



LSC TRANSPORTATION CONSULTANTS, INC.  
545 East Pikes Peak Avenue, Suite 210  
Colorado Springs, CO 80903  
(719) 633-2868  
FAX (719) 633-5430  
E-mail: [lsc@lsctrans.com](mailto:lsc@lsctrans.com)  
Website: <http://www.lsctrans.com>

## Copper Chase at Sterling Ranch Traffic Technical Memorandum (LSC #184990) December 20, 2018

### Traffic Engineer's Statement

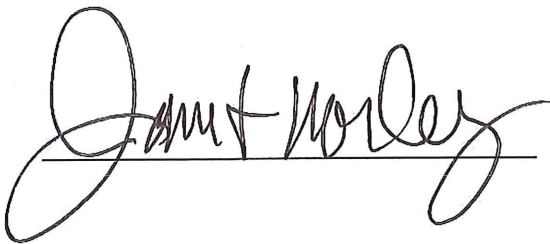
This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Staff has concerns with the actual construction of roads. Depending on another development or sub. is not realistic. Already the overall applicant has changed the phasing multiple times. Address Option A and B to get roads done. Two points of access are required.

### 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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December 20, 2018

Mr. Jim Byers  
Challenger Homes  
8605 Explorer Drive, Suite 250  
Colorado Springs, CO 80920

RE: Copper Chase at Sterling Ranch  
El Paso County, CO  
Traffic Technical Memorandum  
LSC #184990

Dear Mr. Byers:

LSC Transportation Consultants, Inc. has prepared this traffic technical memorandum for Copper Chase at Sterling Ranch. As shown on Figure 1, Sterling Ranch is located east of Vollmer Road near Lochwinnoch Lane between the future extensions of Marksheffel Road and Stapleton Drive in El Paso County, Colorado. LSC prepared a traffic impact study (TIS) for the entire Sterling Ranch development dated June 5, 2008. LSC also prepared a traffic impact analysis for the first phase of the Sterling Ranch development dated March 16, 2015. Since completion of that report, several transportation memoranda regarding the Sterling Ranch development have been prepared, including a memorandum for Phases 1-3 dated October 2, 2017 and site-specific, final plat traffic reports for Branding Iron at Sterling Ranch Filing No. 1 and Homestead at Sterling Ranch Filing No. 1 dated December 19, 2017 and Sterling Ranch Filing No. 2 dated April 3, 2018. The 2015 report and the 2017 memorandum included the parcels currently proposed as Copper Chase at Sterling Ranch. This report is intended as a site-specific, final plat traffic report for the currently proposed Copper Chase at Sterling Ranch.

## REPORT CONTENTS

This report presents:

- The existing roadway and traffic conditions in the site's vicinity including the roadway widths, surface conditions, lane geometries, traffic controls, and posted speed limits.
- Current traffic volume data.
- Estimates of projected intermediate-term (2025) traffic volumes.
- The projected average weekday and peak-hour vehicle-trips to be generated by the proposed development.
- The assignment of the projected site-generated traffic volumes to the area roadways.

- The projected short-term total traffic volumes on the area roadways.
- The projected levels of service at the key intersections in the vicinity of the site.
- The recommended street classifications for the internal streets within the proposed development.
- Roadway capacity of the proposed Vollmer Road interim cross section.
- An evaluation of the ability of the short-term roadway improvements to accommodate the projected short-term traffic volumes.
- The project's obligation (if any) to the County roadway improvement fee program.

## LAND USE AND ACCESS

The Copper Chase at Sterling Ranch site is located northeast of the future intersection of Vollmer Road and Marksheffel Road. Figure 2 shows the location of the site in relation to other filings within the Sterling Ranch development that are either approved or currently under review. The Copper Chase at Sterling Ranch parcel is included in a proposed Sketch Plan Amendment also currently under review. The amendment would increase the density for this parcel from 3 to 5 dwelling units per acre to 5 to 8 dwelling units per acre. LSC prepared a traffic technical memorandum regarding this amendment dated October 30, 2018. As stated in that letter, although the amendment would increase the number of dwelling units in the parcel now planned as Copper Chase at Sterling Ranch the overall number of dwelling units in the areas of the Sterling Ranch development adjacent to Vollmer Road between Marksheffel Road and Briargate Parkway have decreased from what was shown in the previously approved Sketch Plan.

Copper Chase at Sterling Ranch is planned to include 67 duplexes (134 total dwelling units). Access is proposed to Vollmer Road via Alzada Drive and to Sterling Ranch Road via Bynum Drive. The site plan is shown in Figure 2. Alzada Drive and Bynum Drive are both planned to be constructed as Urban Local streets as part of Sterling Ranch Filing No. 2.

## ROADWAY AND TRAFFIC CONDITIONS

The roadways in the site's vicinity are shown on Figure 1 and are described below.

**Vollmer Road** is currently a five-lane urban street within the City of Colorado Springs limits between Black Forest Road and Cowpoke Road; and a two-lane, rural, paved roadway north of Cowpoke Road extending to north of Hodgen Road. In the southbound direction, Vollmer Road has a posted speed limit of 45 miles per hour (mph). South of Cowpoke Road, Vollmer Road has a 40-mph posted speed limit. The 2040 El Paso County *Major Transportation Corridors Plan* (MTCP) and the Sterling Ranch master traffic study show Vollmer Road as a four-lane Urban Minor Arterial in the vicinity of the site. In the interim, auxiliary turn lanes will be completed on Vollmer Road as shown in the attached exhibits and as per the attached memo by LSC dated October 2, 2017.

as a 4-lane road?

**Marksheffel Road** is a Principal Arterial extending north from the City of Fountain to Woodmen Road. Marksheffel Road is planned to ultimately be widened to six lanes and extended north and west from Woodmen Road to connect to Research Parkway at Black Forest Road. Marksheffel Road is shown as a six-lane Principal Arterial through the site on the El Paso County MTCP. Marksheffel Road is planned to be constructed north from Woodmen Road to Vollmer Road in the short-term future.

**Briargate Parkway** is a six-lane, Principal Arterial that extends east from I-25 to Grand Lawn Circle (about one-half mile east of Powers Boulevard). Briargate Parkway is planned to ultimately extend to Towner Drive. With the Sterling Ranch Phase 1 development, Stapleton Road is planned to be constructed as a two-lane roadway between Vollmer Road and the proposed first site access intersection 750 feet east of Vollmer. For this report of short-term conditions, it was assumed that only this section of Briargate Parkway would be constructed in the vicinity of the site.

**Sterling Ranch Road** is a planned Non-Residential Collector shown extending through the Sterling Ranch development between Marksheffel Road and Stapleton Drive. Sterling Ranch Road is planned to be constructed between Marksheffel Road and Dines Boulevard as part of Sterling Ranch Filing No. 2 now under review by the County.

## EXISTING TRAFFIC VOLUMES

Figure 3 shows the existing daily and peak-hour traffic volumes on Vollmer Road in the vicinity of the site. The traffic volumes are from the attached traffic counts conducted adjacent to the site in September 2017. Figure 3 also shows the average weekday traffic volumes on Vollmer Road based on 24-hour machine (tube) counts conducted in September 2017.

## 2025 BACKGROUND TRAFFIC

Figure 4 shows the projected 2025 background traffic volumes. Background traffic is the traffic estimated to be on the roadways without the Copper Chase at Sterling Ranch traffic. Background traffic includes the existing traffic volumes (from Figure 3) plus increases in through traffic due to regional growth plus traffic estimated to be generated by buildout of the residential portion of Sterling Ranch Phases 1 and 2 and the proposed Retreat at Timber Ridge development to be located generally northeast of the intersection of Vollmer Road and Poco Road. The 2025 background traffic volumes assume Marksheffel Road has been constructed between Woodmen Road and Vollmer Road but not west of Vollmer Road. The 2025 background volumes also assume only the short section of Briargate Parkway between Vollmer Road and Wheatland Drive has been constructed in the vicinity of the site.

Figure 4 also shows the lane geometry, traffic control, and level of service at the key intersections based on the short-term background volumes.



## **TRIP GENERATION**

The site-generated vehicle-trips were estimated using the nationally published trip generation rates from *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 1 shows the current trip generation estimate.

As shown in Table 1, Copper Chase at Sterling Ranch is projected to generate about 1,265 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 25 vehicles would enter and 74 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 84 vehicles would enter and 49 vehicles would exit the site.

## **SHORT-TERM DIRECTIONAL 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. The specific distribution estimates are shown in Figure 5. The directional distribution estimates are based on the following factors: the location of the site with respect to the Colorado Springs metropolitan area, the planned access system for the site, the street and roadway system serving the site, and the land uses proposed for the site.

When the distribution percentages (from Figure 5) are applied to the trip generation estimates (from Table 1), the resulting site-generated traffic volumes can be determined. Figure 6 shows the short-term site-generated traffic volume estimate.

## **INTERMEDIATE-TERM (2025) TOTAL TRAFFIC**

Figure 7 shows the projected total traffic volumes for the intermediate term. Total traffic volumes include 2025 background through traffic on Vollmer Road (from Figure 4) plus the short-term site-generated traffic volumes (from Figure 6).

## **LONG-TERM TRAFFIC**

Please refer to the master traffic report—the June 5, 2008 Sterling Ranch Updated Traffic Impact Analysis by LSC—for the long-term peak-hour traffic volume projections and level of service analysis. The original report is for the entire Sterling Ranch Sketch Plan.

## **ESTIMATED VOLLMER ROAD IMPROVEMENTS/CAPACITY**

Currently the MTCP indicates a capacity of existing Vollmer Road to be about 6,000 vehicles per day. The El Paso County *Engineering Criteria Manual* (ECM) indicates the average daily traffic (ADT) capacity

of an ECM-standard rural minor arterial (two lanes) to be 10,000 vehicles per day. However, the proposed interim cross section is a hybrid between urban and rural cross sections and would include auxiliary turn lanes. With the addition of ECM-standard auxiliary right- and left-turn deceleration lanes, LSC estimates the capacity to be about 14,000 vehicles per day through the area of the improved cross section. This is comparable to the fee study estimate of the capacity of Fontaine Boulevard west of Marksheffel, which has a two-lane cross section and auxiliary turn lanes.

The projected intermediate-term total traffic volume as shown in Figure 7 would be 8,945 vehicles per day just south of Marksheffel Road. This volume is below the estimated capacity of 14,000 vehicles per day for a roadway of this cross section.

**PROJECTED INTERSECTION 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.

<b>Table 2</b>			
<b>Intersection Levels of Service Delay Ranges</b>			
<b>Level of Service</b>	<b>Signalized Intersections</b>		<b>Unsignalized Intersections</b>
	<b>Average Control Delay (seconds per vehicle)</b>	<b>V/C<sup>(1)</sup></b>	<b>Average Control Delay (seconds per vehicle)<sup>(2)</sup></b>
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 key area intersections were analyzed to determine the projected levels of service for the intermediate-term background and total traffic volumes based on the unsignalized intersection analysis procedures from the *Highway Capacity Manual 6<sup>th</sup> Edition*. Figures 4 and 7 show the level of service analysis results. The level of service reports are attached.

All of the intersections analyzed are projected to operate at a level of service C or better for all movements as stop-sign-controlled intersections.

### SUBDIVISION STREET CLASSIFICATIONS

All of the internal streets within Copper Chase at Sterling Ranch are proposed to be private.

### ROADWAY IMPROVEMENTS

#### Vollmer Road

also?

provide proposed phasing plan

Based on the projected 2025 total traffic volumes, the criteria contained in the El Paso County *Engineering Criteria Manual*, and the classification of Vollmer Road as a Minor Arterial, northbound right-turn deceleration lanes would be required on Vollmer Road approaching Marksheffel Road and Alzada Drive. A southbound left-turn lane would only be required approaching Marksheffel Road. **However, the road improvements required as part of the Subdivision Improvements Agreement (SIA) for Homestead at Sterling Ranch Filing No. 1 and Branding Iron at Sterling Ranch Filing No. 1 must be constructed. These include auxiliary turn lanes on Vollmer Road** as discussed in our October 2, 2017 transportation memorandum. The applicant will be constructing an interim cross section for Vollmer Road between Marksheffel Road and Briargate Parkway. The interim road improvement would widen the roadway to the east side. There would continue to be one through lane in each direction, but the interim road improvements would allow for southbound left-turn and northbound right-turn lanes at the Briargate Parkway/Vollmer and Dines/Vollmer intersections. An escrow agreement requires a fair share contribution be deposited toward these improvements with each plat or replat within Sterling Ranch.

#### Sterling Ranch Road

Based on the projected 2025 total traffic volumes, the criteria contained in the El Paso County *Engineering Criteria Manual*, and the classification of Sterling Ranch Road as an Urban Non-Residential Collector, a westbound right-turn deceleration lane would **not** be required approaching Bynum Drive.

Based on the projected 2025 total traffic volumes, the criteria contained in the El Paso County *Engineering Criteria Manual* and the classification of Sterling Ranch Road as an Urban Non-Residential Collector, a northbound left-turn lane would be required approaching Bynum Drive. The standard Urban Non-Residential Collector cross-section provides one through lane in each direction plus a center two-way left-turn lane. This center painted median would accommodate left turns at this intersection.

\* \* \* \* \*

Address Marksheffel Road, Bynum Dr., and Alzada Drive.

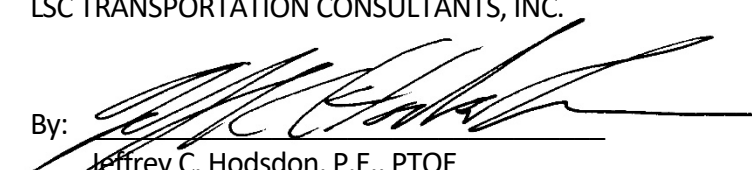
Provide additional analysis for the time in which Marksheffel Road is not connected to the south.

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

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By:

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

JCH/KDF:bjwb

Enclosures: Table 1  
Figures 1-7  
Traffic Count Reports  
Level of Service Reports  
Sterling Ranch – Vollmer Road Street Improvement Plans  
Transportation Memo dated October 2, 2017

Provide a summary table of all  
improvements necessary to be in place  
for this development.

**Table 1**  
**Trip Generation Estimate**  
**Copper Chase at Sterling Ranch**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total External Trips Generated					
			Average Weekday Traffic	Morning Peak Hour		Evening Peak Hour		Average Weekday Traffic	Morning Peak Hour		Evening Peak Hour	
				In	Out	In	Out		In	Out	In	Out
210	Single-Family Detached Housing	134 DU <sup>(2)</sup>	9.44	0.19	0.56	0.62	0.37	1,265	25	74	84	49

Notes:

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

(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.



Approximate Scale  
Scale: 1" = 3,000'

Figure 1  
**Vicinity  
Map**

Copper Chase at Sterling Ranch (LSC #184990)

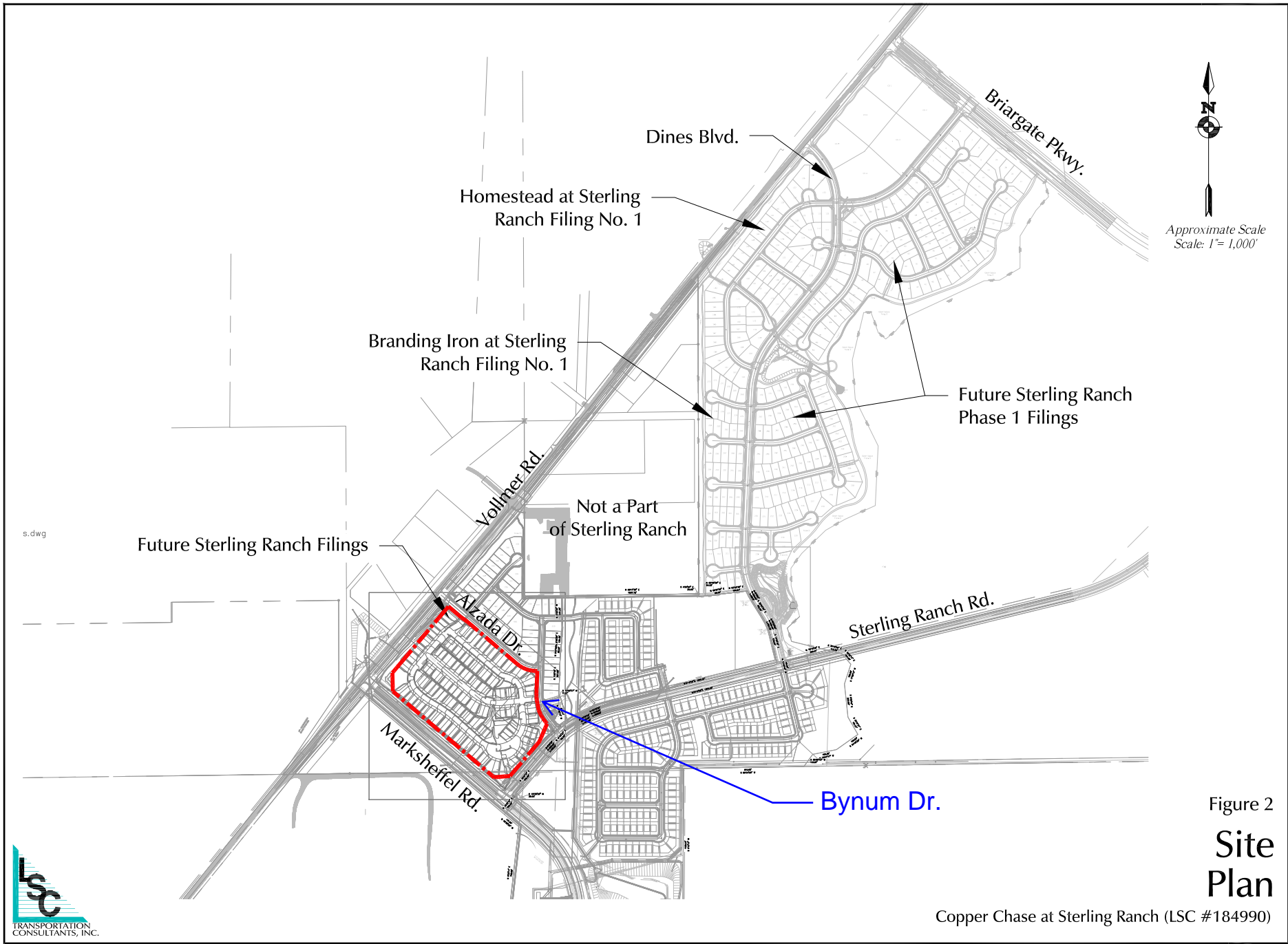


Figure 2

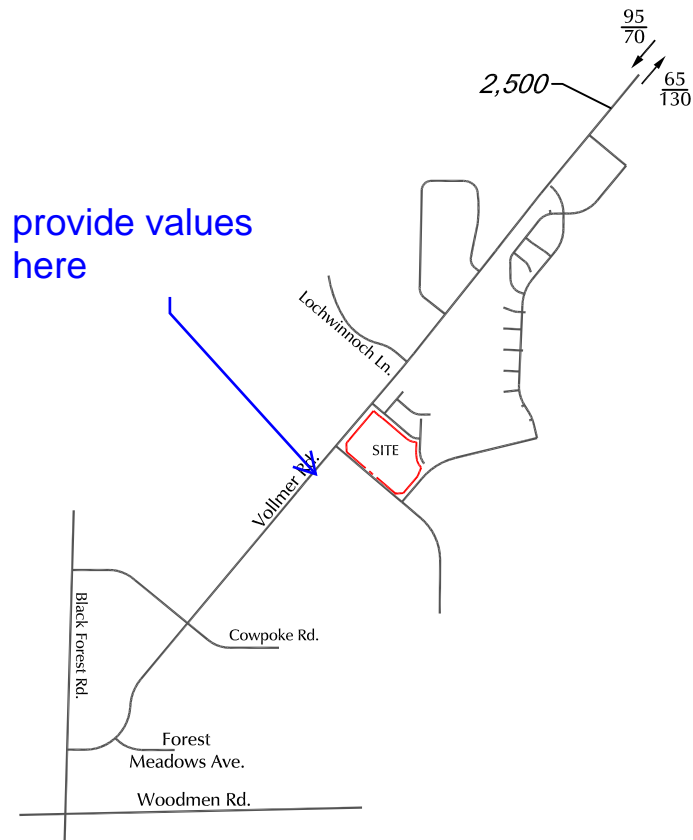
# Site Plan

Copper Chase at Sterling Ranch (LSC #184990)





