0.07	0.08	639	94	80	22	23	447	66	32	9	16	0	0	0	0	0	0%	0	0	0	0	0	192	28	48	13	7
20	North of Fontaine	Shopping Center	820	101	KSF[5]	46.75	0.74	0.45	2.13	2.30	4,722	75	46	215	233	0	0	0	0	0	2,361	37	12	54	116	25%	590	9	9	35	35	1,771	29	25	126	82
22	South of Fontaine	Shopping Center	820	118	KSF	46.75	0.74	0.45	2.13	2.30	5,539	88	54	252	273	0	0	0	0	0	2,770	44	13	63	137	25%	692	11	11	41	41	2,077	33	30	148	95
											12,204	**507**	**393**	**540**	**582**	**1,360**	**241**	**117**	**29**	**53**	**5,131**	**81**	**25**	**117**	**253**		**1,282**	**20**	**20**	**76**	**76**	**4,431**	**165**	**231**	**318**	**200**
											Grand Total at Buildout of Lorson Ranch	**60,359**	**1,417**	**3,156**	**3,605**	**2,386**																**46,091**	**940**	**2,669**	**3,077**	**1,858**
Trip Generation Estimate From *Lorson Ranch Sketch Plan Traffic Technical Memorandum* 4/15/2016																																				
	Single-Family Detached Housing		210	5,183	DU	9.52	0.19	0.56	0.63	0.37	49,342	972	2,915	3,265	1,918	1,092	112	205	60	39	5,660	24	78	264	122	0%	0	0	0	0	0	0	43,276	845	2,675	2,982	1,777
	Multifamily Housing (Low-Rise)		210	118	DU	5.81	0.07	0.37	0.35	0.17	686	9	43	41	20											0%	0	0	0	0	0	0					
	Elementary School		520	500	Students	1.29	0.25	0.20	0.07	0.08	645	124	101	37	38	484	93	51	19	29	0	0	0	0	0	0%	0	0	0	0	0	0	161	31	50	18	9
	Middle School/Junior High School		522	500	Students	1.62	0.30	0.24	0.08	0.08	810	149	122	39	41	608	112	61	20	31	0	0	0	0	0	0%	0	0	0	0	0	0	202	37	61	19	10
	Shopping Center		820	219	KSF	51.58	0.71	0.44	2.22	2.40	11,320	156	96	487	528	0	0	0	0	0	5,660	78	24	122	264	25%	1,415	19	19	79	79	#	4,245	59	53	286	185
											62,803	**1,410**	**3,277**	**3,869**	**2,545**												**1,415**	**19**	**19**	**79**	**79**		**47,884**	**972**	**2,839**	**3,305**	**1,981**
											Change From 2016	**-2,444**	**7**	**-121**	**-264**	**-159**																	**-1,793**	**-32**	**-170**	**-228**	**-123**

Notes:
(1) Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)
(2) See Appendix Table 2 for Internal Trip Percentages
(3) Source: "Trip Generation Handbook - An ITE Proposed Recommended Practice 3rd Edition, 2017" by ITE
(4) DU = dwelling Unit
(5) KSF = thousand square feet of floor area

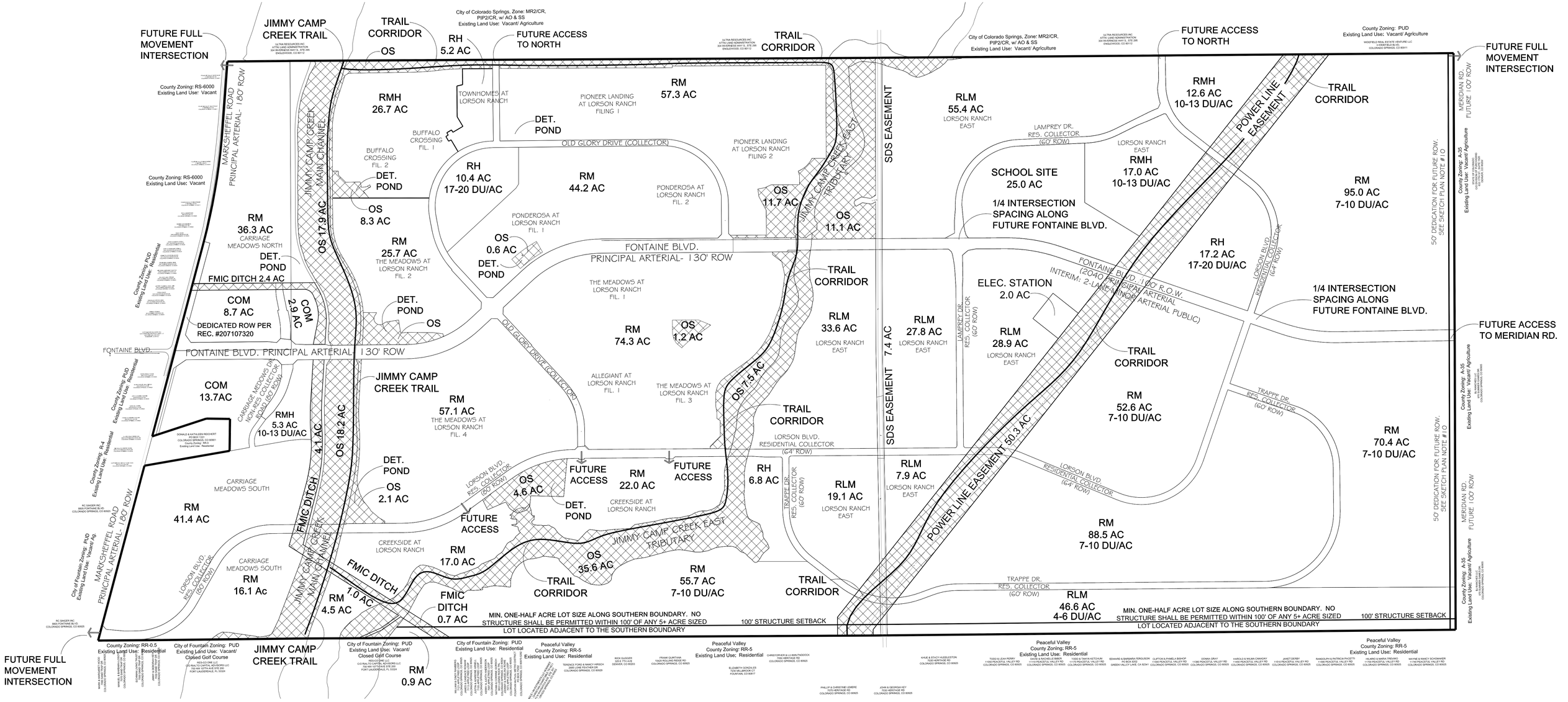
Appendix Table 1
Lorson Ranch Sketch Plan Amendment 2
Internal Trip Estimate