Approximate Scale  
Scale: 1" = 3,000'



LEGEND:

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

XXX = Average Weekday Traffic (vehicles per day) September 2017



Figure 3

# Existing Traffic Volumes

Copper Chase at Sterling Ranch (LSC #184990)

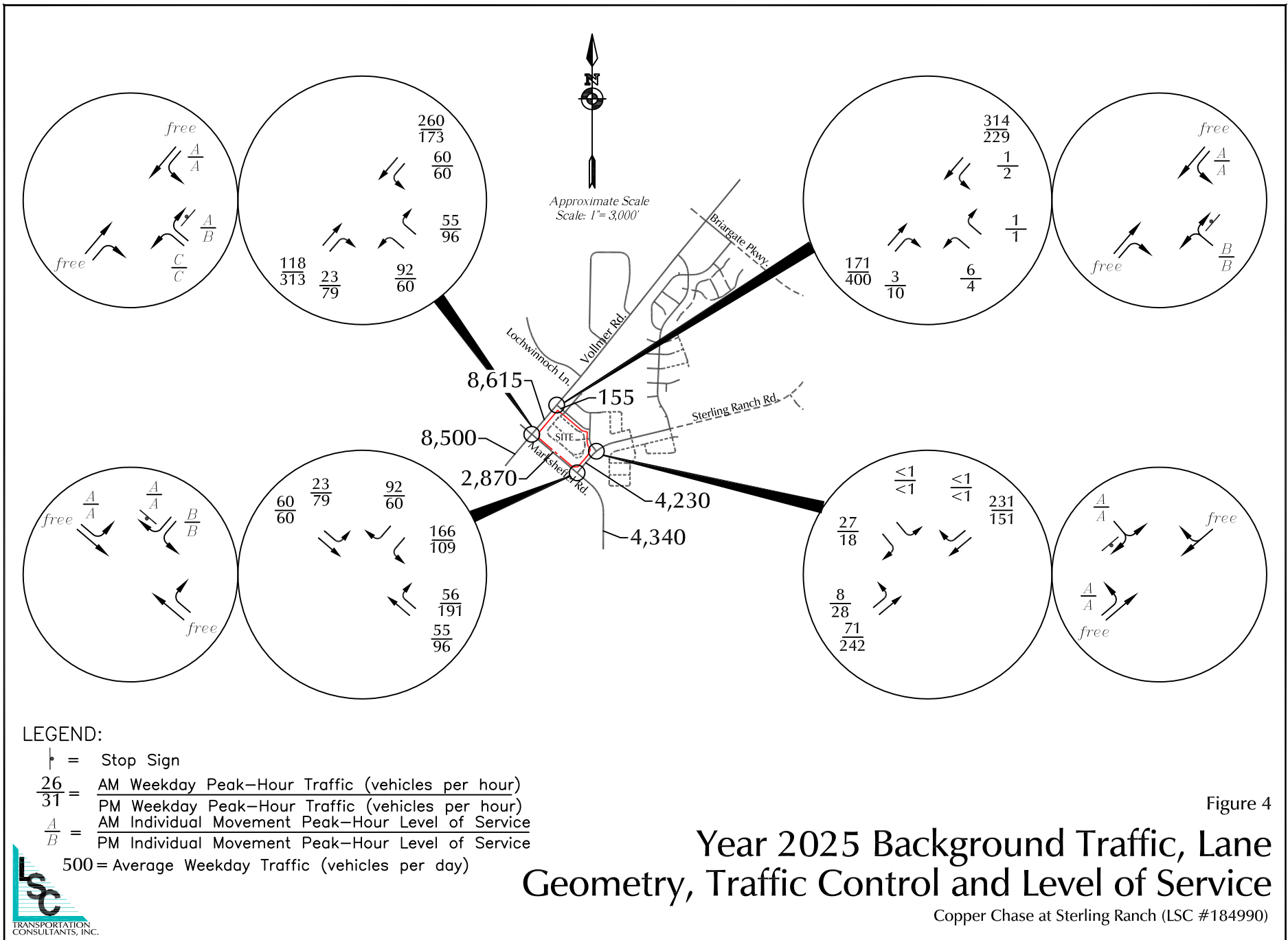


Figure 4

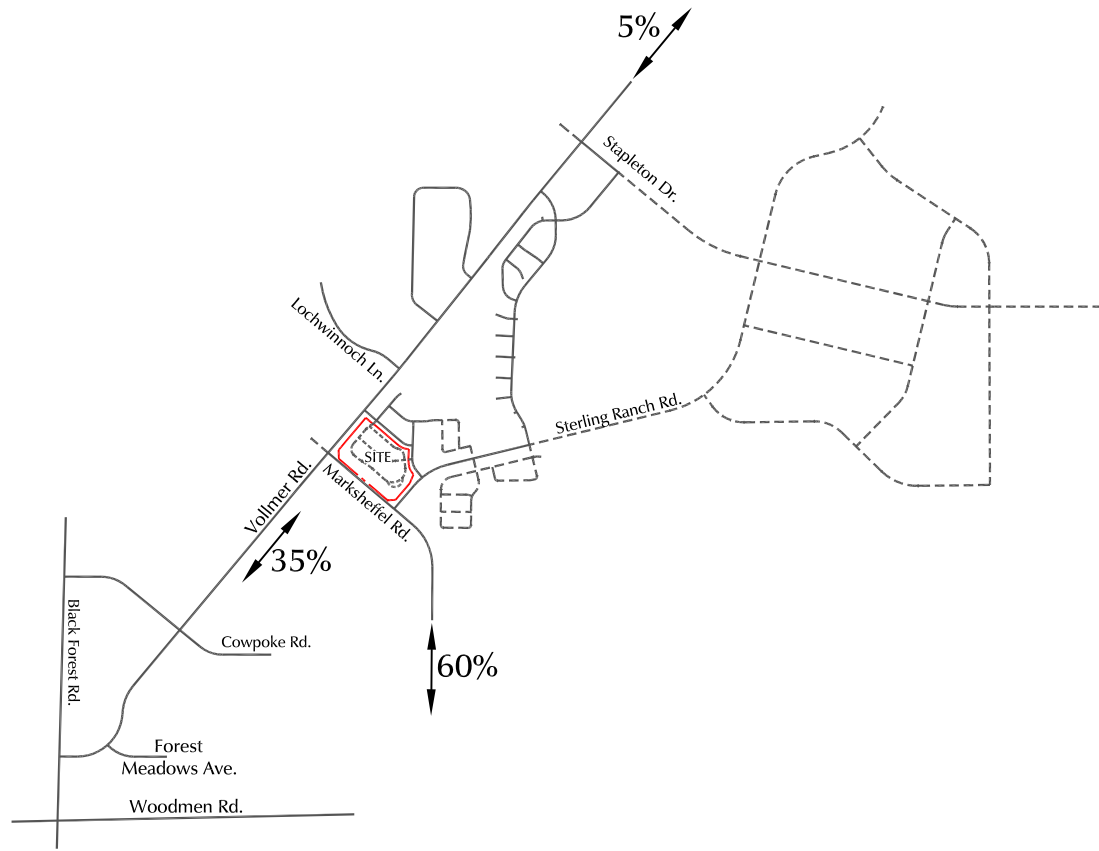
# Year 2025 Background Traffic, Lane Geometry, Traffic Control and Level of Service

Copper Chase at Sterling Ranch (LSC #184990)





Approximate Scale  
Scale: 1" = 3,000'

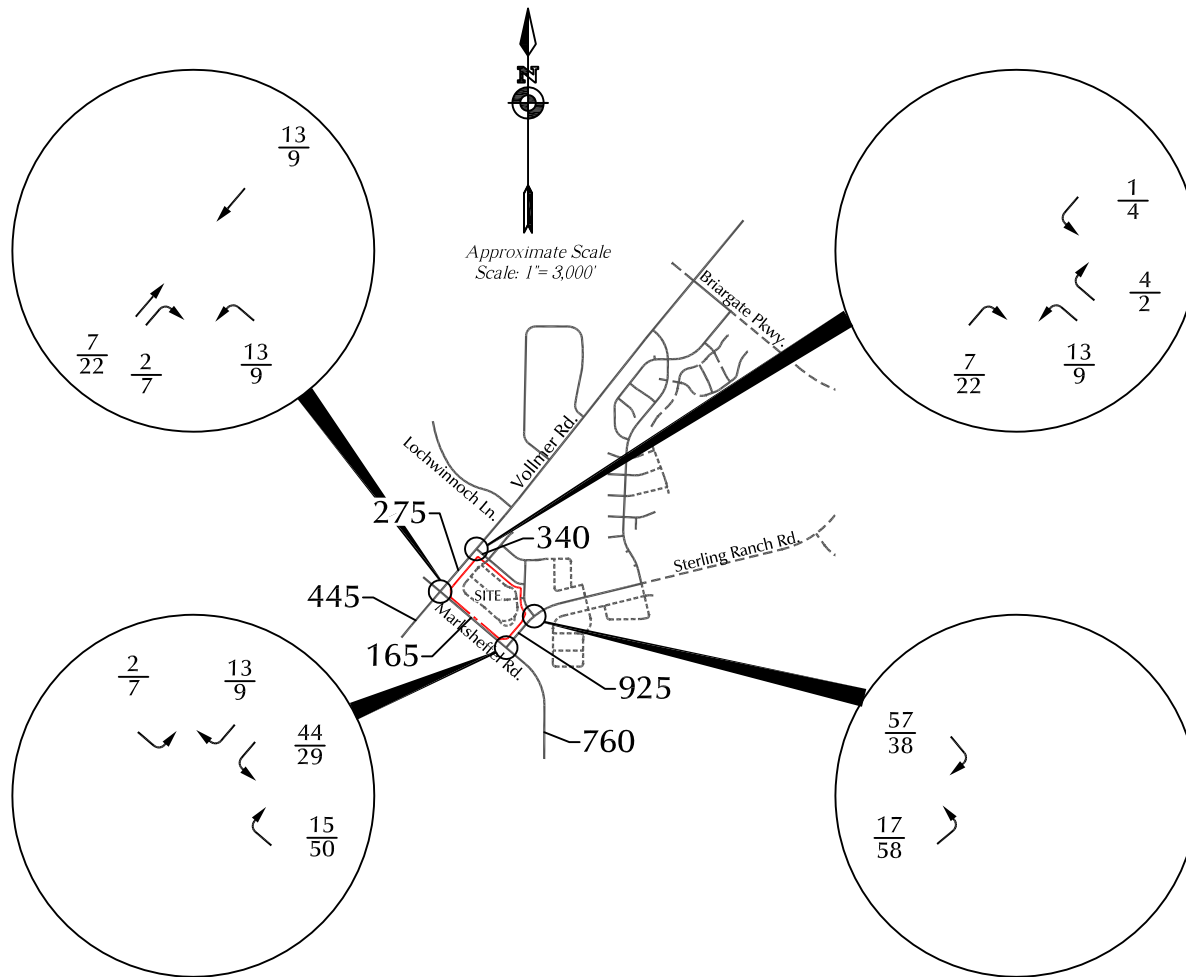


LEGEND:

 35% = Percent Directional Distribution Residential



Figure 5  
**Short-Term Directional Distribution  
of Site-Generated Traffic**  
Copper Chase at Sterling Ranch (LSC #184990)



LEGEND:

$\frac{26}{31} = \frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$

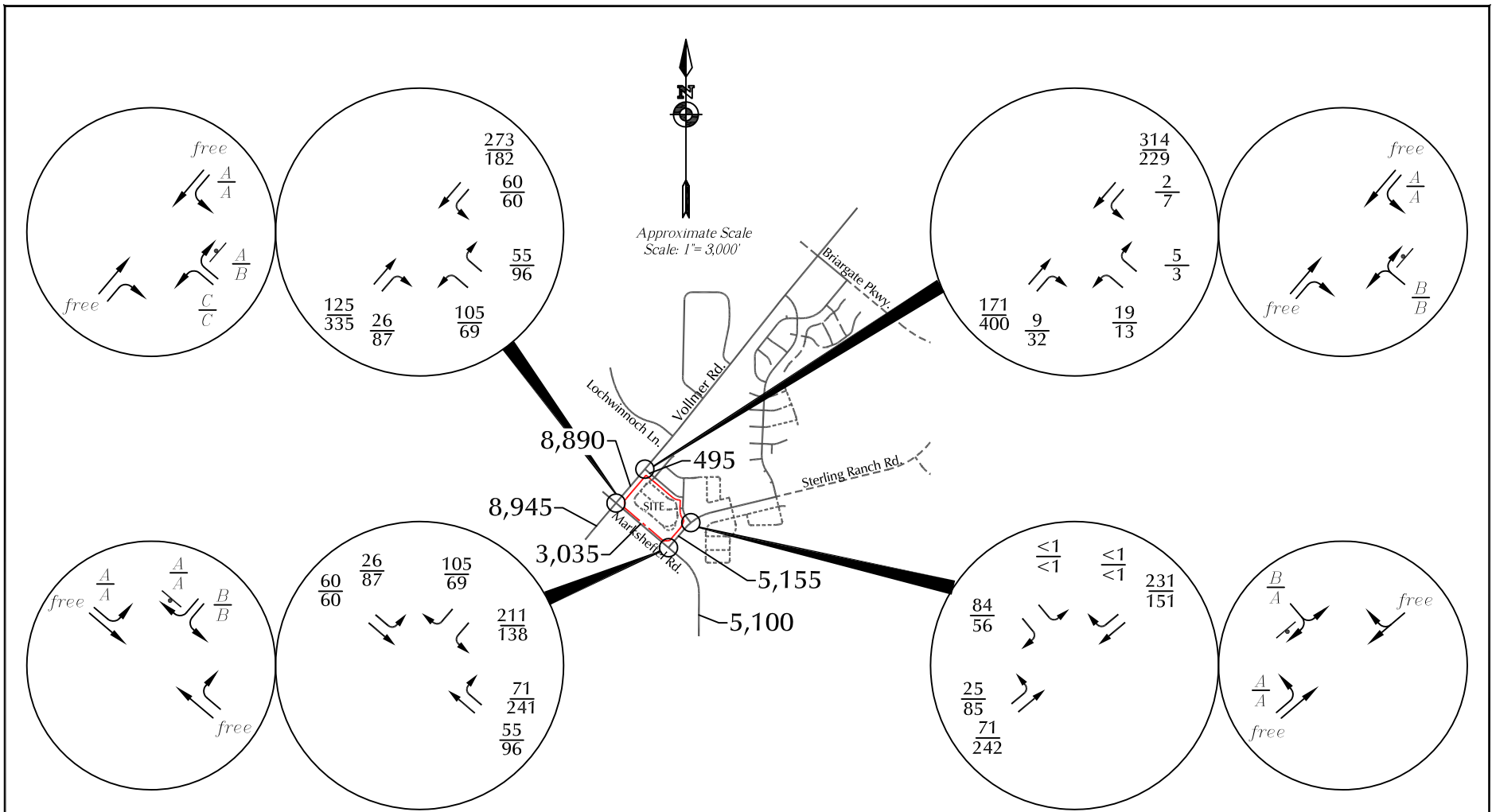
500 = Average Weekday Traffic (vehicles per day)



Figure 6

# Assignment of Site-Generated Traffic

Copper Chase at Sterling Ranch (LSC #184990)



LEGEND:

⊥ = Stop Sign

$\frac{26}{31}$  = 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

500 = Average Weekday Traffic (vehicles per day)



Figure 7  
Year 2025 Total Traffic, Lane  
Geometry, Traffic Control and Level of Service

Copper Chase at Sterling Ranch (LSC #184990)



Intersection						
Int Delay, s/veh	3.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	92	55	118	23	60	260
Future Vol, veh/h	92	55	118	23	60	260
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	100	60	128	25	74	321

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	597	128	0	0	153
Stage 1	128	-	-	-	-
Stage 2	469	-	-	-	-
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	466	922	-	-	1428
Stage 1	898	-	-	-	-
Stage 2	630	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	442	922	-	-	1428
Mov Cap-2 Maneuver	442	-	-	-	-
Stage 1	851	-	-	-	-
Stage 2	630	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	442	922	1428	-
HCM Lane V/C Ratio	-	-	0.226	0.065	0.052	-
HCM Control Delay (s)	-	-	15.5	9.2	7.7	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	0.9	0.2	0.2	-



Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑	↗↘	↘↗	↑
Traffic Vol, veh/h	6	1	171	3	1	314
Future Vol, veh/h	6	1	171	3	1	314
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	-	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	1	186	3	1	388

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	576	186	0	0	189
Stage 1	186	-	-	-	-
Stage 2	390	-	-	-	-
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	479	856	-	-	1385
Stage 1	846	-	-	-	-
Stage 2	684	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	479	856	-	-	1385
Mov Cap-2 Maneuver	479	-	-	-	-
Stage 1	845	-	-	-	-
Stage 2	684	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	511	1385
HCM Lane V/C Ratio	-	-	0.015	0.001
HCM Control Delay (s)	-	-	12.2	7.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection						
Int Delay, s/veh	6.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	23	60	55	56	166	92
Future Vol, veh/h	23	60	55	56	166	92
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	235	-	-	235	235	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	25	65	60	61	180	100

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	121	0	-	0	175 60
Stage 1	-	-	-	-	60 -
Stage 2	-	-	-	-	115 -
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	1467	-	-	-	815 1005
Stage 1	-	-	-	-	963 -
Stage 2	-	-	-	-	910 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1467	-	-	-	801 1005
Mov Cap-2 Maneuver	-	-	-	-	801 -
Stage 1	-	-	-	-	947 -
Stage 2	-	-	-	-	910 -

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1467	-	-	-	801	1005
HCM Lane V/C Ratio	0.017	-	-	-	0.225	0.1
HCM Control Delay (s)	7.5	-	-	-	10.8	9
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9	0.3

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	71	231	0	0	27
Future Vol, veh/h	8	71	231	0	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	205	-	-	-	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	9	77	251	0	0	29

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	251	0	-	0	346 251
Stage 1	-	-	-	-	251 -
Stage 2	-	-	-	-	95 -
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	1314	-	-	-	651 788
Stage 1	-	-	-	-	791 -
Stage 2	-	-	-	-	929 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1314	-	-	-	646 788
Mov Cap-2 Maneuver	-	-	-	-	646 -
Stage 1	-	-	-	-	785 -
Stage 2	-	-	-	-	929 -

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1314	-	-	-	788
HCM Lane V/C Ratio	0.007	-	-	-	0.037
HCM Control Delay (s)	7.8	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection						
Int Delay, s/veh	3.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	60	96	313	79	60	173
Future Vol, veh/h	60	96	313	79	60	173
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	104	337	85	63	180

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	643	337	0	0	422	0
Stage 1	337	-	-	-	-	-
Stage 2	306	-	-	-	-	-
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	438	705	-	-	1137	-
Stage 1	723	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	414	705	-	-	1137	-
Mov Cap-2 Maneuver	414	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	747	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	2.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	414	705	1137	-
HCM Lane V/C Ratio	-	-	0.158	0.148	0.055	-
HCM Control Delay (s)	-	-	15.3	11	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	0.5	0.2	-

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑	↗↘	↘↗	↑
Traffic Vol, veh/h	4	1	400	10	2	229
Future Vol, veh/h	4	1	400	10	2	229
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	-	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	1	430	11	2	239

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	673	430	0	0	441
Stage 1	430	-	-	-	-
Stage 2	243	-	-	-	-
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	421	625	-	-	1119
Stage 1	656	-	-	-	-
Stage 2	797	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	420	625	-	-	1119
Mov Cap-2 Maneuver	420	-	-	-	-
Stage 1	655	-	-	-	-
Stage 2	797	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	449	1119
HCM Lane V/C Ratio	-	-	0.012	0.002
HCM Control Delay (s)	-	-	13.1	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