ITE Land Use	ITE Code	Quantity	Unit	Trip Generation Rates[1] Daily	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out	Raw ITE Trip Generation (Individual Driveway Trips) Daily	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out
Single-Family Detached Housing	210	4,408	DU[2]	9.44	0.19	0.56	0.62	0.37	41,612	815	2,446	2,749	1,615
Residential Condominium/Townhouse	210	894	DU	7.32	0.11	0.35	0.35	0.21	6,544	95	317	315	185
									48,156	**910**	**2,763**	**3,064**	**1,800**
Elementary School	520	690	Students	1.89	0.36	0.31	0.07	0.08	1,304	250	213	51	53
Middle School/Junior High School	522	300	Students	2.13	0.31	0.27	0.07	0.08	639	94	80	22	23
								Total School	**1,943**	**344**	**293**	**73**	**76**
Shopping Center	820	219	KSF[3]	46.75	0.74	0.45	2.13	2.30	10,261	162	99	467	506
								Total School and Retail	**12,204**	**506**	**392**	**540**	**582**

	Percent Internal Trips Daily	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out	Total Internal Trips Daily	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out	Total External Trips Daily	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out
School	3%	13%	9%	2%	2%	1,360	117	241	53	29					
Retail	11%	3%	3%	8%	7%	5,131	25	81	253	117					
Total	13%	16%	12%	10%	8%	**6,491**	**142**	**322**	**306**	**146**	**41,665**	**768**	**2,441**	**2,758**	**1,654**
	70%	70%	40%	40%	70%	913	175	85	20	37	391	75	128	31	16
	70%	70%	40%	40%	70%	447	66	32	9	16	192	28	48	13	7
						1,360	**241**	**117**	**29**	**53**	**583**	**103**	**176**	**44**	**23**
	50%	50%	25%	25%	50%	5,131	81	25	117	253	5,129	80	74	350	252
						6,491	**322**	**142**	**146**	**306**	**47,377**	**951**	**2,691**	**3,152**	**1,929**

Notes:
(1) Source: "Trip Generation, 10th Edition, 2017" by the Institute of Transportation Engineers (ITE)
(2) DU = dwelling Unit
(3) KSF = thousand square feet of floor area

LSC Transportation Consultants, Inc.


FUTURE FULL MOVEMENT INTERSECTION
JIMMY CAMP CREEK TRAIL
TRAIL CORRIDOR
OS
City of Colorado Springs, Zone: MR2/CR, PIP2/CR, w/ AO & SS
Existing Land Use: Vacant/ Agriculture
RH 5.2 AC
FUTURE ACCESS TO NORTH
TRAIL CORRIDOR
City of Colorado Springs, Zone: MR2/CR, PIP2/CR, w/ AO & SS
Existing Land Use: Vacant/ Agriculture
FUTURE ACCESS TO NORTH
County Zoning: PUD
Existing Land Use: Vacant/ Agriculture
FUTURE FULL MOVEMENT INTERSECTION
MERIDIAN RD.
FUTURE 100' ROW
County Zoning: A-35
Existing Land Use: Vacant/ Agriculture
County Zoning: RS-6000
Existing Land Use: Vacant
MARKSHEFFEL ROAD
PRINCIPAL ARTERIAL- 180' ROW
JIMMY CAMP CREEK MAIN CHANNEL
RMH 26.7 AC
TOWNHOMES AT LORSON RANCH
PIONEER LANDING AT LORSON RANCH FILING 1
RM 57.3 AC
DET. POND
BUFFALO CROSSING FIL. 1
BUFFALO CROSSING FIL. 2
OLD GLORY DRIVE (COLLECTOR)
PIONEER LANDING AT LORSON RANCH FILING 2
RH 10.4 AC 17-20 DU/AC
RM 44.2 AC
PONDEROSA AT LORSON RANCH FIL. 2
OS 11.7 AC
JIMMY CAMP CREEK EAST TRIBUTARY
SDS EASEMENT
RLM 55.4 AC
LORSON RANCH EAST
LAMPREY DR. RES. COLLECTOR (60' ROW)
RMH 12.6 AC 10-13 DU/AC
POWER LINE EASEMENT
TRAIL CORRIDOR
SCHOOL SITE 25.0 AC
1/4 INTERSECTION SPACING ALONG FUTURE FONTAINE BLVD.
LORSON RANCH EAST
RMH 17.0 AC 10-13 DU/AC
RM 95.0 AC 7-10 DU/AC
OS 8.3 AC
OS 17.9 AC
OS 11.1 AC
RM 36.3 AC
CARRIAGE MEADOWS NORTH
DET. POND
FMIC DITCH 2.4 AC
RM 25.7 AC
THE MEADOWS AT LORSON RANCH FIL. 2
PONDEROSA AT LORSON RANCH FIL. 1
OS 0.6 AC
DET. POND
FONTAINE BLVD.
PRINCIPAL ARTERIAL- 130' ROW
50' DEDICATION FOR FUTURE ROW. SEE SKETCH PLAN NOTE # 10
County Zoning: PUD
Existing Land Use: Residential
TRAIL CORRIDOR
RH 17.2 AC 17-20 DU/AC
LORSON BLVD. RESIDENTIAL COLLECTOR (64' ROW)
FONTAINE BLVD. (120' R.O.W. (2040 PRINCIPAL ARTERIAL INTERIM: 2-LANE MINOR ARTERIAL PUBLIC)
ELEC. STATION 2.0 AC
1/4 INTERSECTION SPACING ALONG FUTURE FONTAINE BLVD.
COM 8.7 AC
DEDICATED ROW PER REC. #207107320
COM 2.9 AC
DET. POND
OS
RM 74.3 AC
OS 1.2 AC
OLD GLORY DRIVE (COLLECTOR)
RLM 33.6 AC
LORSON RANCH EAST
RLM 27.8 AC
LORSON RANCH EAST
LAMPREY DR. RES. COLLECTOR (60' ROW)
RLM 28.9 AC
LORSON RANCH EAST
FUTURE ACCESS TO MERIDIAN RD.
FONTAINE BLVD.
FONTAINE BLVD. PRINCIPAL ARTERIAL- 130' ROW
JIMMY CAMP CREEK TRAIL
COM 13.7AC
CARRIAGE MEADOWS DR. NORTH RES. COLLECTOR ROAD (60' ROW)
RMH 5.3 AC 10-13 DU/AC
RM 57.1 AC
THE MEADOWS AT LORSON RANCH FIL. 4
ALLEGIANT AT LORSON RANCH FIL. 1
THE MEADOWS AT LORSON RANCH FIL. 3
OS 7.5 AC
OS 7.4 AC
TRAIL CORRIDOR
LORSON BLVD. RESIDENTIAL COLLECTOR (64' ROW)
SDS EASEMENT
RM 52.6 AC 7-10 DU/AC
TRAPPE DR. RES. COLLECTOR (60' ROW)
RM 70.4 AC 7-10 DU/AC
County Zoning: R-4
Existing Land Use: Residential
DET. POND
OS 2.1 AC
OS 18.2 AC
4.1 AC
FMIC DITCH
LORSON BLVD. RES. COLLECTOR (60' ROW)
OS 4.6 AC
FUTURE ACCESS
RM 22.0 AC
FUTURE ACCESS
DET. POND
CREEKSIDE AT LORSON RANCH
RH 6.8 AC
RLM 7.9 AC
LORSON RANCH EAST
RLM 19.1 AC
LORSON RANCH EAST
TRAPPE DR. RES. COLLECTOR (60' ROW)
POWER LINE EASEMENT 50.3 AC
LORSON BLVD. RESIDENTIAL COLLECTOR (64' ROW)
RM 88.5 AC 7-10 DU/AC
50' DEDICATION FOR FUTURE ROW. SEE SKETCH PLAN NOTE # 10
MERIDIAN RD. FUTURE 100' ROW
CARRIAGE MEADOWS SOUTH
RM 41.4 AC
CARRIAGE MEADOWS SOUTH
RM 16.1 Ac
CREEKSIDE AT LORSON RANCH
RM 17.0 AC
OS 35.6 AC
JIMMY CAMP CREEK EAST TRIBUTARY
JIMMY CAMP CREEK MAIN CHANNEL
FMIC DITCH
7.0 AC
RM 4.5 AC
FMIC DITCH 0.7 AC
TRAIL CORRIDOR
RM 55.7 AC 7-10 DU/AC
TRAIL CORRIDOR
TRAPPE DR. RES. COLLECTOR (60' ROW)
RLM 46.6 AC 4-6 DU/AC
MIN. ONE-HALF ACRE LOT SIZE ALONG SOUTHERN BOUNDARY. NO STRUCTURE SHALL BE PERMITTED WITHIN 100' OF ANY 5+ ACRE SIZED LOT LOCATED ADJACENT TO THE SOUTHERN BOUNDARY
100' STRUCTURE SETBACK
MIN. ONE-HALF ACRE LOT SIZE ALONG SOUTHERN BOUNDARY. NO STRUCTURE SHALL BE PERMITTED WITHIN 100' OF ANY 5+ ACRE SIZED LOT LOCATED ADJACENT TO THE SOUTHERN BOUNDARY
100' STRUCTURE SETBACK
FUTURE FULL MOVEMENT INTERSECTION
JIMMY CAMP CREEK TRAIL
RM 0.9 AC
County Zoning: RR-0.5
Existing Land Use: Residential
City of Fountain Zoning: PUD
Existing Land Use: Vacant/ Closed Golf Course
City of Fountain Zoning: PUD
Existing Land Use: Residential
City of Fountain Zoning: PUD
Existing Land Use: Residential
Peaceful Valley
County Zoning: RR-5
Existing Land Use: Residential
Peaceful Valley
County Zoning: RR-5
Existing Land Use: Residential
Peaceful Valley
County Zoning: RR-5
Existing Land Use: Residential
Peaceful Valley
County Zoning: RR-5
Existing Land Use: Residential

COUNTER MEASURES INC.