**Intersection**

Int Delay, s/veh 4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	79	60	96	191	109	60
Future Vol, veh/h	79	60	96	191	109	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	235	-	-	235	235	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	86	65	104	208	118	65

**Major/Minor**

	Major1	Major2	Minor2
Conflicting Flow All	312	0	0
Stage 1	-	-	104
Stage 2	-	-	237
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1248	-	655
Stage 1	-	-	920
Stage 2	-	-	802
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1248	-	610
Mov Cap-2 Maneuver	-	-	610
Stage 1	-	-	857
Stage 2	-	-	802

**Approach**

	EB	WB	SB
HCM Control Delay, s	4.6	0	11.2
HCM LOS			B

**Minor Lane/Major Mvmt**

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1248	-	-	-	610	951
HCM Lane V/C Ratio	0.069	-	-	-	0.194	0.069
HCM Control Delay (s)	8.1	-	-	-	12.3	9.1
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.7	0.2

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	28	242	151	0	0	18
Future Vol, veh/h	28	242	151	0	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	205	-	-	-	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	30	263	164	0	0	20

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	164	0	-	0	487
Stage 1	-	-	-	-	164
Stage 2	-	-	-	-	323
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1414	-	-	-	540
Stage 1	-	-	-	-	865
Stage 2	-	-	-	-	734
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1414	-	-	-	529
Mov Cap-2 Maneuver	-	-	-	-	529
Stage 1	-	-	-	-	847
Stage 2	-	-	-	-	734

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1414	-	-	-	881
HCM Lane V/C Ratio	0.022	-	-	-	0.022
HCM Control Delay (s)	7.6	-	-	-	9.2
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1



Intersection						
Int Delay, s/veh	4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	105	55	125	26	60	273
Future Vol, veh/h	105	55	125	26	60	273
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	60	136	28	74	337

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	621	136	0	0	164
Stage 1	136	-	-	-	-
Stage 2	485	-	-	-	-
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	451	913	-	-	1414
Stage 1	890	-	-	-	-
Stage 2	619	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	428	913	-	-	1414
Mov Cap-2 Maneuver	428	-	-	-	-
Stage 1	844	-	-	-	-
Stage 2	619	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	428	913	1414	-
HCM Lane V/C Ratio	-	-	0.267	0.065	0.052	-
HCM Control Delay (s)	-	-	16.4	9.2	7.7	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	1.1	0.2	0.2	-

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↙		↑	↗↘	↘	↑
Traffic Vol, veh/h	19	5	171	9	2	314
Future Vol, veh/h	19	5	171	9	2	314
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	-	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	5	186	10	2	388

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	578	186	0	0	196
Stage 1	186	-	-	-	-
Stage 2	392	-	-	-	-
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	478	856	-	-	1377
Stage 1	846	-	-	-	-
Stage 2	683	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	478	856	-	-	1377
Mov Cap-2 Maneuver	478	-	-	-	-
Stage 1	845	-	-	-	-
Stage 2	683	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	526	1377
HCM Lane V/C Ratio	-	-	0.05	0.002
HCM Control Delay (s)	-	-	12.2	7.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

Intersection						
Int Delay, s/veh	6.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	26	60	55	71	211	105
Future Vol, veh/h	26	60	55	71	211	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	235	-	-	235	235	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	28	65	60	77	229	114

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	137	0	-	0	181
Stage 1	-	-	-	-	60
Stage 2	-	-	-	-	121
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1447	-	-	-	808
Stage 1	-	-	-	-	963
Stage 2	-	-	-	-	904
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1447	-	-	-	793
Mov Cap-2 Maneuver	-	-	-	-	793
Stage 1	-	-	-	-	945
Stage 2	-	-	-	-	904

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1447	-	-	-	793	1005
HCM Lane V/C Ratio	0.02	-	-	-	0.289	0.114
HCM Control Delay (s)	7.5	-	-	-	11.4	9
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2	0.4

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↗		↘	
Traffic Vol, veh/h	25	71	231	0	0	84
Future Vol, veh/h	25	71	231	0	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	205	-	-	-	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	27	77	251	0	0	91

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	251	0	-	0	382 251
Stage 1	-	-	-	-	251 -
Stage 2	-	-	-	-	131 -
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	1314	-	-	-	620 788
Stage 1	-	-	-	-	791 -
Stage 2	-	-	-	-	895 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1314	-	-	-	607 788
Mov Cap-2 Maneuver	-	-	-	-	607 -
Stage 1	-	-	-	-	774 -
Stage 2	-	-	-	-	895 -

Approach	EB	WB	SB
HCM Control Delay, s	2	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1314	-	-	-	788
HCM Lane V/C Ratio	0.021	-	-	-	0.116
HCM Control Delay (s)	7.8	-	-	-	10.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection						
Int Delay, s/veh	3.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	69	96	335	87	60	182
Future Vol, veh/h	69	96	335	87	60	182
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	104	360	94	63	190

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	676	360	0	0	454
Stage 1	360	-	-	-	-
Stage 2	316	-	-	-	-
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	419	684	-	-	1107
Stage 1	706	-	-	-	-
Stage 2	739	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	395	684	-	-	1107
Mov Cap-2 Maneuver	395	-	-	-	-
Stage 1	666	-	-	-	-
Stage 2	739	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	2.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	395	684	1107	-
HCM Lane V/C Ratio	-	-	0.19	0.153	0.056	-
HCM Control Delay (s)	-	-	16.2	11.2	8.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0.2	-

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑	↑	↘	↑
Traffic Vol, veh/h	13	3	400	32	7	229
Future Vol, veh/h	13	3	400	32	7	229
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	-	-	235	235	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	3	430	34	7	239

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	683	430	0	0	464
Stage 1	430	-	-	-	-
Stage 2	253	-	-	-	-
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	415	625	-	-	1097
Stage 1	656	-	-	-	-
Stage 2	789	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	413	625	-	-	1097
Mov Cap-2 Maneuver	413	-	-	-	-
Stage 1	652	-	-	-	-
Stage 2	789	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.5	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	441	1097
HCM Lane V/C Ratio	-	-	0.039	0.007
HCM Control Delay (s)	-	-	13.5	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection						
Int Delay, s/veh	4.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗	↗	↘	↘	↘
Traffic Vol, veh/h	87	60	96	241	138	69
Future Vol, veh/h	87	60	96	241	138	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	235	-	-	235	235	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	95	65	104	262	150	75

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	366	0	-	0	359 104
Stage 1	-	-	-	-	104 -
Stage 2	-	-	-	-	255 -
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	1193	-	-	-	640 951
Stage 1	-	-	-	-	920 -
Stage 2	-	-	-	-	788 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1193	-	-	-	589 951
Mov Cap-2 Maneuver	-	-	-	-	589 -
Stage 1	-	-	-	-	846 -
Stage 2	-	-	-	-	788 -

Approach	EB	WB	SB
HCM Control Delay, s	4.9	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1193	-	-	-	589	951
HCM Lane V/C Ratio	0.079	-	-	-	0.255	0.079
HCM Control Delay (s)	8.3	-	-	-	13.2	9.1
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.3	-	-	-	1	0.3



Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	242	151	0	0	56
Future Vol, veh/h	85	242	151	0	0	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	205	-	-	-	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	92	263	164	0	0	61

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	164	0	-	0	611 164
Stage 1	-	-	-	-	164 -
Stage 2	-	-	-	-	447 -
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	1414	-	-	-	457 881
Stage 1	-	-	-	-	865 -
Stage 2	-	-	-	-	644 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1414	-	-	-	427 881
Mov Cap-2 Maneuver	-	-	-	-	427 -
Stage 1	-	-	-	-	809 -
Stage 2	-	-	-	-	644 -

Approach	EB	WB	SB
HCM Control Delay, s	2	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1414	-	-	-	881
HCM Lane V/C Ratio	0.065	-	-	-	0.069
HCM Control Delay (s)	7.7	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

# STERLING RANCH - VOLLMER ROAD

## STA 10+00.00 - STA 45+34.37

### COUNTY OF EL PASO, STATE OF COLORADO

# STREET IMPROVEMENT PLANS

INCLUDING SIGNAGE & STRIPING  
FEBRUARY 2018

#### AGENCIES

**OWNER/DEVELOPER:** SR LAND, LLC  
20 BOULDER CRESCENT, SUITE 201  
COLORADO SPRINGS, CO 80903  
JAMES F. MORLEY (719) 471-1742

**CIVIL ENGINEER:** M & S CIVIL CONSULTANTS, INC.  
20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
VIRGIL A. SANCHEZ P.E. (719) 955-5485

**COUNTY ENGINEERING:** EL PASO COUNTY PLANNING  
AND COMMUNITY DEVELOPMENT  
2880 INTERNATIONAL CIRCLE, SUITE 110  
COLORADO SPRINGS, CO 80910  
JEFF RICE, P.E. (719) 520-6300

**TRAFFIC ENGINEERING:** EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS  
3275 AKERS DRIVE  
COLORADO SPRINGS, CO 80922  
JENNIFER IRVINE, P.E. (719) 520-6460

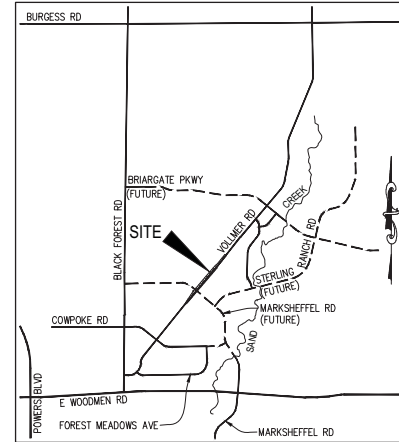
**WATER RESOURCES:** STERLING RANCH METRO DISTRICT ENGINEERS  
JDS-HYDRO CONSULTANTS  
545 E. PIKES PEAK AVE., SUITE 300  
COLORADO SPRINGS, CO 80903  
JOHN MCGINN (719) 668-8769

**FIRE DISTRICT:** BLACK FOREST FIRE PROTECTION DISTRICT  
11445 TEACHOUT ROAD  
COLORADO SPRINGS, CO 80908  
CHIEF BRYAN JACK (719) 495-4300

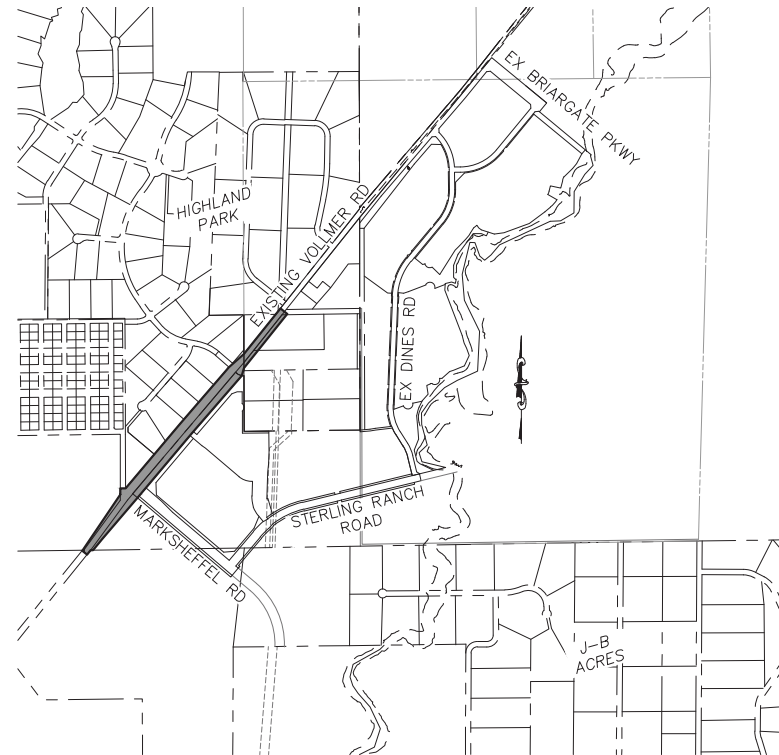
**GAS DEPARTMENT:** COLORADO SPRINGS UTILITIES  
7710 DURANT DR.  
COLORADO SPRINGS, CO 80947  
TIM WENDT (719) 668-3556

**ELECTRIC DEPARTMENT:** MOUNTAIN VIEW ELECTRIC  
11140 E. WOODMEN ROAD  
FALCON, CO 80831  
(719) 495-2283

**COMMUNICATIONS:** QWEST COMMUNICATIONS  
(U.N.C.C. LOCATORS) (800) 922-1987  
AT&T (LOCATORS) (719) 635-3674



VICINITY MAP  
N.T.S.



SITE MAP  
SCALE: NTS

#### BENCHMARKS

1. THE TOP OF AN ALUMINUM SURVEYORS CAP, STAMPED "9853", LOCATED AT THE SOUTHEAST CORNER OF LOT 4, BARBARICK SUBDIVISION  
NORTHING = 411416.273  
EASTING = 235167.071  
ELEVATION = 7023.42
2. THE TOP OF A RED PLASTIC SURVEYORS CAP, ILLEGIBLE, LOCATED AT THE NORTHWEST CORNER OF LOT 13, PAWNEE RANCHEROS SUBDIVISION FILING NO. 2  
NORTHING = 410095.404  
EASTING = 235052.131  
ELEVATION = 7000.40
3. THE TOP OF A RED PLASTIC SURVEYORS CAP, STAMPED "38141", LOCATED AT THE SOUTHWEST CORNER OF LOT 2, BARBARICK SUBDIVISION  
NORTHING = 411399.962  
EASTING = 233849.817  
ELEVATION = 7030.82

#### ABBREVIATIONS

ACT	ACTUAL	FL	FLOW LINE	PT	POINT OF TANGENCY
BCR	BACK OF CURB RETURN	FT	FEET, FOOT	PROP	PROPOSED
BOV	BLOWOFF VALVE ASSEMBLY	FUT	FUTURE	REM	REMOVE
BRK	BREAK	GRD	GRADE	ROW	RIGHT OF WAY
BT	BEGINNING OF TRANSITION	HORZ	HORIZONTAL	RSNTS	RESTRAINTS
CATV	CABLE TV	HP	HIGH POINT ELEVATION	RT	RIGHT
CL	CLASS, CENTERLINE	INT	INTERSECTION	SAN	SANITARY SEWER
CLR	CLEARANCE	IP	LOW POINT ELEVATION	SD	STANDARD DETAIL
CONST	CONSTRUCT	LT	LEFT	STA	STATION
CSU	COLORADO SPRINGS UTILITIES	LOC	LOCATION	STM	STORM
ECR	END CURB RETURN	MIN	MINIMUM	COB	CORNER OF BOX
EL	ELEVATION	N,S,E,W	NORTH,SOUTH,EAST,WEST	TELE	TELEPHONE
EOA	EDGE OF ASPHALT	NTS	NOT TO SCALE	TYP	TYPICAL
EOP	END OF PAVEMENT	PVC	POINT OF VERTICAL CURVATURE	UNK	UNKNOWN
EPC	EL PASO COUNTY	PCC	POINT OF COMPOUND CURVE	UG	UNDERGROUND POWER
ESMT	EASMENT	PTC	POINT OF TANGENCY	UTL	UTILITY
ET	END TRANSITION	PR	PROPERTY LINE	VERT	VERTICAL
EX	EXISTING	PUB	PUBLIC	WTR	WATER LINE
EV	EXISTING	PVI	POINT OF VERTICAL INTERSECTION	XING	CROSSING
GB	GRADE BREAK	PVC	POINT OF VERTICAL CURVE	YD	YARD (CUBIC)
		PVT	POINT OF VERTICAL TANGENT		

#### APPROVALS:

#### ENGINEER'S STATEMENT:

#### DETAILED IMPROVEMENT PLANS AND SPECIFICATIONS ENGINEER'S STATEMENT:

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID DETAILED PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED DRAINAGE PLANS AND SPECIFICATIONS, AND SAID DETAILED PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH THE MASTER PLAN OF THE DRAINAGE BASIN. SAID DETAILED DRAINAGE PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR DRAINAGE FACILITY(S) IS DESIGNED. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS, OR OMISSIONS ON MY PART IN PREPARATION OF THE DETAILED IMPROVEMENT PLANS AND SPECIFICATIONS.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160  
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC. DATE

#### OWNER/DEVELOPER STATEMENT:

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE DRAINAGE REPORT AND PLAN AND THIS SET OF CONSTRUCTION DOCUMENTS. THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

JAMES F. MORLEY  
SR LAND, LLC  
20 BOULDER CRESCENT, SUITE 201  
COLORADO SPRINGS, CO 80903  
(719) 471-1742 DATE

#### EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

JENNIFER IRVINE, P.E.  
COUNTY ENGINEER / ECM ADMINISTRATOR DATE

#### STERLING RANCH METROPOLITAN DISTRICT:

THESE DOCUMENTS HAVE BEEN REVIEWED AND APPROVED FOR STORM DRAIN AND ASSOCIATED UTILITY SERVICE CONSTRUCTION.

FOR AND ON BEHALF OF THE STERLING RANCH METRO. DISTRICT DATE

#### BLACK FOREST FIRE PROTECTION DISTRICT:

ALL FIRE HYDRANTS SHALL BE INSTALLED ACCORDING TO THE BLACK FOREST FIRE PROTECTION DISTRICT SPECIFICATIONS. THE NUMBER OF FIRE HYDRANTS AND HYDRANT LOCATIONS AS SHOWN ON THE WATER INSTALLATION PLAN ARE CORRECT AND ADEQUATE TO SATISFY THE FIRE PROTECTION REQUIREMENTS AS SPECIFIED BY THE BLACK FOREST FIRE PROTECTION DISTRICT.