1889 YORK STREET
DENVER.COLORADO
303-333-7409

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

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

Groups Printed- VEHICLES

	Marksheffel Rd Southbound				Fontaine Blvd Westbound				Marksheffel Rd Northbound				Fontaine Blvd Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
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

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

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

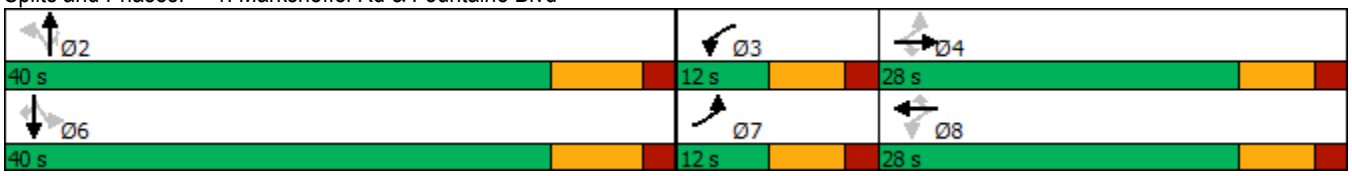
Groups Printed- VEHICLES

	Marksheffel Rd Southbound				Fontaine Blvd Westbound				Marksheffel Rd Northbound				Marksheffel Blvd Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
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	

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		

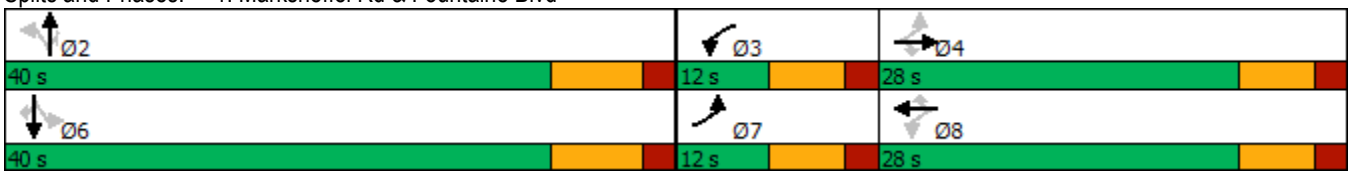
Splits and Phases: 1: Marksheffel Rd & Fountaine Blvd



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	

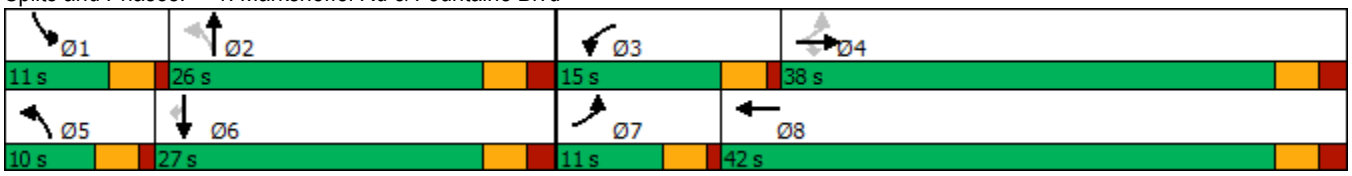
Splits and Phases: 1: Marksheffel Rd & Fountaine Blvd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	354	48	442	1024	606	149	527	178	242	516	45
Future Volume (vph)	38	354	48	442	1024	606	149	527	178	242	516	45
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	pm+pt	NA	Free	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			Free	2		Free			6
Detector Phase	7	4	4	3	8		5	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
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0		9.0	9.0		9.0	9.0	9.0
Total Split (s)	11.0	38.0	38.0	15.0	42.0		10.0	26.0		11.0	27.0	27.0
Total Split (%)	12.2%	42.2%	42.2%	16.7%	46.7%		11.1%	28.9%		12.2%	30.0%	30.0%
Yellow Time (s)	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		1.0	2.0		1.0	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
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	None		None	None	None
Act Effct Green (s)	28.9	21.3	21.3	11.5	31.2	75.6	24.1	16.8	75.6	7.3	17.8	17.8
Actuated g/C Ratio	0.38	0.28	0.28	0.15	0.41	1.00	0.32	0.22	1.00	0.10	0.24	0.24
v/c Ratio	0.16	0.36	0.10	0.87	0.74	0.40	0.55	0.71	0.12	0.75	0.65	0.10
Control Delay	11.5	21.9	0.4	53.9	23.5	0.8	27.8	34.0	0.2	52.9	31.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	21.9	0.4	53.9	23.5	0.8	27.8	34.0	0.2	52.9	31.5	0.4
LOS	B	C	A	D	C	A	C	C	A	D	C	A
Approach Delay		18.5			23.1			25.9			36.1	
Approach LOS		B			C			C			D	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 75.6	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 25.7	Intersection LOS: C
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Marksheffel Rd & Fountaine Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	468	122	732	150	28	978
Future Volume (vph)	468	122	732	150	28	978
Turn Type	Prot	Perm	NA	Free	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		Free	6	
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.0	20.0	20.0		9.0	20.0
Total Split (s)	20.0	20.0	60.0		10.0	70.0
Total Split (%)	22.2%	22.2%	66.7%		11.1%	77.8%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None		None	None
Act Effct Green (s)	12.4	12.4	20.1	44.4	21.7	21.7
Actuated g/C Ratio	0.28	0.28	0.45	1.00	0.49	0.49
v/c Ratio	0.51	0.24	0.48	0.10	0.08	0.64
Control Delay	16.8	5.2	10.5	0.1	6.5	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	5.2	10.5	0.1	6.5	10.6
LOS	B	A	B	A	A	B
Approach Delay	14.4		8.8			10.5
Approach LOS	B		A			B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 44.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 10.8	Intersection LOS: B
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Marksheffel Rd & Lorson Blvd

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	40	0	0	24	0	1166	5	0	763	20
Future Vol, veh/h	0	0	40	0	0	24	0	1166	5	0	763	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	250	-	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	42	0	0	25	0	1227	5	0	803	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	402	-	-	614	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.14	-	-	7.14	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.92	-	-	3.92	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	511	0	0	373	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	511	-	-	373	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

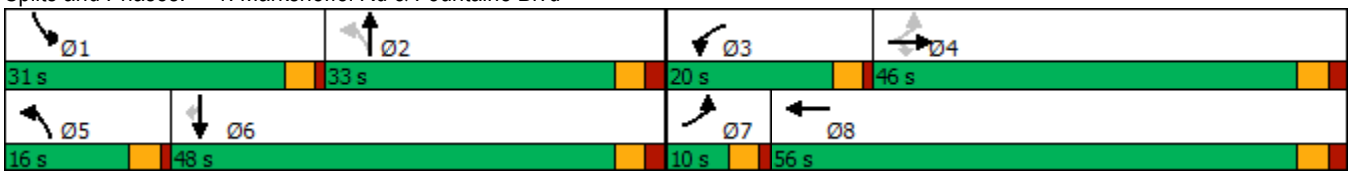
Approach	EB	WB	NB	SB
HCM Control Delay, s	12.7	15.4	0	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	511	373	-	-
HCM Lane V/C Ratio	-	-	0.082	0.068	-	-
HCM Control Delay (s)	-	-	12.7	15.4	-	-
HCM Lane LOS	-	-	B	C	-	-
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	1186	143	338	707	458	116	222	542	774	310	65
Future Volume (vph)	70	1186	143	338	707	458	116	222	542	774	310	65
Turn Type	pm+pt	NA	Perm	Prot	NA	Free	pm+pt	NA	Free	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			Free	2		Free			6
Detector Phase	7	4	4	3	8		5	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
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0		9.0	9.0		9.0	9.0	9.0
Total Split (s)	10.0	46.0	46.0	20.0	56.0		16.0	33.0		31.0	48.0	48.0
Total Split (%)	7.7%	35.4%	35.4%	15.4%	43.1%		12.3%	25.4%		23.8%	36.9%	36.9%
Yellow Time (s)	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		1.0	2.0		1.0	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
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0		4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	None		None	None	None
Act Effct Green (s)	48.0	41.0	41.0	15.2	52.3	113.8	23.7	12.6	113.8	27.0	29.5	29.5
Actuated g/C Ratio	0.42	0.36	0.36	0.13	0.46	1.00	0.21	0.11	1.00	0.24	0.26	0.26
v/c Ratio	0.21	0.95	0.22	0.75	0.44	0.30	0.42	0.58	0.35	0.97	0.34	0.13
Control Delay	15.6	51.8	4.7	59.2	22.8	0.5	29.5	54.4	0.6	68.7	35.9	1.1
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	15.6	51.8	4.7	59.2	22.8	0.5	29.5	54.4	0.6	68.7	35.9	1.1
LOS	B	D	A	E	C	A	C	D	A	E	D	A
Approach Delay		45.2			24.2			18.0			56.1	
Approach LOS		D			C			B			E	

Intersection Summary		
Cycle Length: 130		
Actuated Cycle Length: 113.8		
Natural Cycle: 90		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.97		
Intersection Signal Delay: 36.5	Intersection LOS: D	
Intersection Capacity Utilization 85.6%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 1: Marksheffel Rd & Fountaine Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	329	85	795	532	100	691
Future Volume (vph)	329	85	795	532	100	691
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	9.0	20.0
Total Split (s)	20.0	20.0	60.0	60.0	10.0	70.0
Total Split (%)	22.2%	22.2%	66.7%	66.7%	11.1%	77.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.8	10.8	21.8	21.8	29.1	29.1
Actuated g/C Ratio	0.21	0.21	0.43	0.43	0.57	0.57
v/c Ratio	0.48	0.22	0.55	0.56	0.30	0.39
Control Delay	22.0	7.2	12.8	3.6	6.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	7.2	12.8	3.6	6.9	6.2
LOS	C	A	B	A	A	A
Approach Delay	19.0		9.1			6.3
Approach LOS	B		A			A

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 50.7	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 49.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Marksheffel Rd & Lorson Blvd

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	25	0	0	16	0	733	17	0	1124	60
Future Vol, veh/h	0	0	25	0	0	16	0	733	17	0	1124	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	250	-	-	250
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	26	0	0	17	0	772	18	0	1183	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	592	-	-	386	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.14	-	-	7.14	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.92	-	-	3.92	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	385	0	0	523	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	385	-	-	523	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	12.1	0	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	385	523	-	-
HCM Lane V/C Ratio	-	-	0.068	0.032	-	-
HCM Control Delay (s)	-	-	15	12.1	-	-
HCM Lane LOS	-	-	C	B	-	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	-

LORSON RANCH SKETCH PLAN AMENDMENT 2

APPENDIX A
MARKSHEFFEL ROAD AND LORSON BOULEVARD TRAFFIC CONTROL ANALYSIS

The future intersection of Marksheffel Road/Lorson Boulevard has been analyzed to determine the projected levels of service for the 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, 6th Edition* by the Transportation Research Board. The level of service reports are attached. The projected 2040 total traffic volumes and the results of the analysis are shown in Appendix Figure 1.

Unsignalized (Stop-Sign-Controlled) and Signalized Intersection Traffic Control

The westbound left-turn movement at the intersection of Marksheffel/Lorson is projected to operate at LOS F during the morning and afternoon peak hours if this intersection remains a conventional, stop-sign-controlled, full-movement intersection. Assuming a conventional, signal-controlled intersection, all movements are projected to operate at LOS B or better during the peak hours based on the 2040 total traffic volumes.

Alternative Intersection Configuration/Traffic Control

The following are two potential alternatives to a conventional full-movement intersection (stop-sign controlled or signal controlled, for which analysis results are presented in the preceding paragraph). These include modern roundabout and "channelized T" type intersections.

<u>Modern Roundabout Intersection</u>

A modern roundabout intersection at Lorson/Marksheffel (hypothetically) would initially be a single-lane roundabout but would need to be designed to be expandable to a two-lane roundabout.

By 2040 it was assumed that the intersection would be expanded to a two-lane roundabout. Based on the 2040 total traffic volumes the westbound approach is projected to operate at LOS D (25.5 seconds control delay) during the peak hour.

Advantages

- Generally, modern roundabouts have safety advantages over conventional four-leg signal-controlled intersections. This is because crashes tend to be lower speed, there are fewer conflict points, and the types (angles) of crashes tend to be those that generally result in less severe accidents. Granted, as a conventional T intersection (which would be the case until (and if) a fourth leg is added) this intersection would have significantly fewer conflict points than a four-leg conventional intersection.