FOR AND ON BEHALF OF THE BLACK FOREST FIRE PROTECTION DISTRICT DATE

#### SHEET INDEX

SHEET 1	TITLE SHEET
SHEET 2	NOTES & DETAILS SHEET
SHEET 3	PLAN & PROFILE - VOLLMER ROAD (SOUTH) STA 10+00 TO 23+50
SHEET 4	PLAN & PROFILE - VOLLMER ROAD (SOUTH) INTERIM STA 23+50 TO 33+00
SHEET 5	PLAN & PROFILE - VOLLMER ROAD (SOUTH) STA 33+00 TO 45+34.37
SHEET 6	SIGNAGE & STRIPING - ULTIMATE VOLLMER ROAD (SOUTH)
SHEET 7	SIGNAGE & STRIPING - TEMPORARY VOLLMER ROAD (SOUTH)
SHEET 8	SIGNAGE & STRIPING - INTERIM VOLLMER ROAD (SOUTH)
SHEET 9	PLAN & PROFILE - VOLLMER ROAD (SOUTH) TEMPORARY CONNECTION MARKSHEFFEL ROAD
SHEET 10	PLAN & PROFILE - VOLLMER ROAD (SOUTH) TEMPORARY CONNECTION ALZADA DRIVE



STERLING RANCH - VOLLMER ROAD

STREET IMPROVEMENT PLANS

PROJECT NO. 09-002 DATE: 2/26/2018

SCALE: HORIZONTAL: N/A VERTICAL: N/A

DESIGNED BY: DLM DRAWN BY: JMP CHECKED BY: VAS SHEET 1 OF 10 S101

20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485

M&S CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

APPROVED BY: DATE: DESCRIPTION:

NO. DATE: DESCRIPTION:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

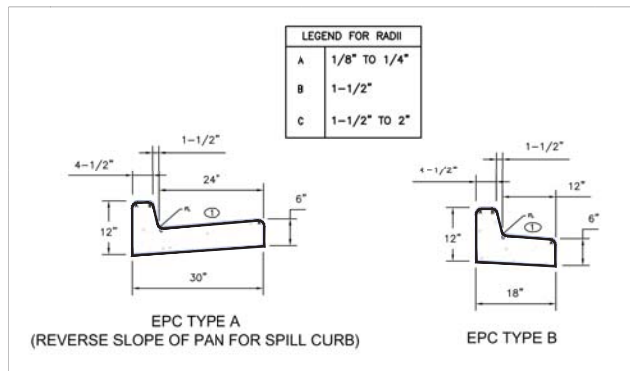
CAUTION

**GENERAL CONSTRUCTION NOTES:**

- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK. THE OMISSION FROM OR THE INCLUSION OF UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NONEXISTENCE OF OR A DEFINITE LOCATION OF EXISTING UNDERGROUND UTILITIES.
- THE CONTRACTOR WILL TAKE THE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO THIS OPERATION. ANY DAMAGE TO THE UTILITIES WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE, AND ANY SERVICE DISRUPTION WILL BE SETTLED BY THE CONTRACTOR.
- ADDITIONAL EROSION CONTROL STRUCTURES MAY BE REQUIRED AT THE TIME OF CONSTRUCTION.
- ALL BACKFILL, SUB-BASE, AND/OR BASE COURSE (CLASS 6) MATERIAL SHALL BE COMPACTED PER THE SOILS ENGINEER'S RECOMMENDATIONS, AND APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES ENGINEERING DIVISION.
- ALL STATIONING IS CENTERLINE OF IMPROVEMENTS UNLESS OTHERWISE INDICATED. ALL ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE INDICATED AS TOP BACK OF CURB (TBC), ASPHALT (ASP), OR TOP OF INLET OR BOX (TOB).
- ALL DISTURBED PAVEMENT EDGES SHALL BE CUT TO NEAT LINES. REPAIR SHALL CONFORM TO EPC ECM APPENDIX K - 1.2C.
- ALL INTERSECTION ACCESSES TO BE CONSTRUCTED WITH A 25 FOOT SIGHT VISIBILITY TRIANGLES EXCEPT [VOLLMER ROAD, MARKSHEFFEL ROAD, BRAIRGATE PARKWAY] WHICH IS AN ARTERIAL AND A 50 FOOT SIGHT VISIBILITY TRIANGLE IS REQUIRED AND THERE SHALL BE NO OBSTRUCTIONS GREATER THAN 18" IN THIS AREA.
- ALL CULVERTS AND STORM DRAIN PIPES SHALL BE SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE (HDPE), REINFORCED CONCRETE PIPE (RCP). ALL CULVERTS SHALL BE PLACED COMPLETE WITH FLARED END SECTIONS. ADEQUACY OF MATERIAL THICKNESS FOR ANY CSP INSTALLED SHALL BE VERIFIED BY OWNER'S GEOTECHNICAL ENGINEER TO SUPPORT MINIMUM 50 YEAR DESIGN LIFE. CULVERTS MUST CONFORM TO EPC ECM SECTION 3.32 - CULVERTS.
- ASPHALT THICKNESS AND BASE COURSE THICKNESS (COMPACTED) FOR ROADS SHALL BE PER DESIGN REPORT BY OWNER'S GEOTECHNICAL ENGINEER. OWNER'S GEOTECHNICAL ENGINEER TO BE ON SITE AT THE TIME OF ROAD CONSTRUCTION TO EVALUATE SOIL CONDITIONS AND DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY TO ASSURE STABILITY OF THE NEW ROADS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES ENGINEERING DIVISION PRIOR TO CONSTRUCTION.

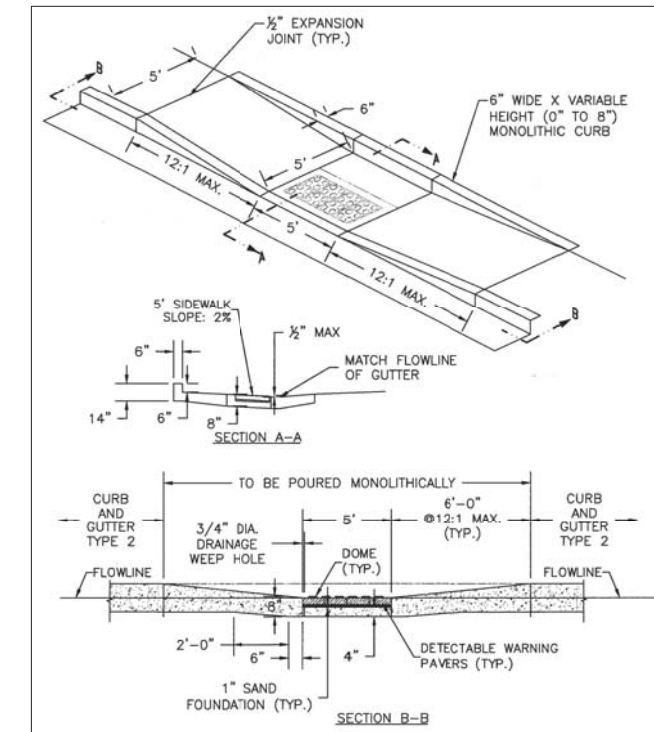
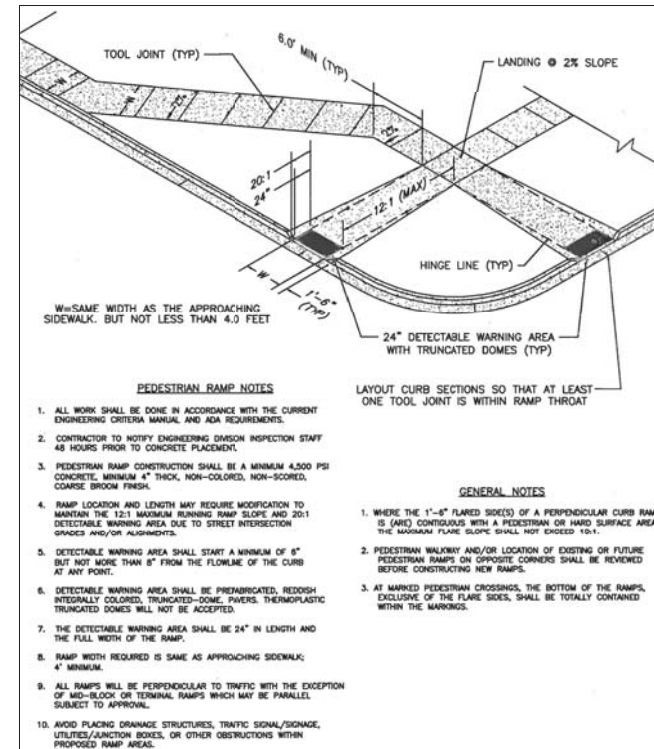
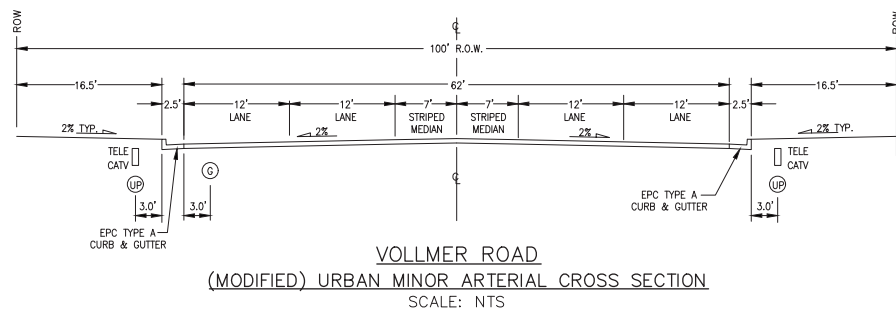
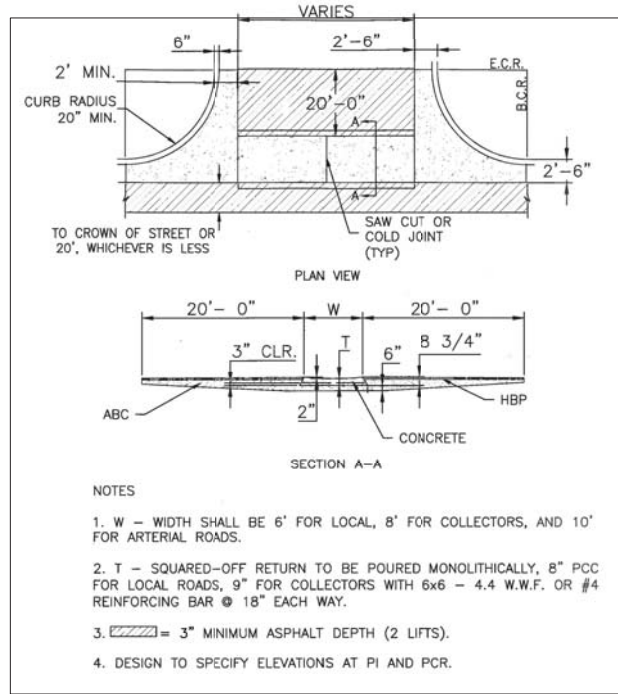
**SIGNING AND STRIPING NOTES:**

- ALL SIGNS AND PAVEMENT MARKINGS SHALL BE IN COMPLIANCE WITH THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE PAVEMENT. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS. AT NO TIME WILL IT BE ACCEPTABLE TO PAINT OVER EXISTING PAVEMENT MARKINGS.
- ANY DEVIATION FROM THE STRIPING AND SIGNING PLAN SHALL BE APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES.
- ALL SIGNS SHOWN ON THE SIGNING AND STRIPING PLAN SHALL BE NEW SIGNS. EXISTING SIGNS MAY REMAIN OR BE REUSED IF THEY MEET CURRENT EL PASO COUNTY AND MUTCD STANDARDS.
- STREET NAME AND REGULATORY STOP SIGNS SHALL BE ON THE SAME POST AT INTERSECTIONS.
- ALL REMOVED SIGNS SHALL BE DISPOSED OF IN A PROPER MANNER BY THE CONTRACTOR.
- ALL STREET NAME SIGNS SHALL HAVE "D" SERIES LETTERS, WITH LOCAL ROADWAY SIGNS BEING 4" UPPER-LOWER CASE LETTERING ON 8" BLANK AND NON-LOCAL ROADWAY SIGNS BEING 6" LETTERING, UPPER-LOWER CASE ON 12" BLANK, WITH A WHITE BORDER THAT IS NOT RECESSED. MULTI-LANE ROADWAYS WITH SPEED LIMITS OF 40 MPH OR HIGHER SHALL HAVE 8" UPPER-LOWER CASE LETTERING ON 18" BLANK WITH A WHITE BORDER THAT IS NOT RECESSED. THE WIDTH OF THE NON-RECESSED WHITE BORDERS SHALL MATCH PAGE 255 OF THE 2012 MUTCD "STANDARD HIGHWAY SIGNS"
- ALL TRAFFIC SIGNS SHALL HAVE A MINIMUM HIGH INTENSITY PRISMATIC GRADE SHEETING.
- ALL LOCAL RESIDENTIAL STREET SIGNS SHALL BE MOUNTED ON A 1.75" X 1.75" SQUARE TUBE SIGN POST AND STUB POST BASE. FOR OTHER APPLICATIONS, REFER TO THE CDOT STANDARD S-614-8 REGARDING USE OF THE P2 TUBULAR STEEL POST SLIPBASE DESIGN.
- ALL SIGNS SHALL BE SINGLE SHEET ALUMINUM WITH 0.100" MINIMUM THICKNESS.
- ALL LIMIT LINES/STOP LINES, CROSSWALK LINES, PAVEMENT LEGENDS, AND ARROWS SHALL BE A MINIMUM 125 MIL THICKNESS PERFORMED THERMOPLASTIC PAVEMENT MARKINGS WITH TAPERED LEADING EDGES PER CDOT STANDARD S-627-1. WORD AND SYMBOL MARKINGS SHALL BE THE NARROW TYPE. STOP BARS SHALL BE 24" IN WIDTH. CROSSWALKS LINES SHALL BE 12" WIDE AND 8' LONG PER CDOT S-627-1.
- ALL LONGITUDINAL LINES SHALL BE A MINIMUM 15MIL THICKNESS EPOXY PAINT. ALL NON-LOCAL RESIDENTIAL ROADWAYS SHALL INCLUDE BOTH RIGHT AND LEFT EDGE LINE STRIPING AND ANY ADDITIONAL STRIPING AS REQUIRED BY CDOT S-627-1.
- THE CONTRACTOR SHALL NOTIFY EL PASO COUNTY DEVELOPMENT SERVICES (719) 520-6819 PRIOR TO AND UPON COMPLETION OF SIGNING AND STRIPING.
- THE CONTRACTOR SHALL OBTAIN A WORK IN THE RIGHT OF WAY PERMIT FROM THE EL PASO COUNTY PUBLIC SERVICE DEPARTMENT (PSD) PRIOR TO ANY SIGNAGE OR STRIPING WORK WITHIN AN EXISTING EL PASO COUNTY ROADWAY.



**STANDARD NOTES FOR EL PASO COUNTY CONSTRUCTION PLANS:**

- ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC).
- CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOILS AND GEOTECHNICAL REPORT, AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, INCLUDING THE FOLLOWING:
  - EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
  - CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2
  - COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
  - CDOT M & S STANDARDS
- NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ONSITE AND OFFSITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY DEVELOPMENT SERVICES DEPARTMENT (DSD) - INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES AND TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORPS OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.
- CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND DSD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES.
- ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY DSD.
- CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY DSD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
- SIGHT VISIBILITY TRIANGLES AS IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED WITHIN SIGHT TRIANGLES.
- SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOT AND MUTCD CRITERIA. [IF APPLICABLE, ADDITIONAL SIGNING AND STRIPING NOTES WILL BE PROVIDED.]
- CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DOT, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
- THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION.



FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
FOR BURIED UTILITY INFORMATION  
48 HRS BEFORE YOU DIG  
CALL 1-800-922-1987

**STERLING RANCH - VOLLMER ROAD**

**NOTES AND DETAILS SHEET**

PROJECT NO. 09-002  
DATE: 2/26/2018  
SCALE: N/A  
HORIZONTAL: N/A  
VERTICAL: N/A

DESIGNED BY: DLM  
DRAWN BY: JWP  
CHECKED BY: VAS

20 ROULDER CRESCENT SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.555.5465

**CIVIL CONSULTANTS, INC.**

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

REVISIONS:

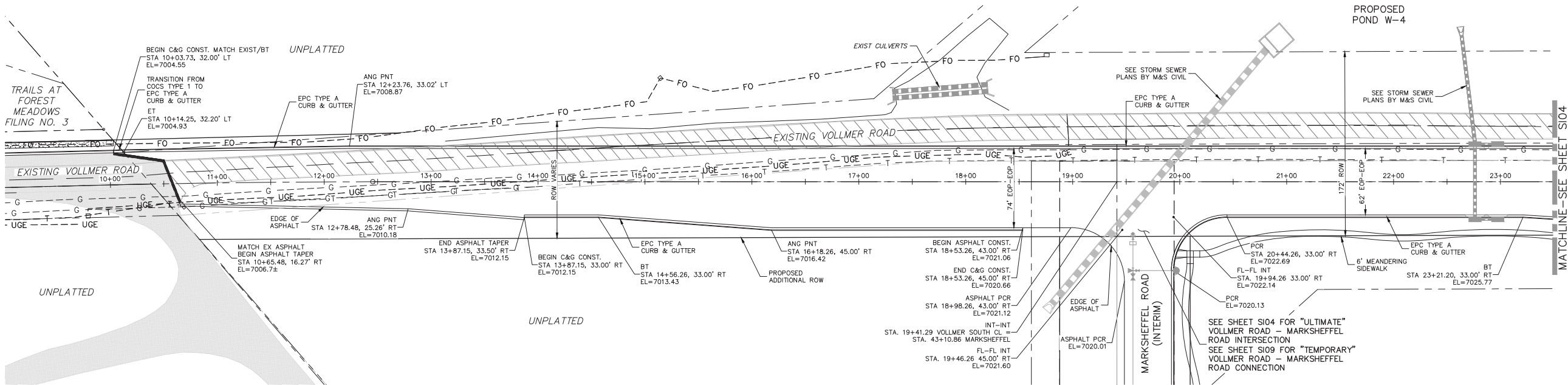
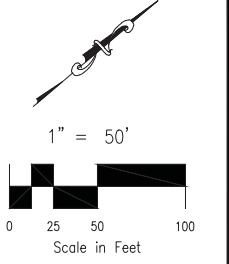
NO.	DATE	DESCRIPTION

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CAUTION

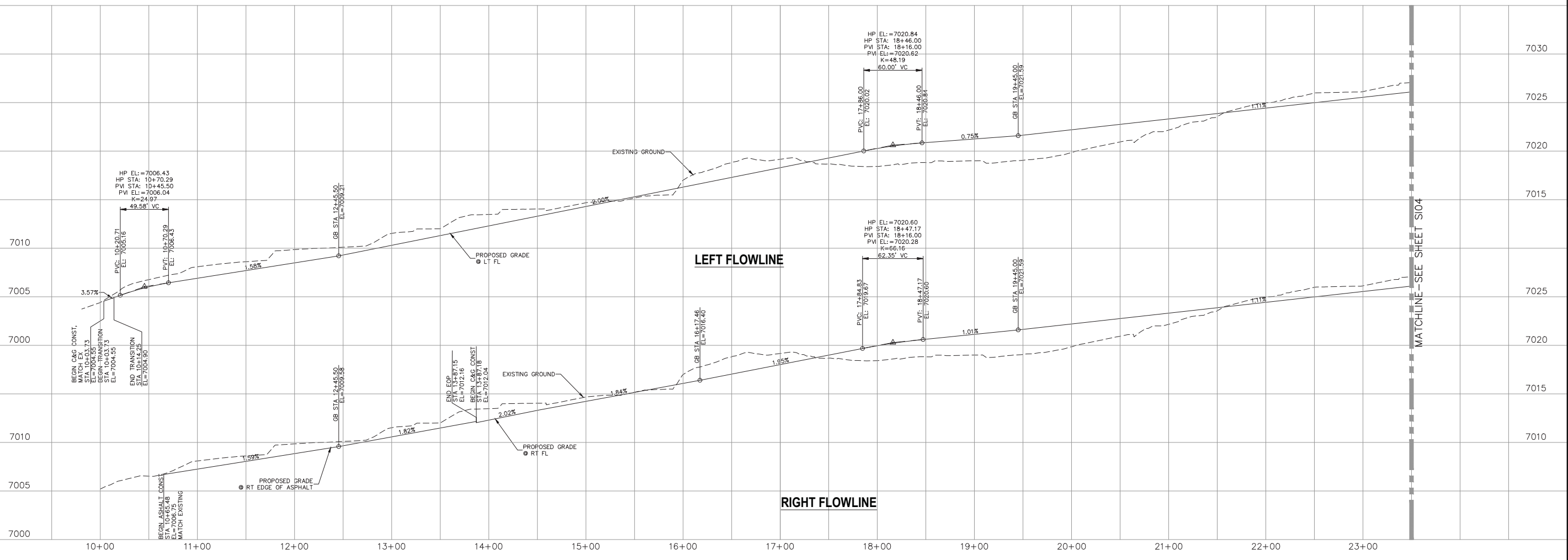


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 CALL 1-800-922-1987



**VOLLMER ROAD  
 STA 10+00.00 TO STA 23+50.00**

SEE STERLING RANCH-MARKSHEFFEL ROAD  
 STREET IMPROVEMENT PLANS  
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20 BOULDER CRESCENT, SUITE 110  
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 PHONE: 719.555.5465

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FOR AND ON BEHALF OF  
 M&S CIVIL CONSULTANTS, INC.

MIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

NO.	DATE	BY	DESCRIPTION

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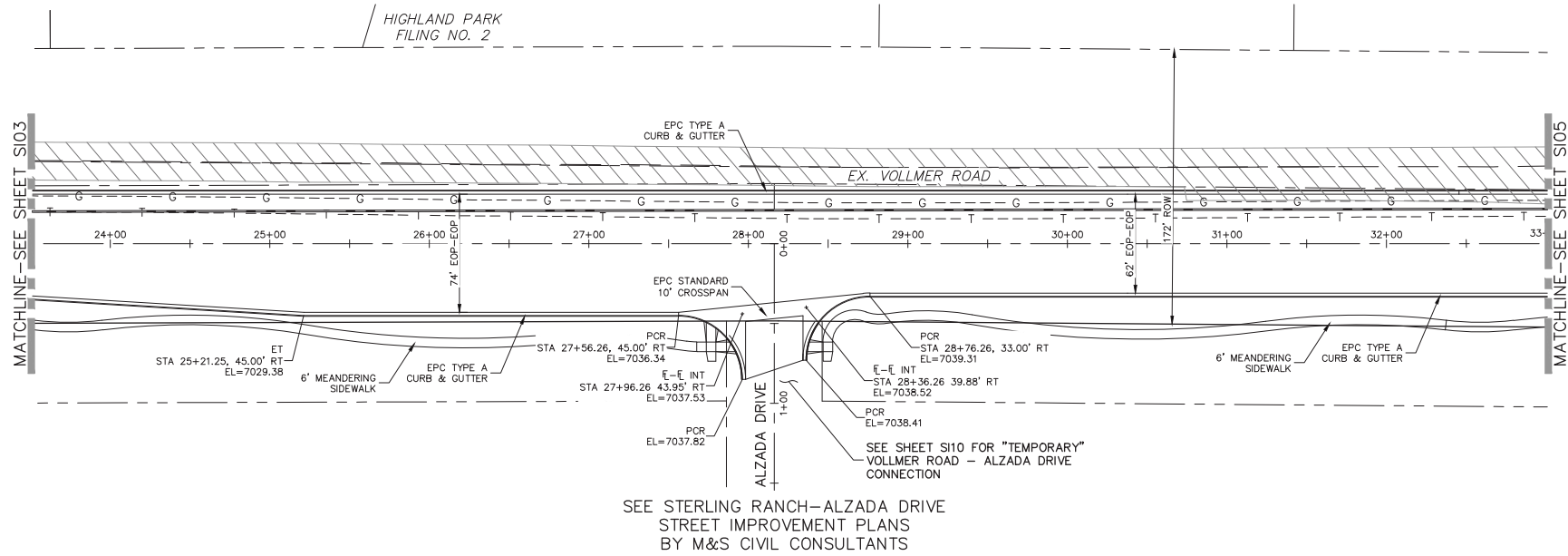
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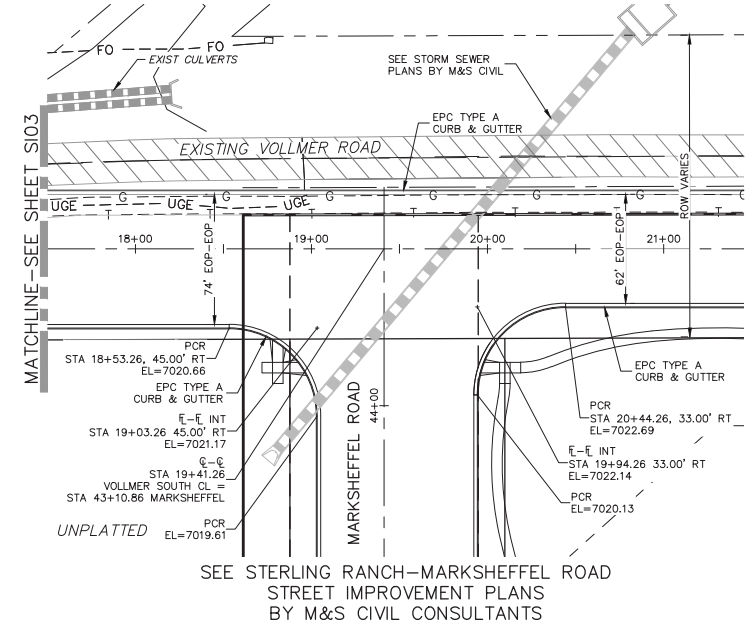
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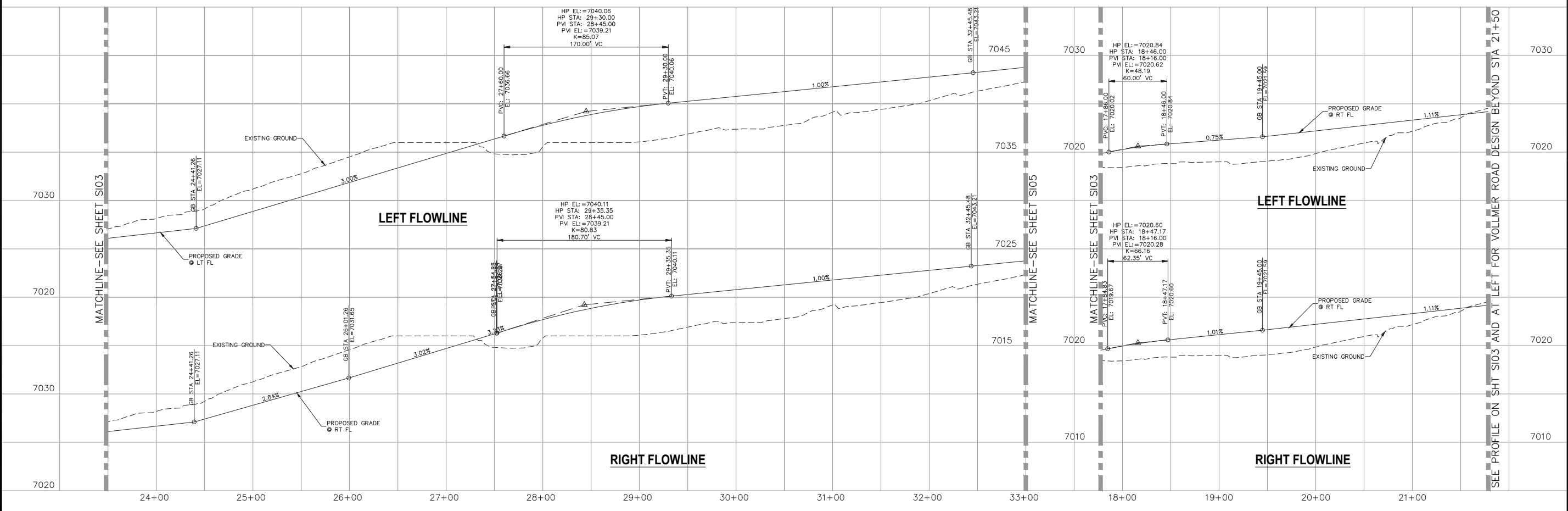
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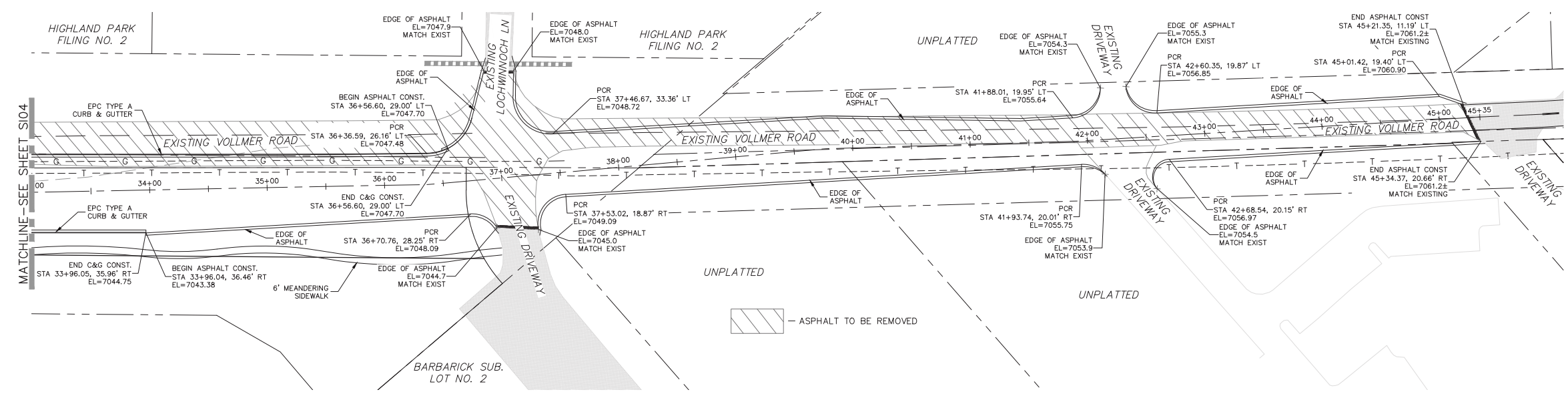
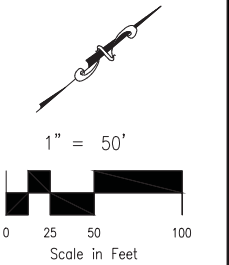
**VOLLMER ROAD**  
STA 23+50.00 TO STA 33+00.00



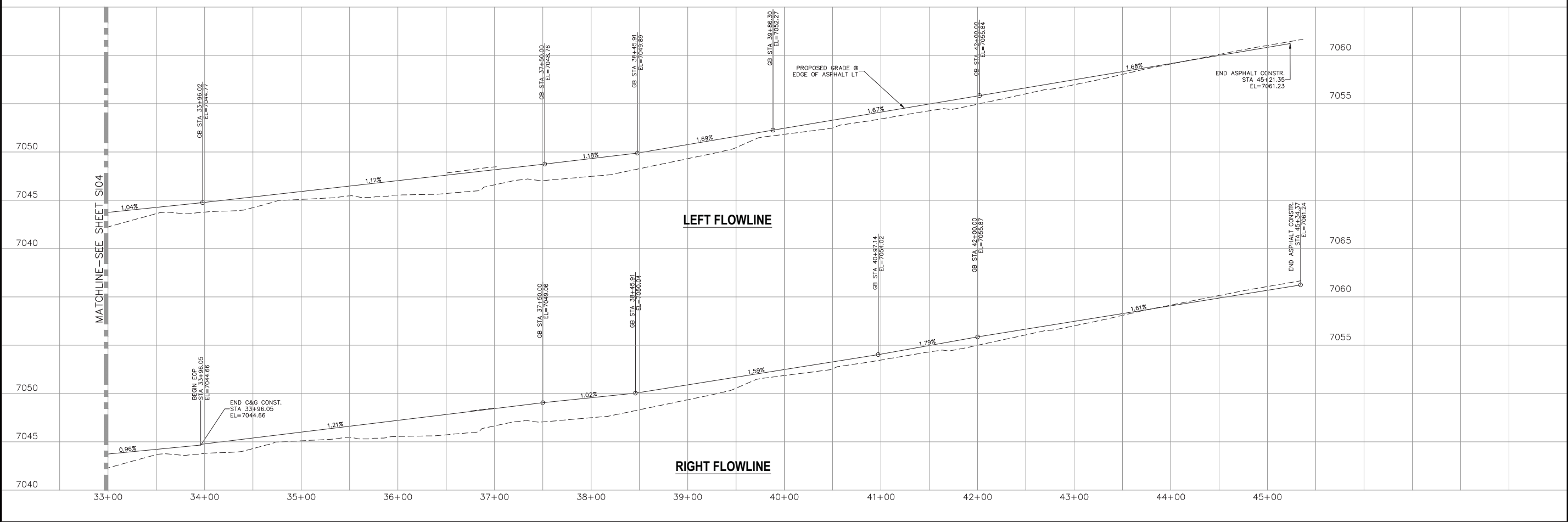
**"ULTIMATE"**  
VOLLMER ROAD - MARKSHEFFEL ROAD INTERSECTION



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 SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'  
 DESIGNED BY: DLM  
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20 ROUIDER CRESCENT, SUITE 110  
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MIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

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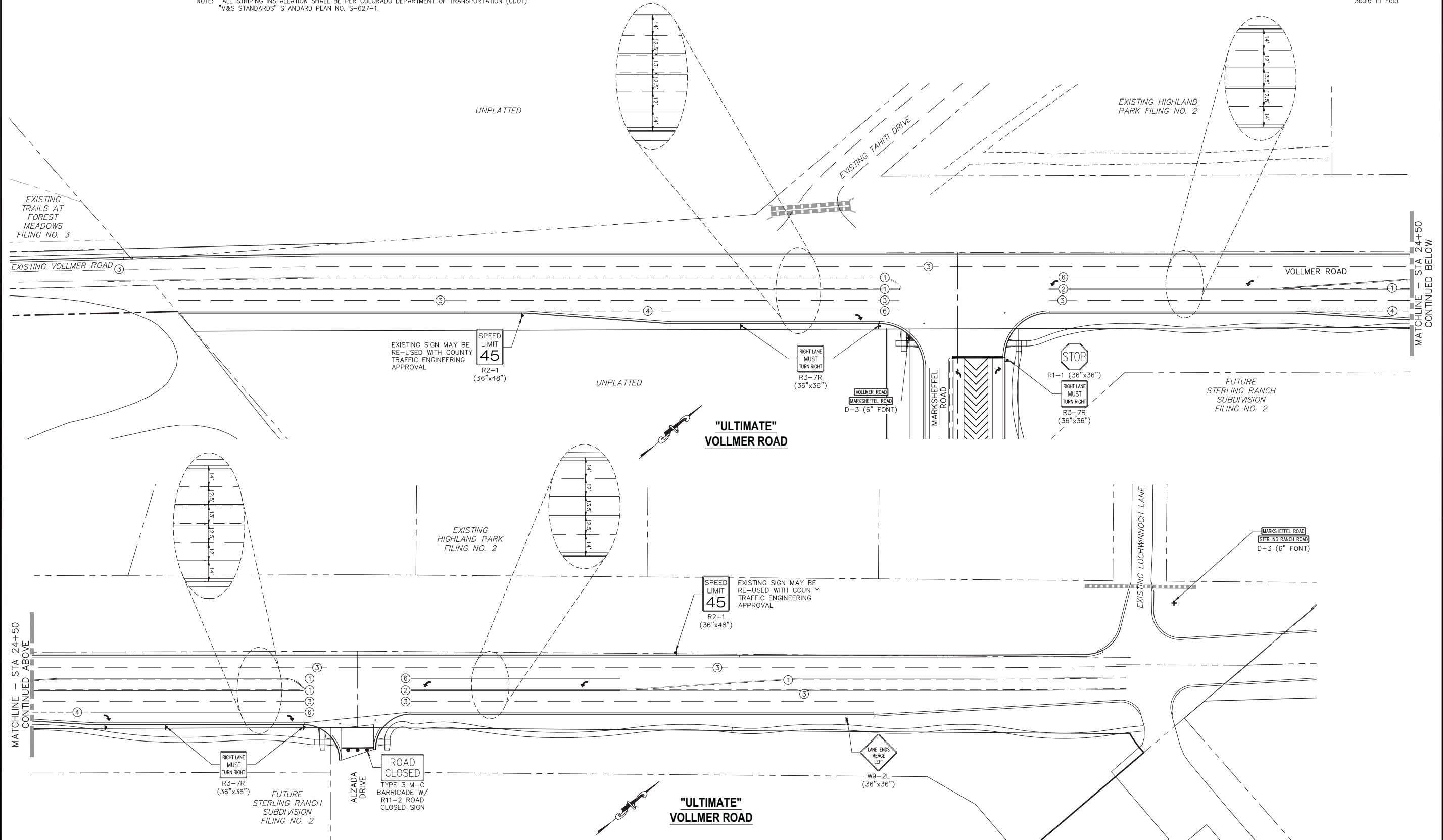
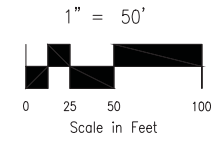
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STRIPING LEGEND		
STRIPE	PAVEMENT MARKINGS	MARKING DESCRIPTION
①	2-WAY LEFT TURN LANE MARKINGS (EPOXY)	OUTSIDE: SOLID YELLOW, 4" WIDE, INSIDE: BROKEN YELLOW, 4" WIDE, 10' SEGMENTS WITH 30" GAPS
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⑤	EDGE/BIKE LANE LINES (EPOXY)	SOLID WHITE, 4" WIDE
⑥	CHANNELIZING LINES (EPOXY)	SOLID WHITE, 8" WIDE
⑦	STOP LINES (THERMO PLASTIC)	SOLID WHITE, 24" WIDE

NOTE: ALL STRIPING INSTALLATION SHALL BE PER COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) "M&S STANDARDS" STANDARD PLAN NO. S-627-1.

**NOTE TO CONTRACTOR:**

- ALL 4" AND 8" SOLID OR SKIP PAVEMENT MARKINGS ARE TO BE EPOXY.
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STERLING RANCH - VOLLMER ROAD  
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 PROJECT NO. 09-002  
 DATE: 2/26/2018  
 SCALE: 1"=50'  
 HORIZONTAL: JWP  
 VERTICAL: N/A  
 DESIGNED BY: DLM  
 DRAWN BY: JWP  
 CHECKED BY: VAS  
 SHEET 6 OF 10  
 S106

20 ROLLER CRESCENT SUITE 110  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.555.5465

M&S CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

MIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

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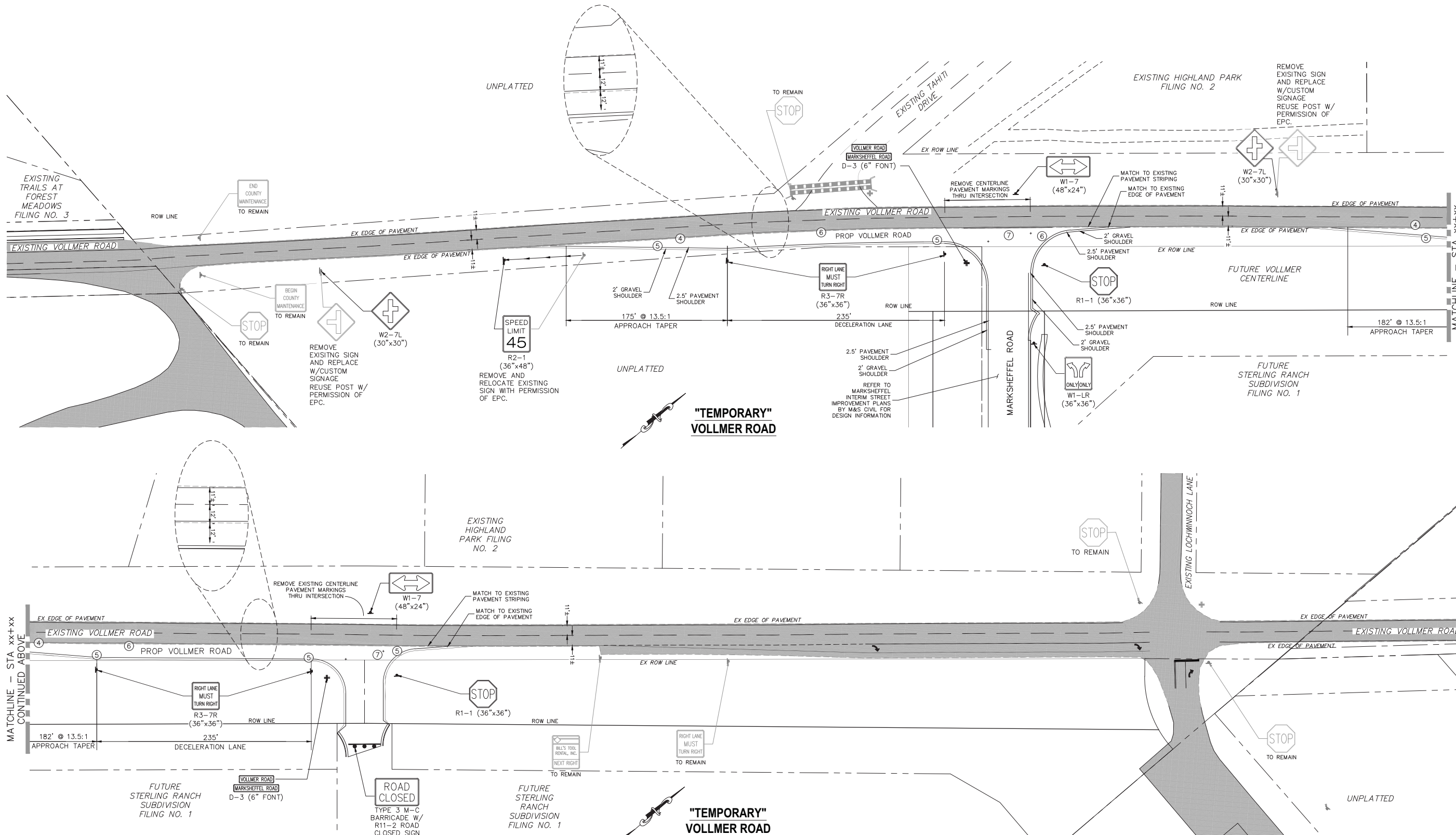
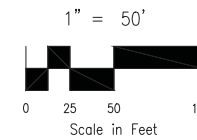
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 PROJECT NO. 09-002  
 DATE: 2/26/2018  
 SCALE: HORIZONTAL: 1"=50' VERTICAL: N/A  
 DESIGNED BY: DLM  
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 SHEET 7 OF 10  
 S107

20 ROULDER CRESCENT SUITE 110  
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FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

MIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

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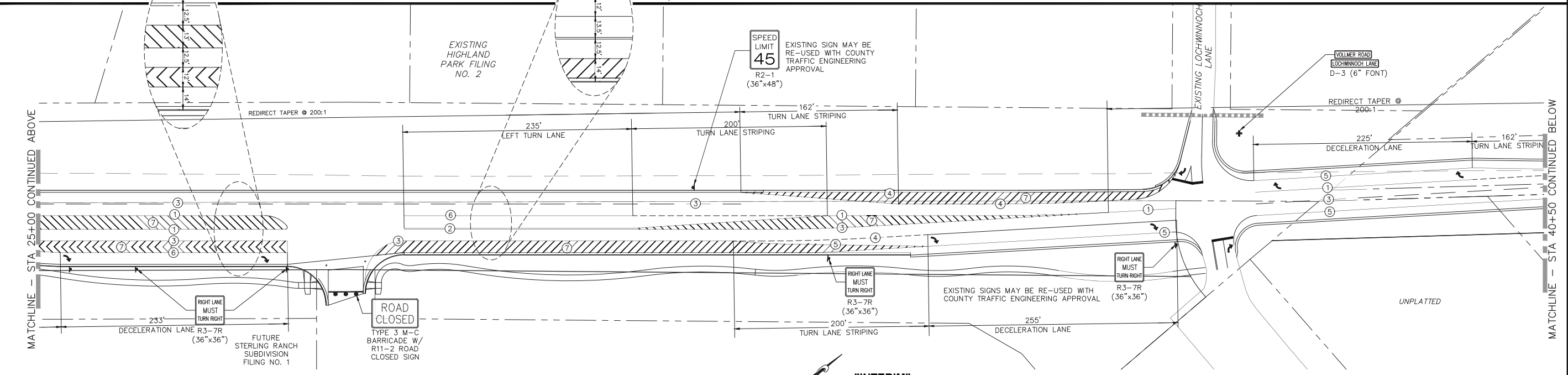
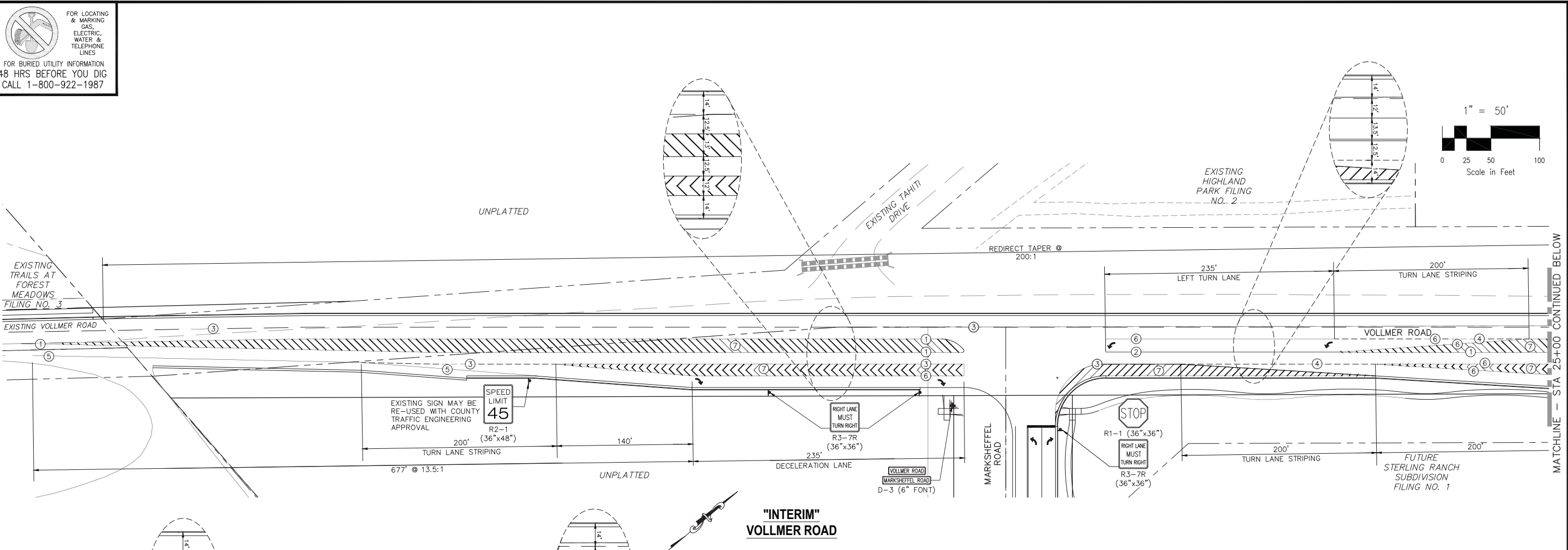
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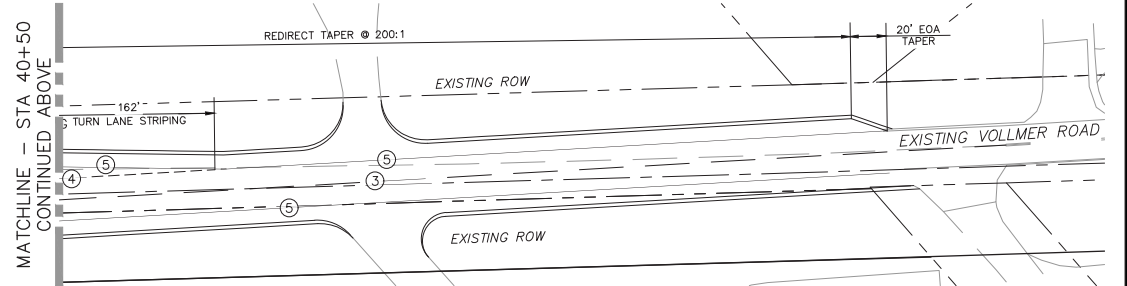
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 SIGNAGE & STRIPING PLANS

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 PHONE: 719.553.5465

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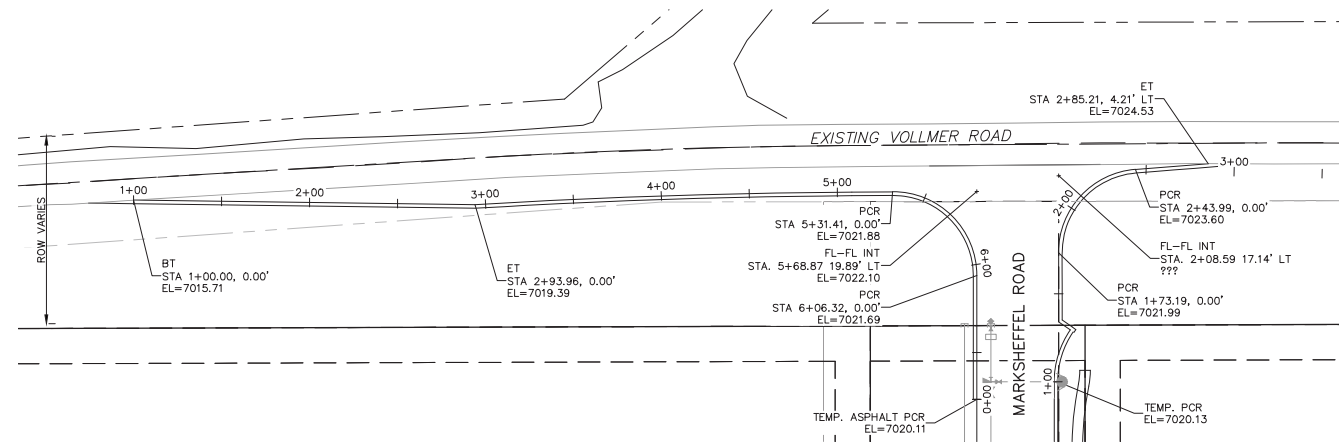
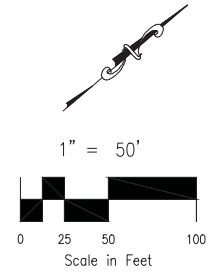
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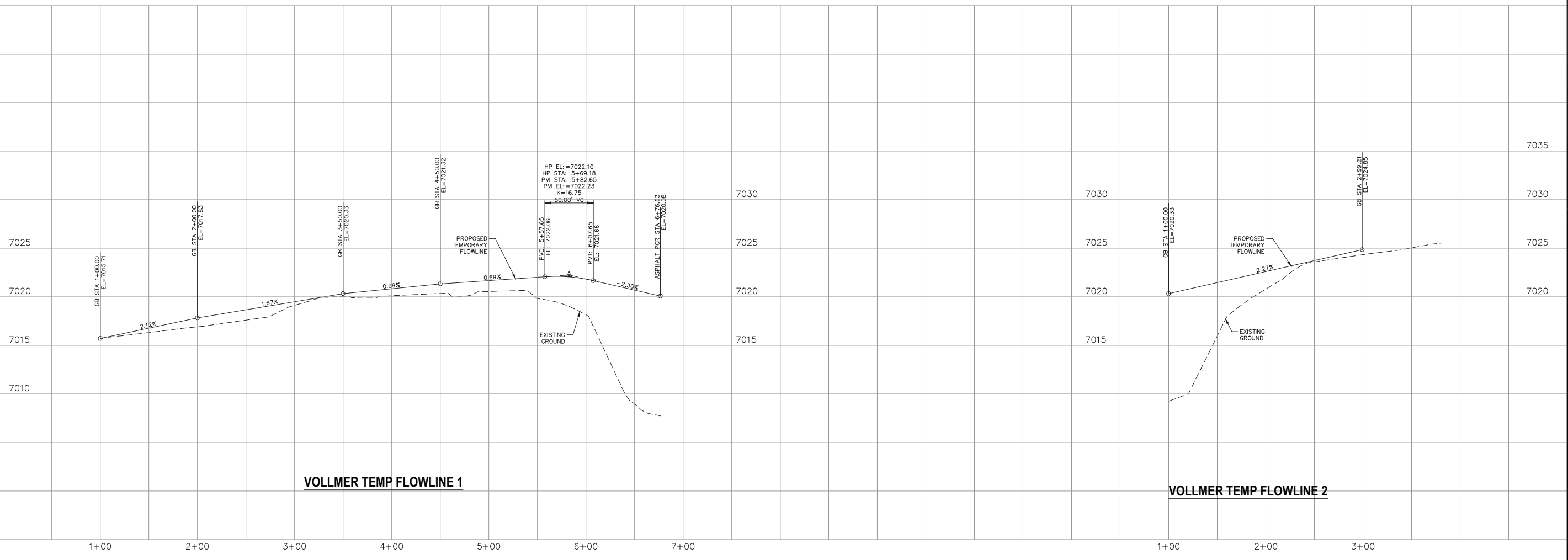
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**VOLLMER ROAD - TEMPORARY CONNECTION  
 AT MARKSHEFFEL ROAD**



**VOLLMER TEMP FLOWLINE 1**

**VOLLMER TEMP FLOWLINE 2**

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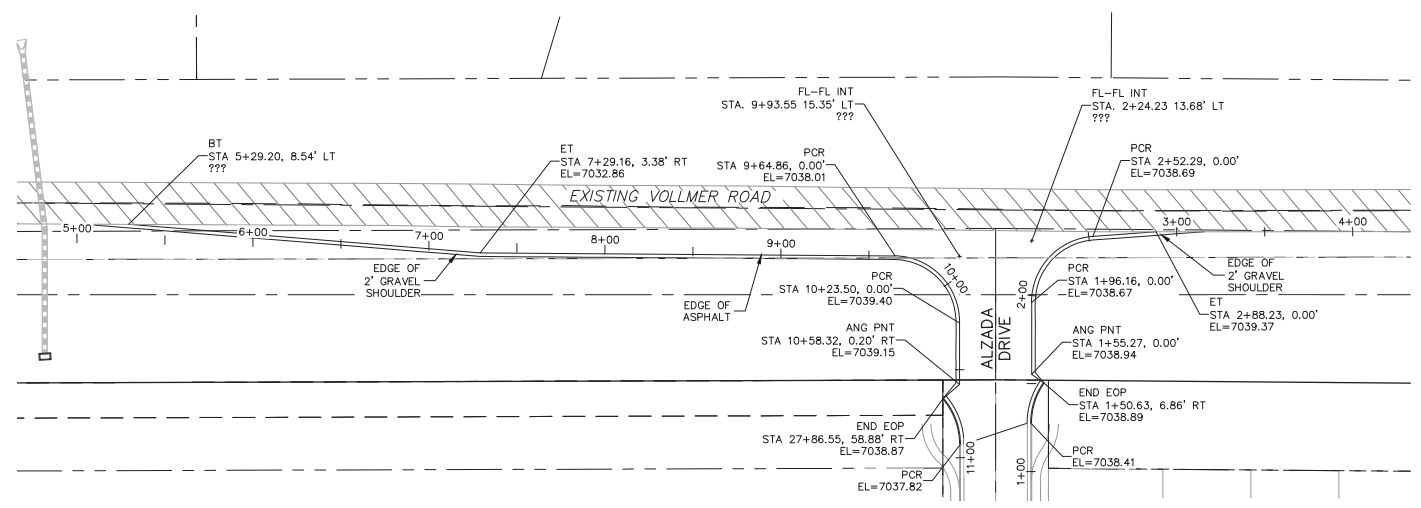
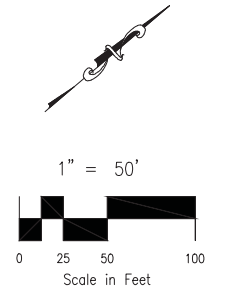
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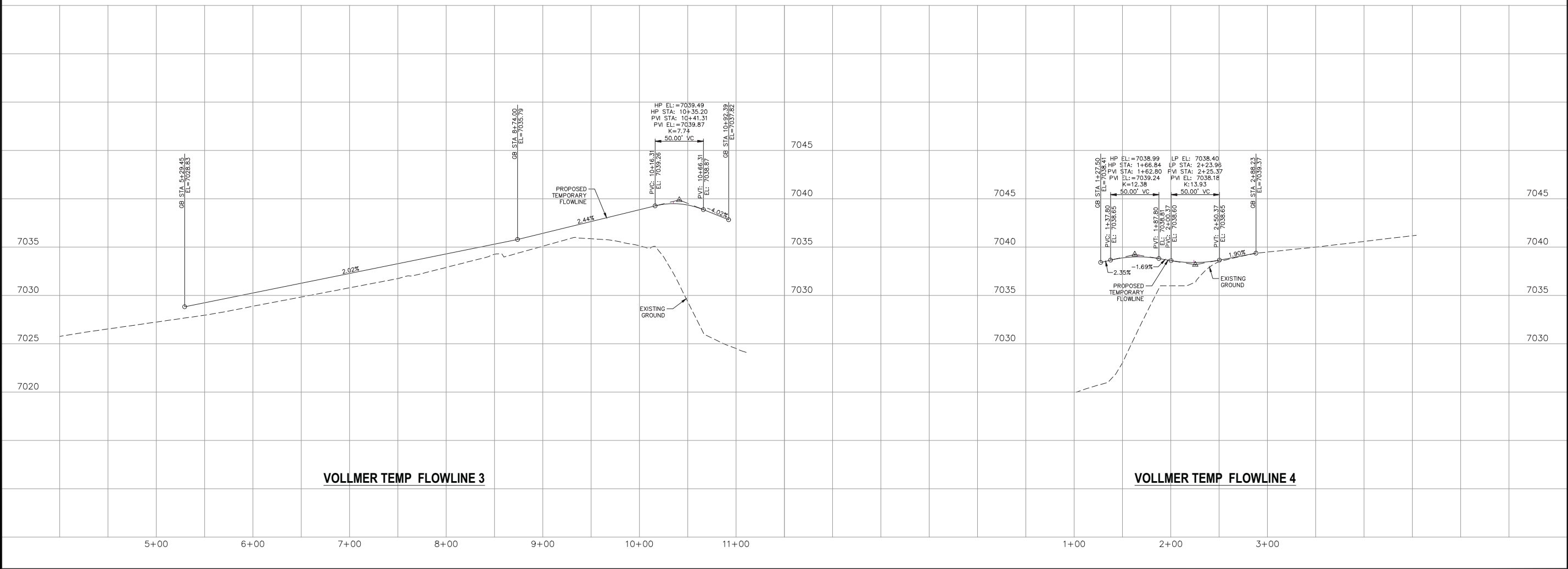
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**VOLLMER ROAD - TEMPORARY CONNECTION  
 AT ALZADA DRIVE**



**VOLLMER TEMP FLOWLINE 3**

**VOLLMER TEMP FLOWLINE 4**

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545 East Pikes Peak Avenue, Suite 210  
Colorado Springs, CO 80903  
(719) 633-2868  
FAX (719) 633-5430  
E-mail: [lsc@lscetrans.com](mailto:lsc@lscetrans.com)  
Website: <http://www.lscetrans.com>

October 2, 2017

Mr. Jim Morley  
Morley-Bentley Investments, LLC  
20 Boulder Crescent, 1st Floor  
Colorado Springs, CO 80903

RE: Sterling Ranch Phases 1-3  
El Paso County, CO  
Traffic Technical Memorandum  
LSC #144010

Dear Mr. Morley:

LSC Transportation Consultants, Inc. has prepared this traffic technical memorandum for Phases 1-3 of the Sterling Ranch development. As shown on Figure 1, the site is located east of Vollmer Road near Lochwinnoch Lane between the future extensions of Marksheffel Road and Stapleton Drive in El Paso County, Colorado.

This memorandum has been prepared to address the proposed interim cross section of Vollmer Road (please refer to attached exhibits). Due to current constraints on the west side of Vollmer Road, the applicant is proposing an interim cross section along the frontage of Sterling Ranch Phase 1. This interim cross section and proposed laneage is attached. The proposed interim road improvement would widen the roadway to the east side. There would continue to be one through lane in each direction but the interim road improvements would allow for southbound left-turn and northbound right-turn lanes at the Briargate Parkway/Vollmer and Dines/Vollmer intersections (both access points to Sterling Ranch Phase 1).

## REPORT CONTENTS

This report presents:

- Current traffic volume data
- Estimates of projected “intermediate-term” (2025) traffic volumes
- Roadway capacity of this interim cross section
- An evaluation of the ability of the short-term roadway improvements to accommodate the projected short-term traffic volumes.

## **LAND USE AND ACCESS**

The site plan figure from the July 2, 2014 traffic report for Sterling Ranch is attached for reference. That traffic report assumed 672 lots in the area shown but no commercial development in the short term at the southeast corner of Vollmer/Briargate Parkway. The analysis in this memo assumes buildout of 719 lots, reflecting a minor increase over the previously anticipated 672-lot count.