- A roundabout may be more aesthetically appealing than a traditional signal-controlled intersection and generally lower traffic noise levels.

- Long-term operation and maintenance cost is likely to be lower with a roundabout than a traffic signal.

Disadvantages

- The travel speed through the intersection compared with a signalized intersection during the signal green phase would be slower for through traffic on Marksheffel Road. This may affect travel times along the corridor if, in the future, other Marksheffel intersections to the north and south are controlled by a series of coordinated traffic signals. However, the average intersection delay should be factored into the overall corridor travel time. This analysis may show no overall disadvantage.

Channelized T Intersection

The channelized T type intersection allows for an intersection with generally lower overall and side-street delay than with a conventional T intersection and with fewer stops for the through traffic on the major roadway when compared to a conventional signalized T intersection. An example of a channelized T-type intersection is at the intersection of US Highway 24 and Garrett Road near Falcon (El Paso County). That particular intersection is signalized with a "directional signal," but a channelized T can also operate as an unsignalized intersection with Stop-sign control on the minor street. Whether signalized or unsignalized, the raised median configuration would allow for "free" (no stopping) movement for the southbound through movement through the intersection. The westbound left turn would cross the northbound lanes and into a channelized southbound left-turn acceleration lane for merging into southbound through traffic.

By 2040 the delay for the westbound left-turn movement is projected to be LOS F during the morning peak hour even with the channelized T. If the channelized T intersection were signalized with a "directional signal," the delay for the westbound left-turn movement is projected to be 21.3 seconds (LOS C).

Advantages

- The intersection of Marksheffel/Lorson could likely operate at a satisfactory level of service as a Stop-sign-controlled intersection for longer as an unsignalized, channelized T intersection than if it were to remain a conventional T intersection.

- Once signal control would be required to maintain an acceptable level of service, the channelized T configuration would result in lower delay for through traffic especially for the southbound traffic, which would operate freely. The overall intersection delay is projected to be lower with a channelized T intersection. Based on the 2040 total morning peak-hour volumes, the projected overall intersection delay is 7.9 seconds per vehicle (LOS A) with a signal-controlled channelized T intersection and 10.8 seconds per

vehicle (LOS B) with a conventional signal-controlled intersection. Based on the 2040 total afternoon peak-hour volumes the projected overall intersection delay is 6.1 seconds per vehicle (LOS A) with a signal-controlled channelized T intersection and 9.8 seconds per vehicle (LOS A) with a conventional signal-controlled intersection.

- There is the potential, depending on the time of day and traffic volumes, to allow for a longer side-street signal phase due to one-way signal progression and no red phase for southbound traffic.

Disadvantages

- The channelized T configuration would only work on an interim basis prior to the addition of a potential fourth leg of this intersection. It is anticipated that development of the Singer property on the west side of Marksheffel Road would result in a request for a full-movement-capable, fourth/west leg of this intersection. If/when that occurs, many of the channelized T improvements would need to be removed or modified.

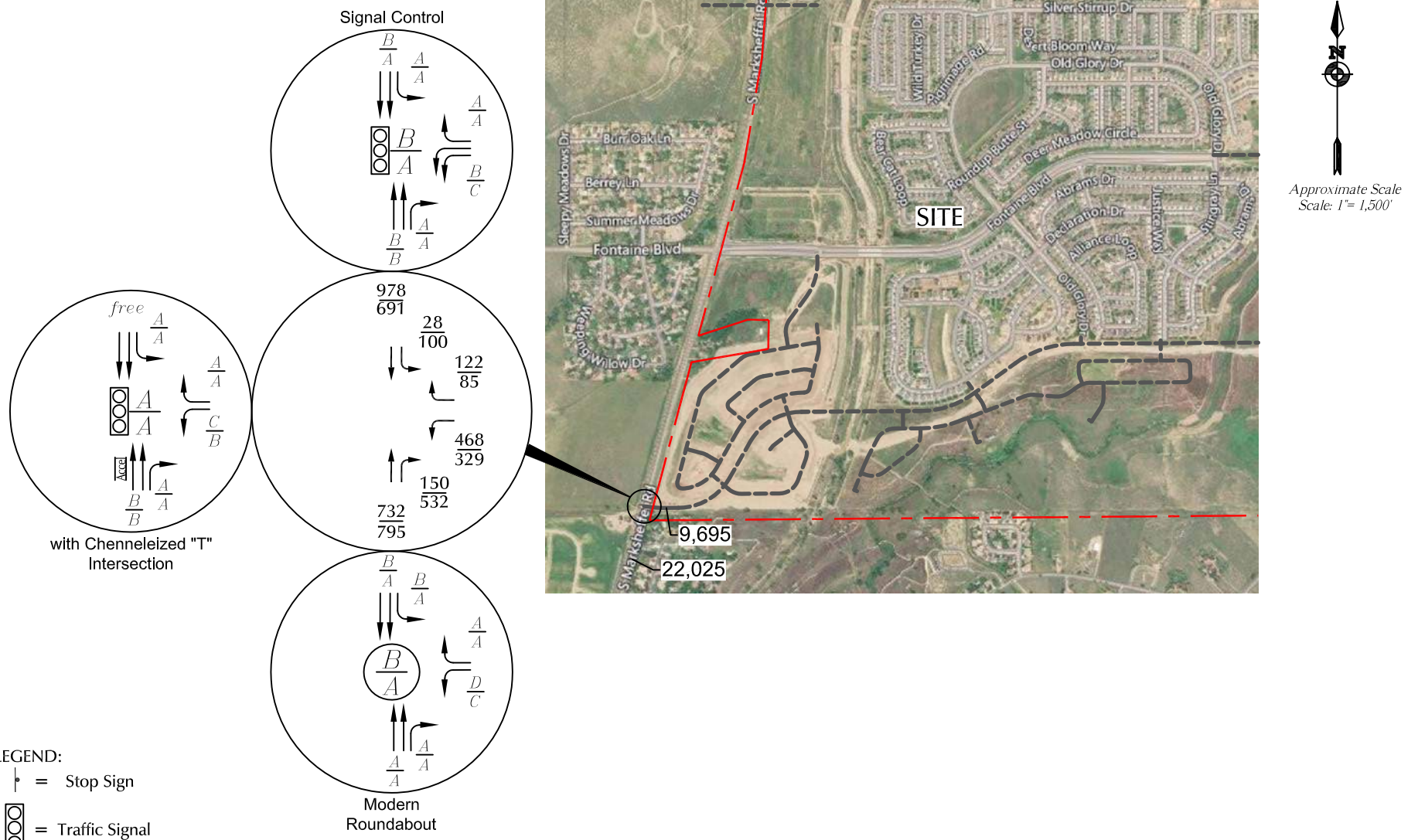
- The channelized T configuration may be confusing for some drivers and the merging movement into southbound traffic requires a more complex movement than with a signal. However, most motorists entering the intersection from the east would be regular users and would quickly learn to navigate the intersection.

- A channelized T intersection would require the construction of raised channelizing medians on Marksheffel Road and the ongoing maintenance of those medians.

- The section of Marksheffel Road between Lorson Boulevard and Poa Annua would need to be designed to accommodate a southbound left-turn acceleration lane from Lorson Boulevard, a taper, and a southbound left-turn lane approaching Poa Annua. Based on a posted speed limit of 55 mph, the El Paso County *Engineering Criteria Manual* (ECM) requires a 960-foot-long acceleration lane plus a 222-foot taper. Based on a design speed of 60 mph the ECM requires a 290-foot-long left-turn lane approach Poa Annua plus 50 to 75 feet of storage length. The total length of the acceleration lane, taper, and left-turn lane would be between 1,522 and 1,547 feet. The total distance between Lorson Boulevard and Poa Annua street is about 1,025 feet centerline to centerline. The construction of a channelized T intersection would therefore require a deviation(s) to the ECM.

- A channelized T can be more difficult for pedestrians than a conventional signalized intersection. However, there may be ways to better accommodate pedestrians – such as adding a pedestrian-only phase for southbound traffic. More research would be needed regarding pedestrian accommodation.

Enclosures: Figure 1
Level of Service Reports



LEGEND:

= Stop Sign

= Traffic Signal

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

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

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

X,XXX= Average Daily Traffic (vehicles per day) (Estimates by LSC)

Appendix Figure 1

2040 Total Traffic, Lane Geometry, Traffic Control and Level of Service

Lorson Ranch Sketch Plan 2018 Amendment (LSC #184890)

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

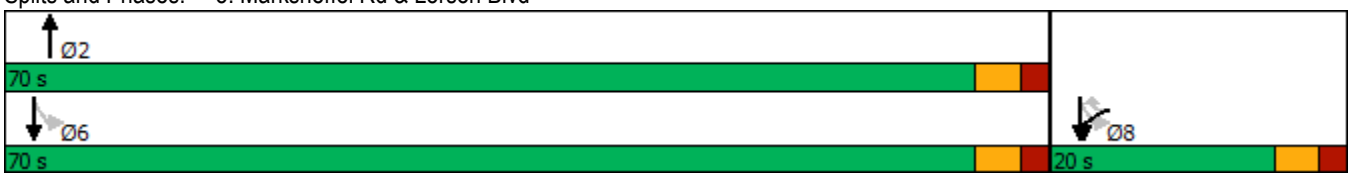
Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	621	929	1058
Demand Flow Rate, veh/h	634	947	1080
Vehicles Circulating, veh/h	786	30	503
Vehicles Exiting, veh/h	191	1553	917
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	21.7	5.9	13.4
Approach LOS	C	A	B

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	LT	TR
RT Channelized						
Lane Util	0.793	0.207	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	503	131	445	502	508	572
Cap Entry Lane, veh/h	655	728	1313	1384	850	926
Entry HV Adj Factor	0.980	0.977	0.981	0.980	0.979	0.981
Flow Entry, veh/h	493	128	436	492	497	561
Cap Entry, veh/h	642	711	1288	1357	832	908
V/C Ratio	0.768	0.180	0.339	0.363	0.598	0.618
Control Delay, s/veh	25.5	7.1	5.9	6.0	13.5	13.2
LOS	D	A	A	A	B	B
95th %tile Queue, veh	7	1	2	2	4	4

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø6
Lane Configurations							
Traffic Volume (vph)	468	122	732	150	28	978	
Future Volume (vph)	468	122	732	150	28	978	
Turn Type	Prot	Perm	NA	Free	Perm	NA	
Protected Phases	8!		2			8 6!	6
Permitted Phases		8		Free	8 6!		
Detector Phase	8	8	2		8 6	8 6	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0				4.0
Minimum Split (s)	20.0	20.0	20.0				20.0
Total Split (s)	20.0	20.0	70.0				70.0
Total Split (%)	22.2%	22.2%	77.8%				78%
Yellow Time (s)	3.0	3.0	3.0				3.0
All-Red Time (s)	2.0	2.0	2.0				2.0
Lost Time Adjust (s)	0.0	0.0	0.0				
Total Lost Time (s)	5.0	5.0	5.0				
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None				None
Act Effct Green (s)	15.1	15.1	14.5	39.6	39.6	39.6	
Actuated g/C Ratio	0.38	0.38	0.37	1.00	1.00	1.00	
v/c Ratio	0.73	0.19	0.60	0.10	0.05	0.31	
Control Delay	21.3	3.5	12.2	0.1	0.2	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.3	3.5	12.2	0.1	0.2	0.3	
LOS	C	A	B	A	A	A	
Approach Delay	17.7		10.1			0.2	
Approach LOS	B		B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 39.6	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 7.9	Intersection LOS: A
Intersection Capacity Utilization 61.3%	ICU Level of Service B
Analysis Period (min) 15	
! Phase conflict between lane groups.	