## **EXISTING TRAFFIC VOLUMES**

Figure 2 shows the existing daily and peak-hour traffic volumes on Vollmer Road adjacent to the site. The traffic volumes are from the attached traffic counts conducted adjacent to the site in September 2017. Figure 2 also shows the average weekday traffic volumes on Vollmer Road based on 24-hour machine (tube) counts conducted in September 2017.

## **2025 BACKGROUND TRAFFIC**

Volumes in Figure 3 represent eight years of growth in current Vollmer Road traffic volumes (out to 2025) at 5.4 percent per year. This is the growth rate of volumes projected in the 2016 *Major Transportation Corridors Plan (MTCP) Update*. Note: It is our understanding that the Marksheffel extension southeast across Sand Creek will occur in the short term, however no timing is available from the City of Colorado Springs.

## **TRIP GENERATION**

The site-generated vehicle-trips were estimated using the nationally published trip generation rates from *Trip Generation, 9th Edition, 2012* by the Institute of Transportation Engineers (ITE). Table 1 shows the current trip generation estimate.

## **SHORT-TERM DIRECTIONAL DISTRIBUTION**

Figure 4 shows the short-term directional distribution estimates. This figure has been taken from the July 2, 2014 Sterling Ranch traffic report. Note: It is our understanding that the Marksheffel extension northwest across Sand Creek to Vollmer Road is anticipated to occur in the short term, however no timing of this connection is available from the City of Colorado Springs.

## **INTERMEDIATE-TERM (2025) SITE-GENERATED TRAFFIC**

Figure 5 shows the projected site-generated traffic volume for 719 lots. The site-generated traffic volumes were calculated by applying the directional distribution percentages (from Figure 4) to the trip generation estimates (from Table 1).

## **INTERMEDIATE-TERM (2025) TOTAL TRAFFIC**

Figure 6 shows the projected total traffic volumes for the intermediate term. Total traffic volumes include 2025 background through traffic on Vollmer Road (from Figure 3) plus Phase 1 site-generated traffic volumes (from Figure 5).



### ESTIMATED VOLLMER ROAD CAPACITY

Currently the MTCP indicates a capacity of existing Vollmer Road to be about 6,000 vehicles per day. The ECM indicates the ADT capacity of an ECM-standard rural minor arterial (two lanes) to be 10,000 vehicles per day. However, the proposed interim cross section is a hybrid between urban and rural cross sections and would include auxiliary turn lanes. With the addition of ECM-standard auxiliary right- and left-turn deceleration lanes, LSC estimates the capacity to be about 14,000 vehicles per day through the area of the improved cross section. This is comparable to the fee study estimate of the capacity of Fontaine Boulevard west of Marksheffel, which has a two-lane cross section and auxiliary turn lanes.

The projected intermediate-term total traffic volume as shown in Figure 6 would be 5,300 vehicles per day—well below the estimated capacity of 14,000 vehicles per day for a roadway of this cross section. The projected volume would also be below the estimated existing capacity of 6,000 vehicles per day.

### PROJECTED INTERSECTION LEVELS OF SERVICE

The intersections of Marksheffel Road/Vollmer Road and Stapleton Drive/Vollmer Road, and the two full-movement site access intersections to Vollmer Road were analyzed to determine the projected levels of service for the intermediate-term total traffic volumes based on the unsignalized intersection analysis procedures from the *Highway Capacity Manual*. Figure 6 shows the level of service analysis results. The level of service reports are attached.

As shown on the figures, all the intersections analyzed are projected to operate at a level of service B as stop-sign-controlled intersections.

\* \* \* \* \*

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

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By \_\_\_\_\_  
Jeffrey C. Hodsdon, P.E., PTOE  
Principal



JCH:bjwb

Enclosures: Table 1  
Figures 1-6  
Cross Section and Laneage Exhibits  
Site Plan Exhibit from July 2, 2014 Report  
Traffic Count Reports  
Level of Service Reports

**Table 1  
Trip Generation Estimate  
Sterling Ranch Phases 1-3**

TAZ <sup>(2)</sup>	Parcel	Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total External Trips Generated						
					Average Weekday Traffic	Morning Peak Hour		Evening Peak Hour		Average Weekday Traffic	Morning Peak Hour		Evening Peak Hour		
						In	Out	In	Out		In	Out	In	Out	
<b>October 2017 Currently Anticipated Sterling Ranch Phases 1-3 (Residential Trip Generation Only)</b>															
2, 4, 5, 6, & 7	A1-A4; B1-B3	210	Single-Family Detached Housing	719 DU <sup>(3)</sup>	9.52	0.19	0.56	0.63	0.37	6,845	135	404	453	266	
<b>Sterling Ranch Phases 1-3 Traffic Impact Analysis July 2, 2014</b>															
<b>Phase 1</b>															
7	A1	210	Single-Family Detached Housing	100 DU	9.52	0.19	0.56	0.63	0.37	952	19	56	63	37	
2	A2	210	Single-Family Detached Housing	100 DU	9.52	0.19	0.56	0.63	0.37	952	19	56	63	37	
4	A3	---	Sanitary Lift Station	-----	---	---	---	---	---	---	---	---	---	---	
				<b>Total Phase 2</b>	200 DU					1,904	38	112	126	74	
<b>Phase 2</b>															
7	A1	210	Single-Family Detached Housing	60 DU	9.52	0.19	0.56	0.63	0.37	571	11	34	38	22	
2	A2	210	Single-Family Detached Housing	92 DU	9.52	0.19	0.56	0.63	0.37	876	17	52	58	34	
6	A4	210	Single-Family Detached Housing	7 DU	9.52	0.19	0.56	0.63	0.37	67	1	4	4	3	
				<b>Total Phase 2</b>	159 DU					1,514	29	90	100	59	
2, 4, 5, 6, & 7				<b>Total Phases 1 &amp; 2</b>	359 DU					3,418	67	202	226	133	
<b>Phase 3</b>															
7	B1	210	Single-Family Detached Housing	34 DU	9.52	0.19	0.56	0.63	0.37	324	6	19	21	13	
	B2	210	Single-Family Detached Housing	133 DU	9.52	0.19	0.56	0.63	0.37	1,266	25	75	84	49	
5 & 6	B3	210	Single-Family Detached Housing	146 DU	9.52	0.19	0.56	0.63	0.37	1,390	27	82	92	54	
				<b>Total Phase 3</b>	313 DU					2,980	58	176	197	116	
2, 4, 5, 6, & 7				<b>Total Phases 1, 2, &amp; 3</b>	672 DU					6,398	125	378	423	249	
<b>Sterling Ranch Updated Traffic Impact Analysis June 5, 2008</b>															
4	---	220	Apartment	89 DU	6.72	0.10	0.41	0.40	0.22	598	9	36	36	19	
2	---	210	Single-Family Detached Housing	234 DU	9.57	0.19	0.56	0.64	0.37	2,239	44	132	149	87	
5	---	210	Single-Family Detached Housing	82 DU	9.52	0.19	0.56	0.63	0.37	781	15	46	52	30	
6	---	210	Single-Family Detached Housing	103 DU	9.52	0.19	0.56	0.63	0.37	981	19	58	65	38	
7	---	210	Single-Family Detached Housing	611 DU	9.52	0.19	0.56	0.63	0.37	5,817	115	344	385	226	
				<b>Total TAZs 2, 5, 6, &amp; 7</b>	1,030 DU					9,818	193	580	651	381	
<b>Difference in Estimated Trip Generation TAZs 2, 5, 6 &amp; 7</b>				-311 DU						-2,973	-58	-176	-198	-115	

Notes:

- (1) Source: "Trip Generation, 9th Edition, 2012" by the Institute of Transportation Engineers (ITE)
- (2) TAZ = Traffic Analysis Zone from Sterling Ranch Updated Traffic Impact Analysis by LSC June 5, 2008
- (3) DU = dwelling unit

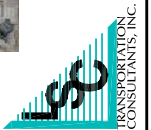


Approximate Scale  
Scale: 1" = 3,000'



Figure 1  
Vicinity  
Map

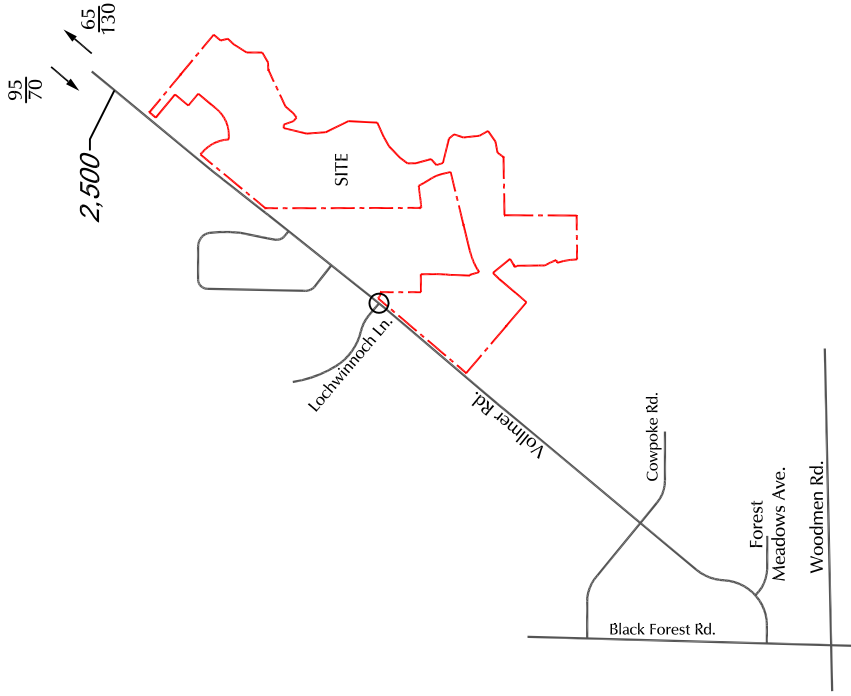
Sterling Ranch (LSC #144010)







Approximate Scale  
Scale: 1" = 3,000'



LEGEND:

⊥ = Stop Sign

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

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

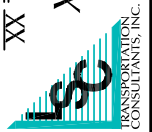
X,XXX = Average Weekday Traffic (vehicles per day) September 2017

\*Based on counts conducted September 2017

Figure 2

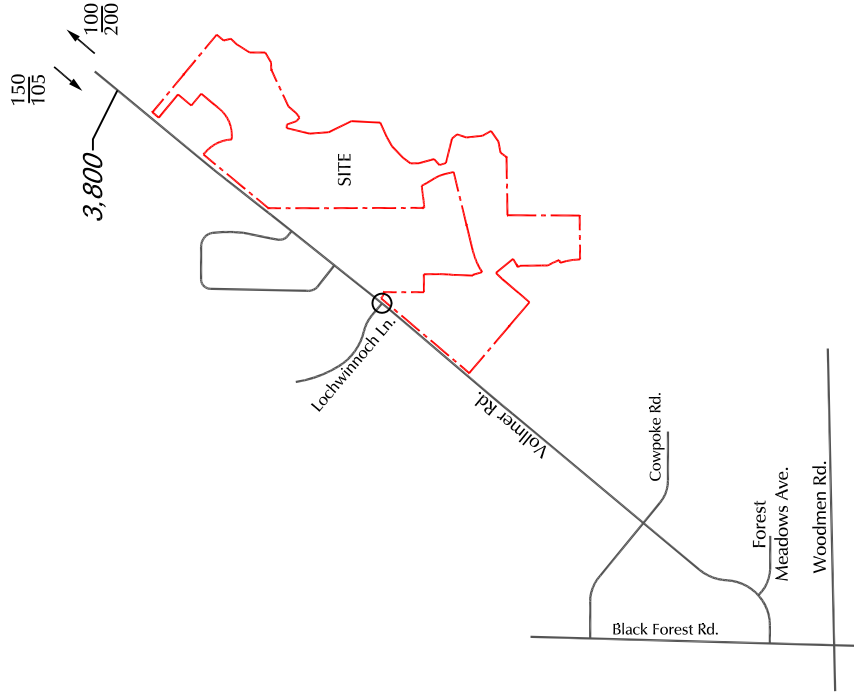
# Existing Traffic Volumes

Sterling Ranch (LSC #144010)





Approximate Scale  
Scale: 1" = 3,000'



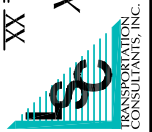
LEGEND:

- $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)
- X,XXX = Average Weekday Traffic (vehicles per day)

Figure 3

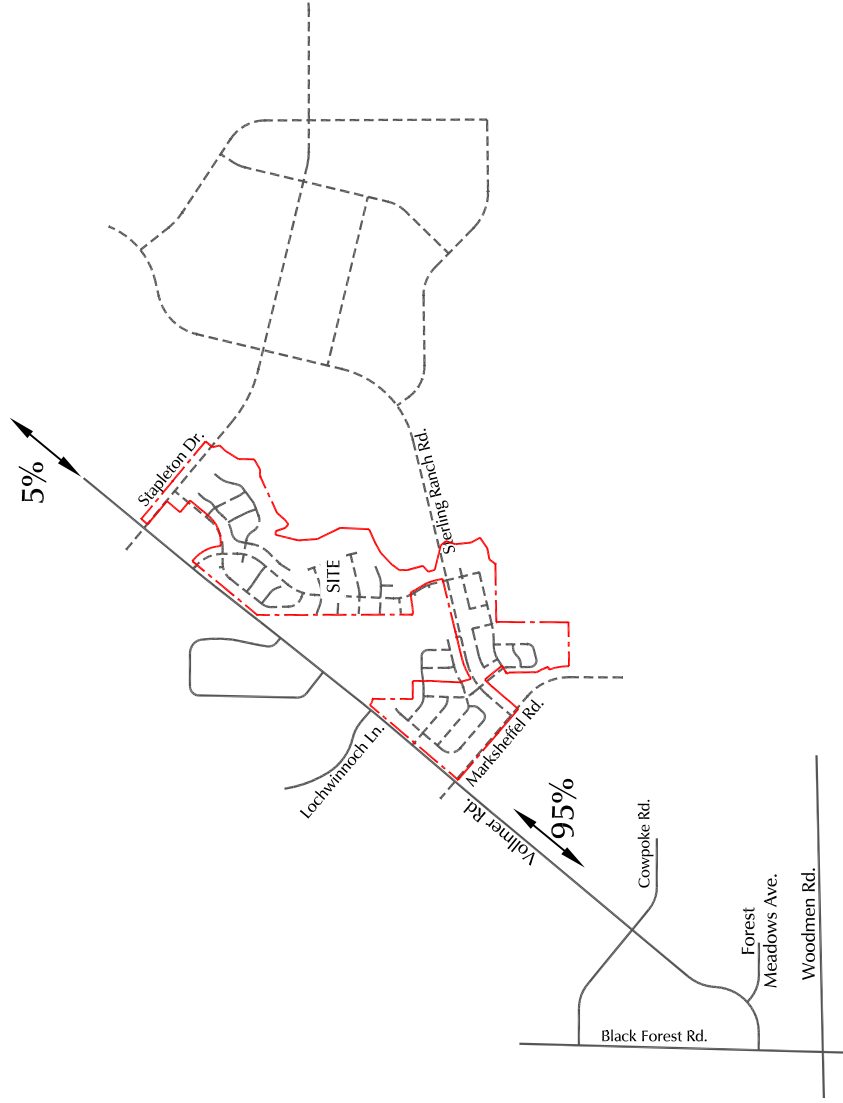
# 2025 Background Traffic

Sterling Ranch (LSC #144010)





Approximate Scale  
Scale: 1" = 3,000'



LEGEND:

↔ 35%

= Percent Directional Distribution

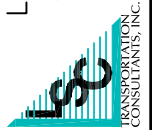


Figure 4

# Short-Term Directional Distribution of Site-Generated Traffic

Sterling Ranch (LSC #144010)

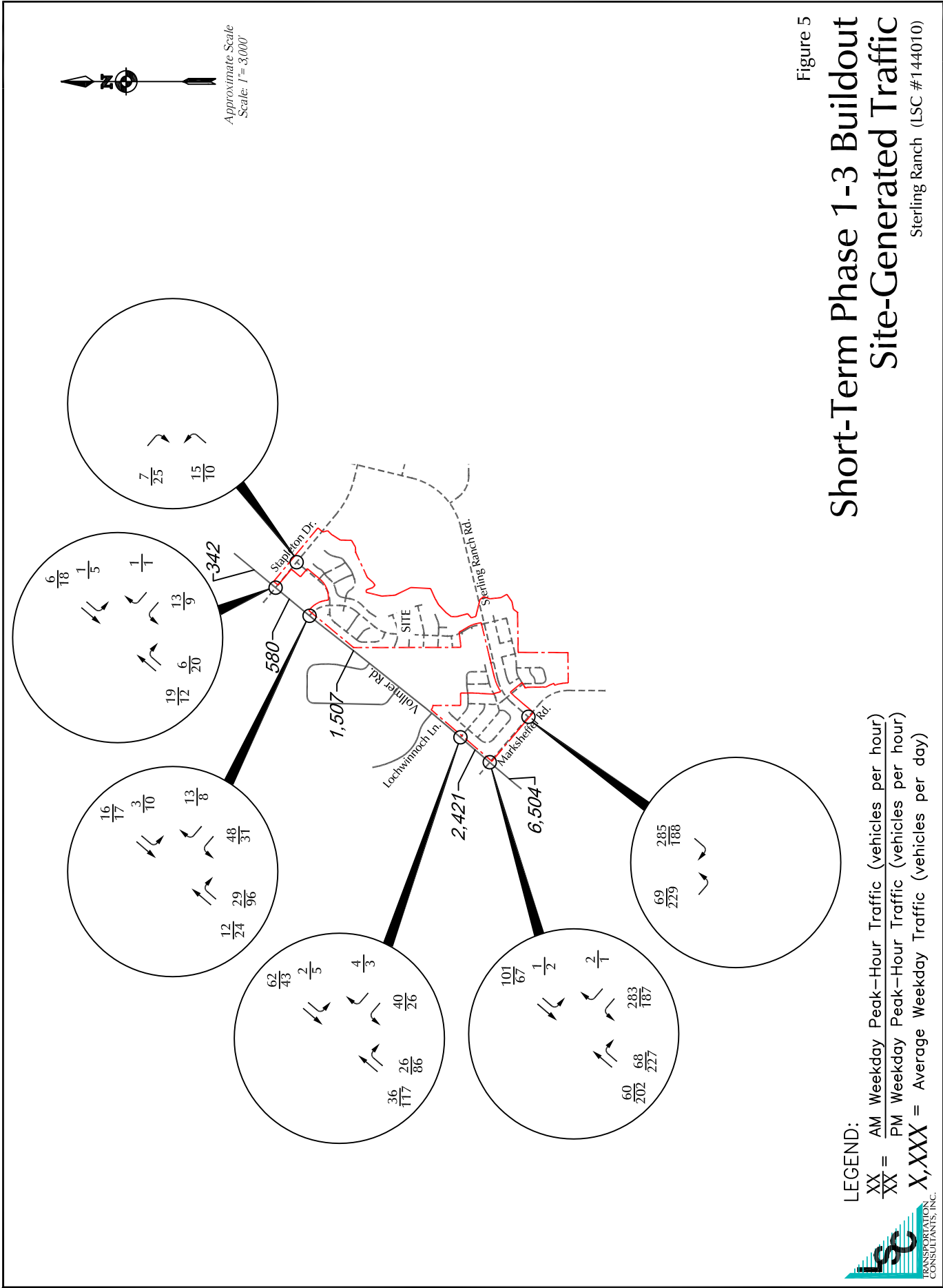
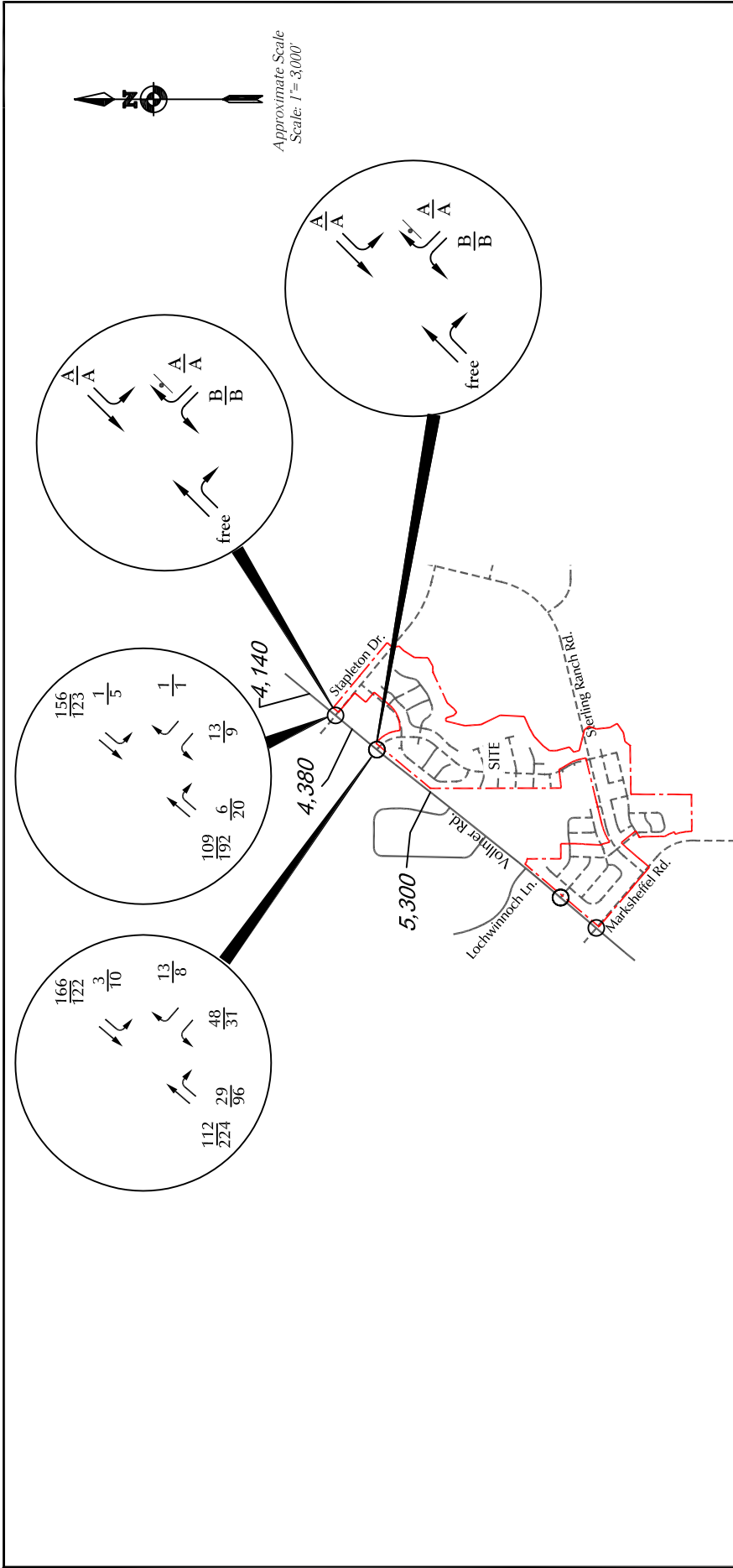


Figure 5  
**Short-Term Phase 1-3 Buildout**  
**Site-Generated Traffic**  
 Sterling Ranch (LSC #144010)



LEGEND:

↑ = Stop Sign

$\frac{26}{31}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)

$\frac{26}{31}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)

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

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

LSC 500 = Average Weekday Traffic (vehicles per day)

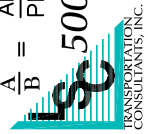
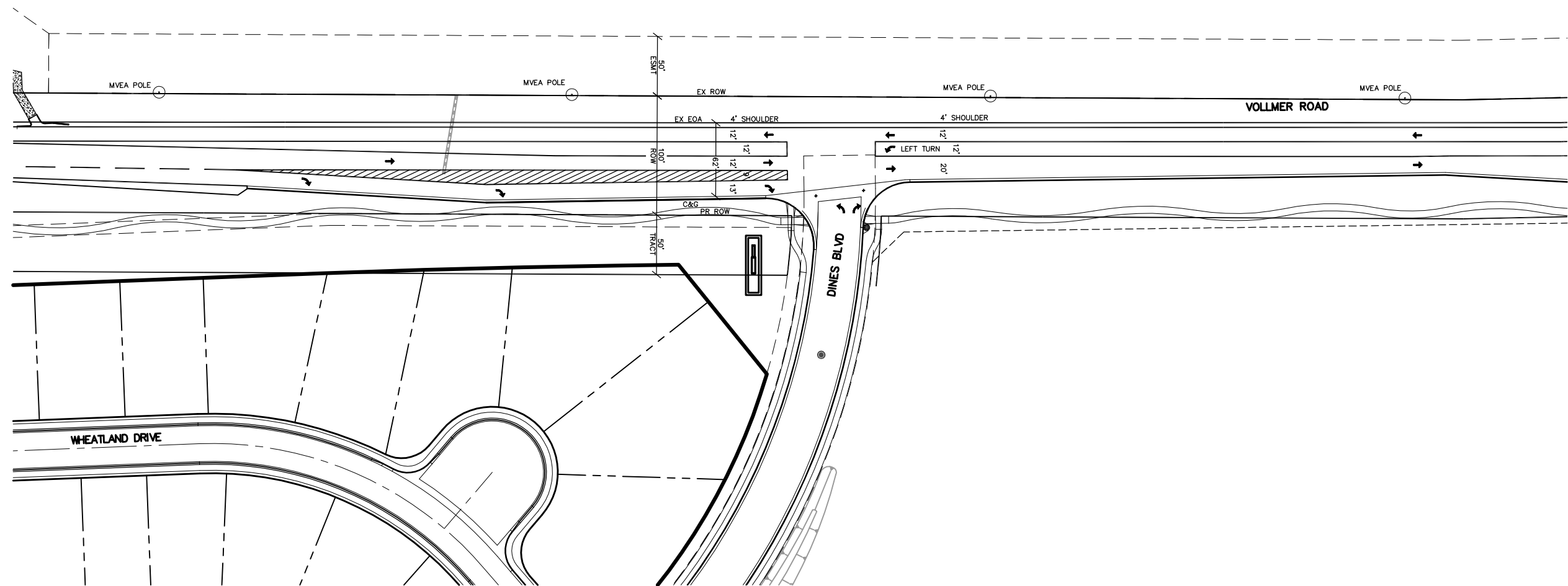
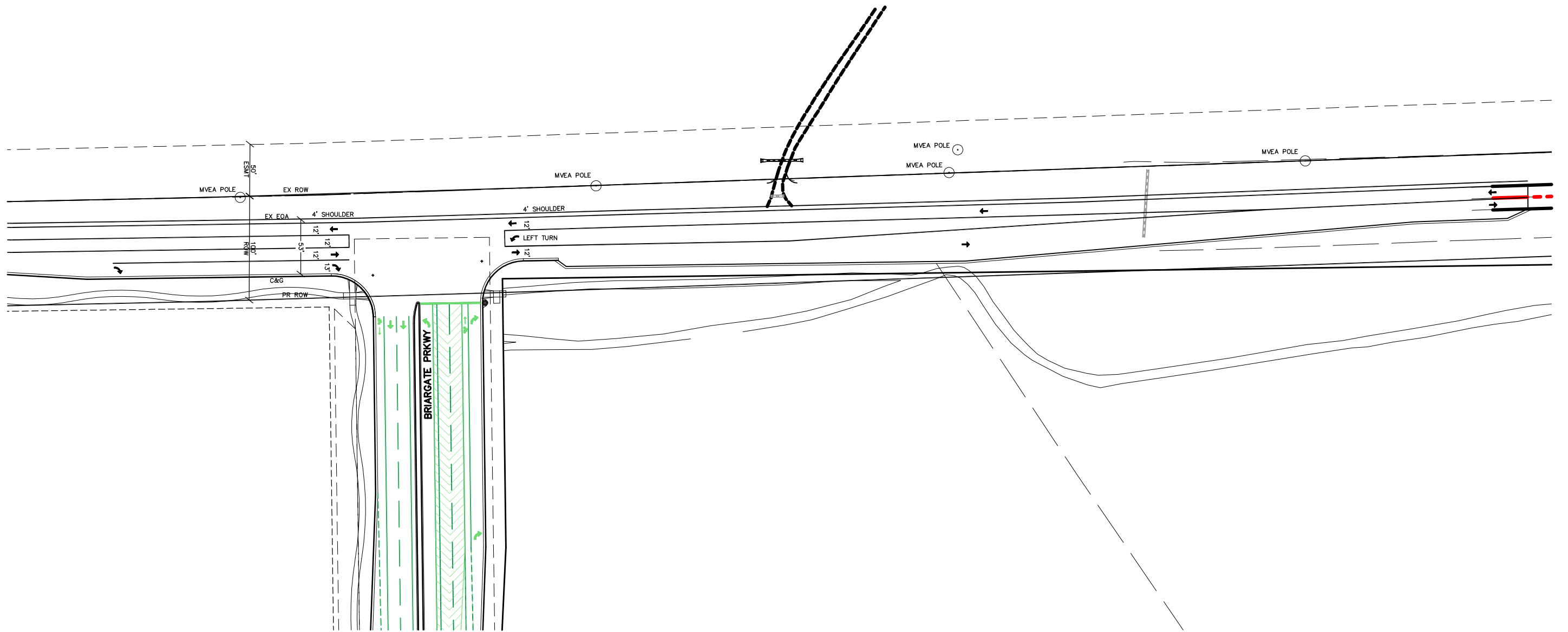


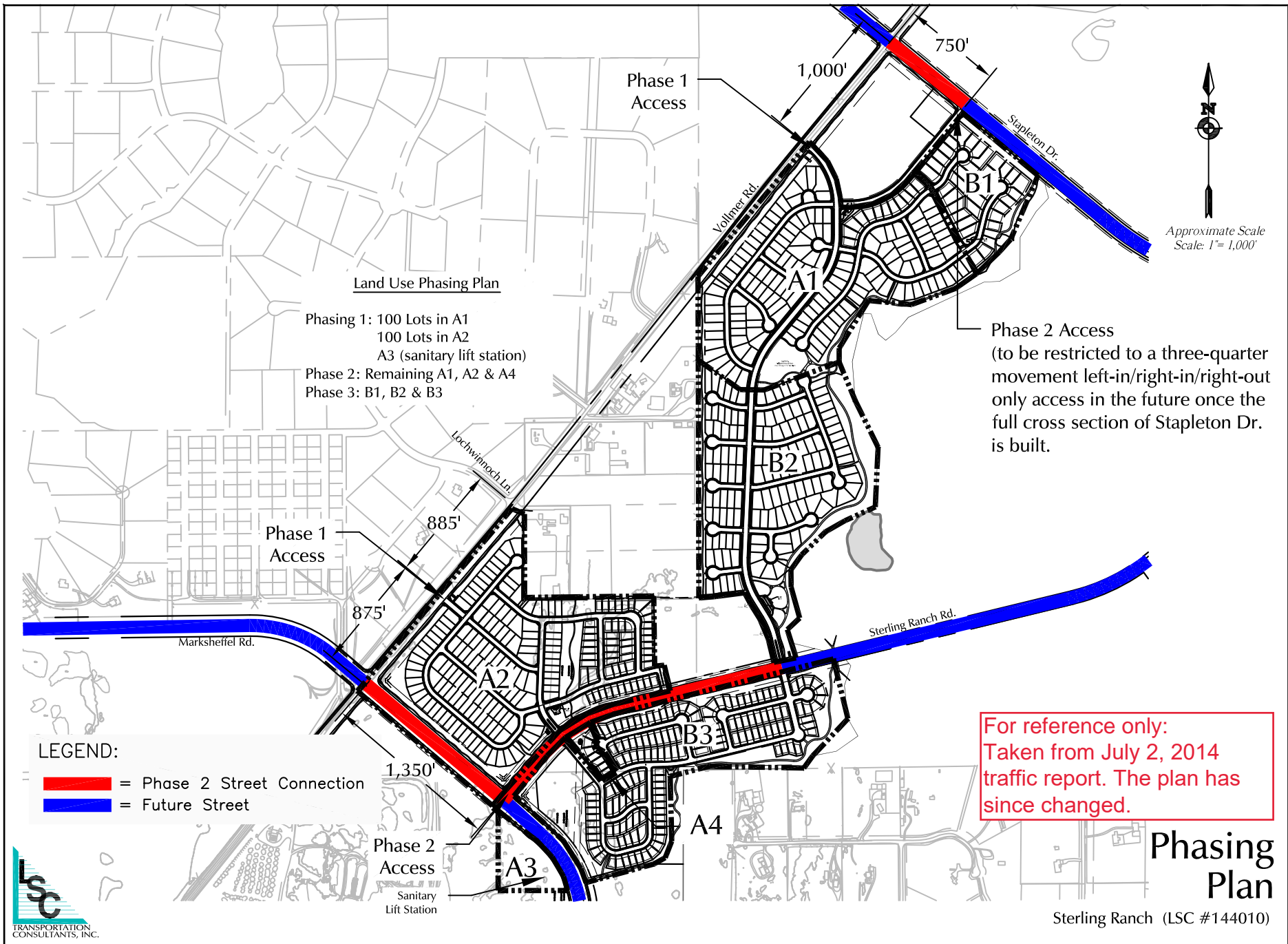
Figure 6

# Year 2025 Total Traffic & Intersection Analysis

Sterling Ranch (LSC #144010)











Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	48	13	112	29	3	166
Future Vol, veh/h	48	13	112	29	3	166
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	-	235	285	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	14	122	32	4	205

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	335	122	0	0	154
Stage 1	122	-	-	-	-
Stage 2	213	-	-	-	-
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	660	929	-	-	1426
Stage 1	903	-	-	-	-
Stage 2	823	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	658	929	-	-	1426
Mov Cap-2 Maneuver	658	-	-	-	-
Stage 1	900	-	-	-	-
Stage 2	823	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	658	929	1426	-
HCM Lane V/C Ratio	-	-	0.079	0.015	0.003	-
HCM Control Delay (s)	-	-	10.9	8.9	7.5	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	0	-

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	13	1	119	6	1	156
Future Vol, veh/h	13	1	119	6	1	156
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	-	235	285	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	1	129	7	1	193

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	324	129	0	0	136	0
Stage 1	129	-	-	-	-	-
Stage 2	195	-	-	-	-	-
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	670	921	-	-	1448	-
Stage 1	897	-	-	-	-	-
Stage 2	838	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	669	921	-	-	1448	-
Mov Cap-2 Maneuver	669	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	669	921	1448
HCM Lane V/C Ratio	-	-	0.021	0.001	0.001
HCM Control Delay (s)	-	-	10.5	8.9	7.5
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	0

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	31	8	224	96	10	122
Future Vol, veh/h	31	8	224	96	10	122
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	-	235	285	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	9	241	103	10	127

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	388	241	0	0	344
Stage 1	241	-	-	-	-
Stage 2	147	-	-	-	-
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	616	798	-	-	1215
Stage 1	799	-	-	-	-
Stage 2	880	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	611	798	-	-	1215
Mov Cap-2 Maneuver	611	-	-	-	-
Stage 1	793	-	-	-	-
Stage 2	880	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	611	798	1215
HCM Lane V/C Ratio	-	-	0.055	0.011	0.009
HCM Control Delay (s)	-	-	11.2	9.6	8
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	0

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	9	1	212	20	5	123
Future Vol, veh/h	9	1	212	20	5	123
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	-	235	285	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	93	93	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	1	228	22	5	128

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	366	228	0	0	250	0
Stage 1	228	-	-	-	-	-
Stage 2	138	-	-	-	-	-
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	634	811	-	-	1316	-
Stage 1	810	-	-	-	-	-
Stage 2	889	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	631	811	-	-	1316	-
Mov Cap-2 Maneuver	631	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	889	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	631	811	1316
HCM Lane V/C Ratio	-	-	0.016	0.001	0.004
HCM Control Delay (s)	-	-	10.8	9.4	7.7
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	0

# Markup Summary

## dsdrice (7)

10/11/2019 11:24:38 AM  
Traffic Technical Memo  
as a 4-lane road?

North from the City of Fountain to Woodmead to six lanes and extended north and west to Black Forest Road. Marksheffel Road is shown as a 4-lane road. Marksheffel Road is planned as a 4-lane road in the short-term future.

**Subject:** Callout  
**Page Label:** 4  
**Author:** dsdrice  
**Date:** 4/9/2019 11:24:38 PM  
**Color:** ■

as a 4-lane road?

All of the internal streets within Copper Chase at Sterling Ranch are proposed to be private.  
ROADWAY IMPROVEMENTS  
Valley Road  
Based on the proposed plan, the site developer, the traffic control Engineering Consultant, and the distribution of Valley Road as a right-of-way improvement would be required to Valley Road between Alameda Street and Marksheffel Road. The proposed plan would require the developer to provide additional improvements required as part of the Subdivision (SD) for development of Sterling Ranch. The 1.5 and 2.0 acre lots are to be developed. These lots would have been in Valley Road between Alameda Street and Marksheffel Road. The proposed plan is to provide for Valley Road between Marksheffel Road and Alameda Street. The proposed plan would require the developer to provide for the road in each direction, but the street road improvements would allow for

**Subject:** Callout  
**Page Label:** 7  
**Author:** dsdrice  
**Date:** 4/9/2019 11:25:40 PM  
**Color:** ■

also?

which are proposed to be private.  
provide proposed phasing plan  
The criteria contained in the 2017 Engineering Manual for Valley Road as a Minor Arterial, and the distribution of Valley Road as a right-of-way improvement would be required to Valley Road between Alameda Street and Marksheffel Road. The proposed plan would require the developer to provide additional improvements required as part of the Subdivision (SD) for development of Sterling Ranch. The 1.5 and 2.0 acre lots are to be developed. These lots would have been in Valley Road between Alameda Street and Marksheffel Road. The proposed plan is to provide for Valley Road between Marksheffel Road and Alameda Street. The proposed plan would require the developer to provide for the road in each direction, but the street road improvements would allow for

**Subject:** Callout  
**Page Label:** 7  
**Author:** dsdrice  
**Date:** 4/9/2019 11:26:51 PM  
**Color:** ■

provide proposed phasing plan

provide values here

**Subject:** Callout  
**Page Label:** 12  
**Author:** dsdrice  
**Date:** 4/9/2019 11:33:38 PM  
**Color:** ■

provide values here

Transmittal Memo dated October 2, 2017  
Provide a summary table of all improvements necessary to be in place for this development.

**Subject:** Text Box  
**Page Label:** 8  
**Author:** dsdrice  
**Date:** 4/9/2019 11:36:28 PM  
**Color:** ■

Provide a summary table of all improvements necessary to be in place for this development.

Copper Chase at Sterling Ranch  
Bynum Dr.

**Subject:** Callout  
**Page Label:** 11  
**Author:** dsdrice  
**Date:** 4/9/2019 11:46:32 PM  
**Color:** ■

Bynum Dr.

Address Marksheffel Road, Bynum Dr., and Alameda Drive  
Provide additional analysis for the time in which Marksheffel Road is not connected to the south.

**Subject:** Text Box  
**Page Label:** 7  
**Author:** dsdrice  
**Date:** 4/9/2019 11:47:32 PM  
**Color:** ■

Address Marksheffel Road, Bynum Dr., and Alameda Drive.

Provide additional analysis for the time in which Marksheffel Road is not connected to the south.

## dsdparsons (1)

Staff has concerns with the actual construction of roads. Depending on another development or sub. is not realistic. Already the overall applicant has changed the phasing multiple times. Address Option A and B to get roads done. Two points of access are required.

**Subject:** Callout  
**Page Label:** 1  
**Author:** dsdparsons  
**Date:** 4/11/2019 2:21:42 PM  
**Color:** ■

Staff has concerns with the actual construction of roads. Depending on another development or sub. is not realistic. Already the overall applicant has changed the phasing multiple times. Address Option A and B to get roads done. Two points of access are required.