Splits and Phases: 5: Marksheffel Rd & Lorson Blvd



Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

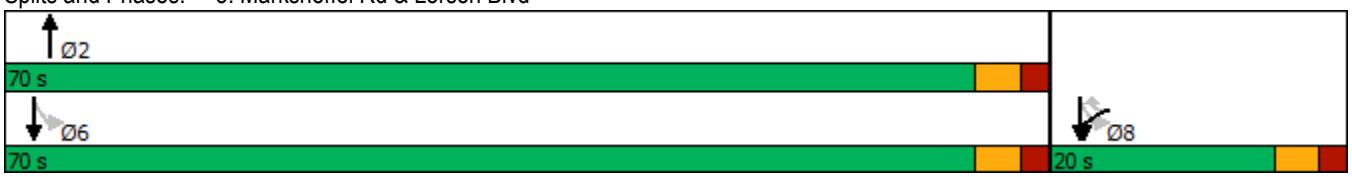
Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	435	1397	832
Demand Flow Rate, veh/h	444	1425	849
Vehicles Circulating, veh/h	854	107	353
Vehicles Exiting, veh/h	678	1095	945
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.6	9.5	8.3
Approach LOS	B	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	LT	TR
RT Channelized						
Lane Util	0.795	0.205	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	353	91	670	755	399	450
Cap Entry Lane, veh/h	615	687	1223	1297	976	1052
Entry HV Adj Factor	0.980	0.978	0.980	0.981	0.981	0.980
Flow Entry, veh/h	346	89	657	741	391	441
Cap Entry, veh/h	603	672	1199	1272	957	1031
V/C Ratio	0.574	0.132	0.548	0.582	0.409	0.428
Control Delay, s/veh	16.6	6.8	9.3	9.6	8.4	8.2
LOS	C	A	A	A	A	A
95th %tile Queue, veh	4	0	3	4	2	2

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø6
Lane Configurations							
Traffic Volume (vph)	329	85	795	532	100	691	
Future Volume (vph)	329	85	795	532	100	691	
Turn Type	Prot	Perm	NA	Free	Perm	NA	
Protected Phases	8!		2			8 6!	6
Permitted Phases		8		Free	8 6!		
Detector Phase	8	8	2		8 6	8 6	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0				4.0
Minimum Split (s)	20.0	20.0	20.0				20.0
Total Split (s)	20.0	20.0	70.0				70.0
Total Split (%)	22.2%	22.2%	77.8%				78%
Yellow Time (s)	3.0	3.0	3.0				3.0
All-Red Time (s)	2.0	2.0	2.0				2.0
Lost Time Adjust (s)	0.0	0.0	0.0				
Total Lost Time (s)	5.0	5.0	5.0				
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None				None
Act Effct Green (s)	15.1	15.1	15.8	40.9	40.9	40.9	
Actuated g/C Ratio	0.37	0.37	0.39	1.00	1.00	1.00	
v/c Ratio	0.53	0.14	0.61	0.35	0.21	0.22	
Control Delay	14.7	3.9	12.1	0.6	0.9	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	14.7	3.9	12.1	0.6	0.9	0.2	
LOS	B	A	B	A	A	A	
Approach Delay	12.5		7.5			0.3	
Approach LOS	B		A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 40.9	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 6.1	Intersection LOS: A
Intersection Capacity Utilization 58.2%	ICU Level of Service B
Analysis Period (min) 15	
! Phase conflict between lane groups.	

Splits and Phases: 5: Marksheffel Rd & Lorson Blvd



Markup Summary

dsdrice (15)

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Author: dsdrice
Date: 2/6/2019 10:00:10 PM
Color:

Subject: Highlight
Page Label: 9
Author: dsdrice
Date: 2/6/2019 10:00:30 PM
Color:

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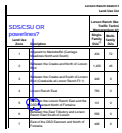
Author: dsdrice
Date: 2/6/2019 10:01:14 PM
Color:

Subject: Highlight
Page Label: 19
Author: dsdrice
Date: 2/6/2019 10:02:46 PM
Color:

DSD

Subject: Highlight
Page Label: 19
Author: dsdrice
Date: 2/6/2019 10:02:49 PM
Color:

DSD



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Author: dsdrice
Date: 2/6/2019 10:04:01 PM
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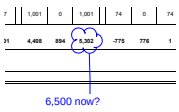
SDS/CSU OR powerlines?



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6,500 now?

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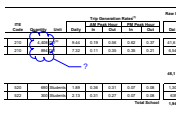
Date: 2/6/2019 10:06:46 PM
Color:



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Date: 2/6/2019 10:07:25 PM
Color:

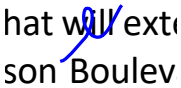
?

Subject: Cloud+
Page Label: 4
Author: dsdrice
Date: 2/6/2019 3:19:26 PM
Color:

Needs to be based on the total allowed by the SKP since the purpose is to shift density to the east.

Subject: Callout
Page Label: 5
Author: dsdrice
Date: 2/6/2019 3:20:55 PM
Color:

existing and



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Author: dsdrice
Date: 2/6/2019 3:21:06 PM
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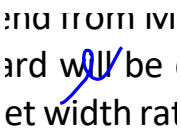
Delete



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Date: 2/6/2019 3:21:15 PM
Color:

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Page Label: 1
Author: dsdrice
Date: 2/6/2019 3:22:29 PM
Color:

See comment letter.

Subject: Cloud+
Page Label: 6
Author: dsdrice
Date: 2/6/2019 9:52:09 PM
Color:

They need to be if the Sketch Plan is reserving the right to develop 6500 DU by shifting density to the undeveloped ares to the east.

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jchodsdon (2)

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Page Label: 23
Author: jchodsdon
Date: 6/22/2018 3:18:31 PM
Color:

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Page Label: 24
Author: jchodsdon
Date: 6/22/2018 3:18:46 PM
Color: