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Copper Chase at Sterling Ranch
Traffic Technical Memorandum
PUDSP-22-002
(LSC #184990)
July 25, 2023

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.

A handwritten signature in blue ink, appearing to be 'R. B. J.', written over a horizontal line.

7/31/23
Date

Copper Chase at Sterling Ranch

Traffic Impact Study

Prepared for:

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

JULY 25, 2023

LSC Transportation Consultants
Prepared by: Kirstin D. Ferrin, P.E.
Reviewed by: Jeffrey C. Hodsdon, P.E.

LSC #184990
PUDSP-22-002



CONTENTS

REPORT CONTENTS 1

REPORT SCENARIOS 2

 Short-Term Scenario 2

 Long-Term Scenario 2

RECENT TRAFFIC REPORTS 2

EXISTING ROAD AND TRAFFIC CONDITIONS 3

LAND USE AND ACCESS 4

 Intersection Sight Distance..... 4

 Pedestrian and Bicycle Analysis..... 4

 Safety Analysis 5

TRIP GENERATION 5

TRIP DISTRIBUTION AND ASSIGNMENT 5

BACKGROUND TRAFFIC VOLUMES 6

 Short-Term Scenario Background Conditions..... 6

 Long-Term Scenario Background Conditions..... 6

TOTAL TRAFFIC VOLUMES 6

 Short-Term Scenario Total Conditions 6

 Long-Term Scenario Total Conditions 7

LEVELS OF SERVICE..... 7

 Vollmer Road /Marksheffel Road 7

 Sterling Ranch Road /Marksheffel Road..... 8

SIGNAL WARRANT THRESHOLD ANALYSIS – AM AND PM PEAK HOURS 8

 Marksheffel/Vollmer 8

 Marksheffel/Sterling Ranch..... 8

SUBDIVISION STREET CLASSIFICATIONS 9

DEVIATON REQUESTS..... 9

ROADWAY IMPROVEMENTS 9

ROADWAY IMPROVEMENT FEE PROGRAM..... 10

Enclosures: 10

Tables 1, 3, and 4

Figures 1-14

Trail Map

Level of Service Reports

Appendix Tables 1-2



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July 25, 2023

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

RE: Copper Chase at Sterling Ranch
El Paso County, CO
Updated Traffic Impact Study
PUDSP-22-002
LSC #184990

Dear Mr. Byers:

LSC Transportation Consultants, Inc. has prepared this updated traffic impact study (TIS) for the proposed Copper Chase at Sterling Ranch residential development. As shown in Figure 1, the site is located east of Vollmer Road and north of the future extension of Marksheffel Road in El Paso County, Colorado.

LSC prepared a traffic technical memorandum for this development dated May 26, 2022, however since completion of that memorandum LSC has updated the Sterling Ranch Master Traffic Impact Study and prepared multiple reports various for preliminary plans and filings within Sterling Ranch and the surrounding area which impact the recommendations and conclusions. This report replaces the May 2022 memorandum and is intended as site-specific, PUD Development/PUD Plan report for Copper Chase at Sterling Ranch.

REPORT CONTENTS

This report presents:

- A list of previous Sterling Ranch traffic reports and the context of this project;
- A summary of the proposed land use and access plan;
- 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;
- The projected average weekday and peak-hour vehicle trips to be generated by the proposed future development;
- The assignment of the projected site-generated traffic volumes to the area roadways;

- Estimates of projected short-term long-term Background traffic volumes;
- The projected short-term and long-term total traffic volumes on the area roadways;
- The projected levels of service at the key intersections within the study area;
- A list of deviation requests
- Findings and recommendations for study area roadways and intersections, including number of lanes, auxiliary turn lanes, intersection traffic control, etc.; and
- The recommended street classifications
- The project's obligation to the County roadway improvement fee program.

REPORT SCENARIOS

Short-Term Scenario

The short-term scenario includes the roadway segments to be added in the short term only as shown in Figure 2. This scenario includes traffic to be generated by the currently proposed Copper Chase at Sterling Ranch and traffic to be generated in the short term by buildout of Homestead at Sterling Ranch, Branding Iron at Sterling Ranch, Sterling Ranch Filings 2-4, Homestead North at Sterling Ranch Filings 1-3, the Retreat at TimberRidge Filings 1-3, Sterling Ranch East Filings 1 and 2, and the planned FourSquare at Sterling Ranch East development. Trips projected from these other short-term developments outside of the currently proposed Copper Chase at Sterling Ranch are included as short-term “background traffic” in this report.

Long-Term Scenario

The long-term scenario is essentially the same as the 2043 Long-Term scenario contained in the LSC February 10, 2023 Master TIS with additional detail added for this application – including the analysis of minor intersections and street segments that are part of the currently proposed development. The study area of this report is more focused than the Sketch Plan.

RECENT TRAFFIC REPORTS

- LSC completed an updated master traffic study (MTIS) for the entire Sterling Ranch development, dated March 17, 2023. Appendix Table 1 includes a link to the El Paso County Electronic Development Application Review Program (EDARP) page where a copy of the latest version of that MTIS can be obtained.
- A list of other traffic studies within Sterling Ranch and in the vicinity of area of study completed within the past five years (that LSC is aware of) is attached for reference (Appendix Table 1).
- El Paso County is currently studying the Briargate Stapleton Corridor as part of a Pikes Peak Rural Transportation Authority (PPRTA) study. A draft version of the Briargate-Stapleton Corridor Study by Wilson & Company was published December 9, 2021.

EXISTING ROAD AND TRAFFIC CONDITIONS

The adjacent streets are shown in Figure 1 and are described below. Copies of the 2016 El Paso County Major Transportation Corridors Plan (MTCP), 2040 Roadway Plan, and 2016 MTCP 2060 Corridor Preservation Plan with the site location identified on them have been attached to this report.

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. Improvements to a section of Vollmer Road in the vicinity of the future Marksheffel Road are currently under construction. In the southbound direction, Vollmer Road has a posted speed limit of 45 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 2023 Sterling Ranch master traffic study show Vollmer Road as a four-lane Urban Minor Arterial in the vicinity of the site. Note: The new Connect COS City of Colorado Springs transportation plan shows Vollmer as a Principal Arterial.

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 four-lane Principal Arterial through the site on the El Paso County *MTCP*. The City of Colorado Springs intends to take ownership and maintenance of Marksheffel Road when it is constructed from Vollmer to the east and south to where it will connect to the segment constructed north of Woodmen Road in the City.

The section of Marksheffel Road adjacent to Sterling Ranch is currently under construction on 107 feet of right-of-way to the City's required cross section(s) and criteria. It is anticipated that Marksheffel Road will be connected between Vollmer Road and Woodmen Road by the end of 2023.

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 ultimately to extend to Towner Drive. The segment of Briargate Parkway between Vollmer Road and Sterling Ranch Road is planned to be constructed in the short term with the Sterling Ranch East Preliminary Plan.

Sterling Ranch Road is a planned Non-Residential Collector shown extending through the Sterling Ranch development between Marksheffel Road and the north end of the Sketch Plan area (Arroya Road). The segment between Marksheffel Road and Dines Boulevard has been constructed and the segment between Dines Boulevard and Briargate Parkway will be constructed in the short term with the Sterling Ranch East Preliminary Plan.

LAND USE AND ACCESS

Copper Chase at Sterling Ranch is planned to include 138 lots for single-family homes and is located east of Vollmer Road and north of the segment of Marksheffel Road currently under construction. Figure 3 shows the proposed site plan.

Access is proposed to Alzada Drive and Bynum Drive. Both of these existing “Urban Local” roadways are part of the approved Sterling Ranch Filing No. 2. The Copper Chase at Sterling Ranch access points are consistent with the access assumed in the TIS for that filing.

Copper Chase at Sterling Ranch was included in the Sterling Ranch Master TIS as Traffic Analysis Zone (TAZ) 5. Traffic projected to be generated by land uses within this zone was also included as part of the short-term background traffic volumes in the *Sterling Ranch East Rezoning and Preliminary Plan TIS*. The land use and access currently proposed are consistent with what was assumed in the *Master TIS and the Sterling Ranch East Rezoning and Preliminary Plan TIS*.

Intersection Sight Distance

Figure 4 shows a sight-distance analysis at the proposed intersections to Alzada Drive and Bynum Drive. Based on a design speed of 25 miles per hour (mph) and the criteria contained in Table 2-21 of the *Engineering Criteria Manual (ECM)*, the required intersection sight distance at the future intersections is 280 feet. Based on the criteria contained in Table 2-17 of the *ECM*, the required stopping sight distance approaching this intersection is 155 feet. As shown in Figure 3, both proposed intersections analyzed will meet the criteria.

Pedestrian and Bicycle Analysis

Figure 5 shows the location of all planned trails and sidewalks in the vicinity of the site. Connections are also proposed to the planned future Sand Creek Regional Trail (west of Dines Boulevard), as shown in the attached map.

A detached sidewalk will be provided along the west side of Sterling Ranch Road. The multi-use paved shoulder on Sterling Ranch Road will accommodate bicycles.

There are no existing schools within two miles of the site. However, multiple school sites are planned within Sterling Ranch northeast of the intersection of Sterling Ranch Road/Dines Boulevard. School pedestrians would travel to/from the intersection of Sterling Ranch/Dines on the sidewalks and trails identified in Figure 4. The need for additional pedestrian facilities and/or school crossings should be identified when the school site(s) are developed.

Safety Analysis

Most of the roadways in the vicinity of the site have not yet been constructed. The Colorado State Patrol (CSP) provided LSC with crash history data for Vollmer Road between Tahiti Drive and Burgess Road from September 2019 through September 2022. During the reported time period, there were twelve reported crashes. Of the twelve reports, ten were single-vehicle non-intersection-related crashes on Vollmer Road. One crash involved a southbound vehicle that turned right onto Poco Road and crashed into several cars parked on Poco Road partially in the lane. The only intersection related crash occurred in June 2022. A vehicle heading northbound on Vollmer Road was slowing to turn left at Lochwinnoch Road and the vehicle behind them attempted to pass on the left side. The crash history data has been attached.

TRIP GENERATION

Copper Chase at Sterling Ranch site-generated vehicle trips have been estimated using the nationally-published trip-generation rates from *Trip Generation, 11th Edition, 2021* by the Institute of Transportation Engineers (ITE). Table 1 shows the trip-generation estimate. The trip-generation estimate is consistent with the estimate assumed in the *Sterling Ranch Master TIS* and the *Sterling Ranch East Rezoning and Preliminary Plan TIS* for the same parcels.

Copper Chase at Sterling Ranch is expected to generate 1,301 vehicle trips on the average weekday, with about half entering and half exiting the site during 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 71 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 82 vehicles would enter and 48 vehicles would exit the site.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated traffic volumes on the street and roadway system serving the site is an important factor in determining the site's traffic impacts. The distribution estimates for short-term and long-term residential related traffic are shown in Figure 6. The short-term directional-distribution estimate assumes the short-term roadway network shown in Figure 2 only and the long-term directional distribution estimate assumes buildout of the roadway network. The directional-distribution estimates are based, in part, on the estimates contained in the sketch plan TIS report. Factors include: 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 6) are applied to the new, external trip-generation estimates (from Table 1), the resulting site-generated traffic volumes can be determined. Figures 7 and 8 show the short-term and long-term site-generated traffic volumes, respectively. The short-term site-generated traffic volumes assume only the street network

shown in Figure 2 and the long-term site-generated traffic volumes assume buildout of the area roadway network.

BACKGROUND TRAFFIC VOLUMES

Background traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development's trip generation of site-generated traffic volumes. Background traffic (for a specified horizon year) includes the through traffic and the traffic generated by nearby developments (existing and planned, including traffic generated by existing and planned developments within the greater Sterling Ranch overall development) but assumes zero traffic generated by land uses within Copper Chase at Sterling Ranch.

Short-Term Scenario Background Conditions

Figure 9 shows the projected volumes for the short-term Background scenario. This scenario includes traffic to be traffic generated in the short term by buildout of Homestead at Sterling Ranch, Branding Iron at Sterling Ranch, Sterling Ranch Filings 2-4, Homestead North at Sterling Ranch Filings 1-3, the Retreat at TimberRidge Filings 1-3, Sterling Ranch East Filings 1 and 2, and the planned FourSquare at Sterling Ranch East development.

Long-Term Scenario Background Conditions

Figure 10 shows the projected 2043 Background daily traffic volumes on key street segments at the key area intersections. These volumes assume buildout of the area street network, including the completion of Marksheffel Road between Vollmer Road and Black Forest Road, Briargate Parkway between Meridian Road and Black Forest Road, and Sterling Ranch Road between Marksheffel Road and Briargate Parkway.

The 2043 Background traffic volumes are estimates by LSC, based on the traffic projections in the LSC February 10, 2023 Master TIS report. The 2043 Background daily traffic volumes assume buildout of all other land uses within the Sterling Ranch Master Plan.

TOTAL TRAFFIC VOLUMES

Short-Term Scenario Total Conditions

Figure 11 shows the projected volumes for the short-term total scenario. These volumes are the sum of the short-term Background scenario (from Figure 9) plus the short-term site-generated traffic volumes (from Figure 7).

Long-Term Scenario Total Conditions

Figure 12 shows the projected volumes for the 2043 total scenario. These volumes are the sum of the 2043 Background scenario (from Figure 10) plus the long-term site-generated traffic volumes (from Figure 8).

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 intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections. Table 1 shows the level of service delay ranges.

Table 2: Intersection Levels of Service Delay Ranges

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

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

The study area stop-sign-controlled intersections have been analyzed based on the unsignalized-intersection analysis procedures from the *Highway Capacity Manual, 6th Edition* by the Transportation Research Board. The future signalized intersections of Vollmer Road/Marksheffel Road and Sterling Ranch Road /Marksheffel Road have been analyzed using Synchro.

Vollmer Road /Marksheffel Road

Marksheffel Road is planned to be constructed between Vollmer Road and Sterling Ranch Road in the short-term future. The intersection of Marksheffel/Vollmer is initially planned to be stop-sign controlled. Based on the projected short-term total traffic volumes, the westbound left-turn movement is projected to operate at LOS D during the morning peak hour and LOS E during the afternoon peak hour.

By 2043, it was assumed that Marksheffel Road would be constructed west to Briargate Parkway and that the intersection of Vollmer/Marksheffel will be converted to traffic-signal control. The intersection of Vollmer/Marksheffel is projected to operate at an overall LOS C or better during the peak hours as a signalized intersection, based on the projected 2043 total traffic volumes.

Sterling Ranch Road /Marksheffel Road

Marksheffel Road is planned to be constructed between Vollmer Road and Sterling Ranch Road in the short-term future. The intersection of Marksheffel/Sterling Ranch is initially planned to be stop-sign controlled. Based on the projected short-term total traffic volumes, the southbound left-turn movement is projected to operate at LOS C during the morning peak hour and LOS D during the afternoon peak hour.

By 2043, it was assumed that Sterling Ranch would be constructed south of Marksheffel Road and that the intersection of Sterling Ranch/Marksheffel will be converted to traffic-signal control. The intersection of Sterling Ranch/Marksheffel is projected to operate at an overall LOS C or better during the peak hours as a signalized intersection, based on the projected 2043 total traffic volumes.

SIGNAL WARRANT THRESHOLD ANALYSIS – AM AND PM PEAK HOURS

The intersections of Marksheffel/Vollmer and Marksheffel/Sterling Ranch were analyzed to determine if the thresholds for Four-Hour and/or Eight-Hour Vehicular-Volume Traffic-Signal Warrant thresholds would be reached or exceeded, based on the projected short-term traffic volumes.

The off-peak-hour volumes are estimates by LSC based on the peak-hour traffic volumes, 72-hour machine counts conducted by LSC on Vollmer Road in November 2020, and vehicle time-of-day distribution data for single-family homes published by the Institute of Transportation Engineers.

Marksheffel/Vollmer

Table 3 shows the results of the analysis for the intersection of Marksheffel/Vollmer. As shown in Table 3, in the short-term, only one of the hours analyzed is projected to meet the thresholds for an Eight-Hour Vehicular-Volume Traffic-Signal Warrant and none of the hours analyzed are projected to meet the thresholds for a Four-Hour Vehicular Volume Traffic Signal Warrant. This analysis indicates that traffic-signal warrant(s) will likely **not** be met at the intersection of Marksheffel/Vollmer in the short-term.

Marksheffel/Sterling Ranch

Table 4 shows the results of the analysis for the intersection of Marksheffel/Sterling Ranch. As shown in Table 4, in the short-term, only three of the hours analyzed are projected to meet the

thresholds for an Eight-Hour Vehicular-Volume Traffic-Signal and only one of the hours analyzed are projected to meet the thresholds for a Four-Hour Vehicular Volume Traffic Signal Warrant. This analysis indicates that traffic-signal warrant(s) will likely **not** be met at the intersection of Marksheffel/Sterling Ranch in the short-term.

SUBDIVISION STREET CLASSIFICATIONS

All of the internal streets within Copper Chase at Sterling Ranch should be classified as Urban Local. Figure 13 shows the recommended street classifications for the internal streets and the streets in the vicinity of the site.

DEVIATION REQUESTS

The following deviation requests to the criteria contained in the El Paso County *Engineering Criteria Manual (ECM)* have been included with this submittal:

- A deviation from the maximum mid-block ped ramp spacing
- A deviation from the number of ped ramps at a “T” intersection
- A deviation from the minimum center-line radius and minimum intersection-spacing standards.
- A deviation request for tangent length between broken back curves & for K-values at stop conditions on a local road

ROADWAY IMPROVEMENTS

Table 6 from the *Sterling Ranch East Rezoning and Preliminary Plan TIS* contained a summary of needed area improvements. Appendix Table 2 is a copy of this table with the improvements needed either prior to or with Copper Chase at Sterling Ranch highlighted. Please see Figure 14 for a map of the key street-segment locations. These recommendations are consistent with the LSC Sketch Plan TIS report.

The following auxiliary lanes shown will be required with Copper Chase at Sterling Ranch development if not completed with Sterling Ranch Filing No. 2. Note: These are shown on the construction plans by JR Engineering for these adjacent roadways and construction is underway

- Marksheffel/Vollmer
 - 155-foot northbound right-turn deceleration lane on Vollmer approaching Marksheffel, plus a 160-foot taper
 - 310-foot southbound left-turn lane on Vollmer approaching Marksheffel, plus a 160-foot taper.
 - 425-foot westbound left-turn lane on Marksheffel approaching Vollmer, plus a 200-foot taper
 - 235-foot westbound right-turn deceleration lane on Marksheffel approaching Vollmer, plus a 200-foot taper

- Sterling Ranch/Marksheffel
 - 470-foot eastbound left-turn lane on Marksheffel approaching Sterling Ranch, plus a 200-foot taper
 - A 285-foot southbound left-turn lane on Sterling Ranch approaching Marksheffel, plus a 90-foot reverse-curve taper
 - A 155-foot southbound right-turn lane on Sterling Ranch approaching Marksheffel, plus a 160-foot taper
- Sterling Ranch/Bynum
 - A 155-foot northbound left-turn lane on Sterling Ranch Road approaching Bynum, plus a 90-foot reverse-curve taper

ROADWAY IMPROVEMENT FEE PROGRAM

This project will be required to participate in the El Paso County Road Improvement Fee Program. Copper Chase at Sterling Ranch will join the ten-mil PID. The 2019 ten-mil PID building permit fee portion associated with this option is \$1,221 per single-family dwelling unit. Based on 158 lots, the total building permit fee would be \$168,498. Note: program fees are subject to change.

* * * * *

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

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

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

JCH/KDF:jas

Enclosures: Tables 1, 3, and 4
Figures 1-14
Trail Map
Level of Service Reports
Appendix Tables 1-2

Tables 1, 3, and 4



Table 1
Sterling Ranch East Phase 1 Preliminary Plan
Copper Chase at Sterling Ranch

| ITE Code | ITE Land Use | Quantity | Unit | Trip Generation Rates ⁽¹⁾ | | | | | Total Trip Generated | | | | |
|----------|--------------------------------|----------|-------------------|--------------------------------------|--------------|------|--------------|------|----------------------|--------------|-----|--------------|-----|
| | | | | Daily | AM Peak Hour | | PM Peak Hour | | Daily | AM Peak Hour | | PM Peak Hour | |
| | | | | | In | Out | In | Out | | In | Out | In | Out |
| 210 | Single-Family Detached Housing | 138 | DU ⁽²⁾ | 9.43 | 0.18 | 0.52 | 0.59 | 0.35 | 1,301 | 25 | 71 | 82 | 48 |

Notes:

(1) Source: "Trip Generation, 11th Edition, 2021" by the Institute of Transportation Engineers (ITE)

(2) DU = Dwelling Unit

Source: LSC Transportation Consultants, Inc.

Apr-23

Table 3
Traffic Signal Warrant Analysis
Marksheffel Road/Vollmer Road

| Warrant Analysis ⁽¹⁾ | | | | | | | | | | | | | | | | | | |
|--|---------------------------------|-------------------------------------|--|----------------------|--------------------------|----------------------|--------------------|-------|-------------|-------|------------------------|---------------|------------------|--|---------------------------------------|---------------------------------|---------------------------------------|---------------------------------|
| Warrant 1: Eight Hour Vehicular Volume Evaluation | | | | | | | | | | | | | | Warrant 2: Four Hour Vehicular Volume Evaluation | | | | |
| Hour | Short-Term Background Traffic | | Copper Chase at Sterling Ranch Generated Traffic | | Short-Term Total Traffic | | Warrant Thresholds | | | | Warrant Threshold Met? | | | | Short-Term Background | | Short-Term Total | |
| | Major ⁽²⁾ Vollmer | Minor ⁽³⁾ Marksheffel | Major Vollmer | Minor Marksheffel | Major Vollmer | Minor Marksheffel | Condition A | | Condition B | | Short-Term Background | | Short-Term Total | | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB |
| | | | | | | | Major | Minor | Major | Minor | Condition n A | Condition n B | Condition n A | Condition n B | | | | |
| | | | | | | | | | | | | | | | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB |
| Short-Term Total Traffic⁽⁴⁾ | | | | | | | | | | | | | | | | | | |
| 12-1 AM | 45 | 2 | 1 | 1 | 46 | 3 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 1-2 AM | 23 | 2 | 1 | 1 | 24 | 3 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 2-3 AM | 16 | 0 | 1 | 0 | 17 | 0 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 3-4 AM | 25 | 2 | 1 | 1 | 26 | 3 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 4-5 AM | 40 | 8 | 1 | 2 | 41 | 10 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 5-6 AM | 105 | 19 | 1 | 6 | 106 | 25 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 6-7 AM | 312 | 57 | 7 | 17 | 319 | 74 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 7-8 AM | 754 | 99 | 13 | 29 | 767 | 128 | 600 | 150 | 900 | 75 | No | No | No | No | 223 | No | 217 | No |
| 8-9 AM | 841 | 83 | 14 | 24 | 855 | 107 | 600 | 150 | 900 | 75 | No | No | No | No | 190 | No | 186 | No |
| 9-10 AM | 728 | 52 | 13 | 15 | 741 | 67 | 600 | 150 | 900 | 75 | No | No | No | No | 236 | No | 230 | No |
| 10-11 AM | 843 | 52 | 18 | 15 | 861 | 67 | 600 | 150 | 900 | 75 | No | No | No | No | 189 | No | 185 | No |
| 11-12 PM | 947 | 50 | 22 | 15 | 969 | 65 | 600 | 150 | 900 | 75 | No | No | No | No | 163 | No | 158 | No |
| 12-1 PM | 791 | 49 | 22 | 15 | 813 | 64 | 600 | 150 | 900 | 75 | No | No | No | No | 205 | No | 197 | No |
| 1-2 PM | 783 | 52 | 23 | 16 | 806 | 68 | 600 | 150 | 900 | 75 | No | No | No | No | 209 | No | 199 | No |
| 2-3 PM | 901 | 55 | 26 | 17 | 927 | 72 | 600 | 150 | 900 | 75 | No | No | No | No | 175 | No | 168 | No |
| 3-4 PM | 956 | 53 | 32 | 16 | 988 | 69 | 600 | 150 | 900 | 75 | No | No | No | No | 161 | No | 153 | No |
| 4-5 PM | 992 | 66 | 40 | 20 | 1032 | 86 | 600 | 150 | 900 | 75 | No | No | No | Yes | 152 | No | 140 | No |
| 5-6 PM | 829 | 65 | 40 | 20 | 869 | 85 | 600 | 150 | 900 | 75 | No | No | No | No | 193 | No | 183 | No |
| 6-7 PM | 565 | 52 | 32 | 16 | 597 | 68 | 600 | 150 | 900 | 75 | No | No | No | No | 308 | No | 292 | No |
| 7-8 PM | 353 | 38 | 23 | 11 | 376 | 49 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 8-9 PM | 286 | 27 | 24 | 8 | 310 | 35 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 9-10 PM | 183 | 21 | 17 | 6 | 200 | 27 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 10-11 PM | 103 | 10 | 8 | 3 | 111 | 13 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 11-12 AM | 54 | 6 | 5 | 2 | 59 | 8 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| Numbers of Hours the Warrant Thresholds Are Met | | | | | | | | | | | 0 | 0 | 0 | 1 | | 0 | | 0 |
| Warrant Met? | | | | | | | | | | | No | | No | | | No | | No |

Notes:
(1) Thresholds are based on 2 or more lanes on the major approach and 1 lane on the minor approach (Warrant evaluation assuming the westbound left turn only for the minor street)
(2) The major street traffic includes all movements (left, through, and right)
(3) The minor street traffic includes only the left turns from the minor street
(4) Off peak hour traffic volumes are based on the projected peak hour traffic volumes, 72-hour machine counts conducted on Vollmer Road in November 2020 and vehicle time-of-day distribution data for single-family residential published by the Institute of Transportation Engineers

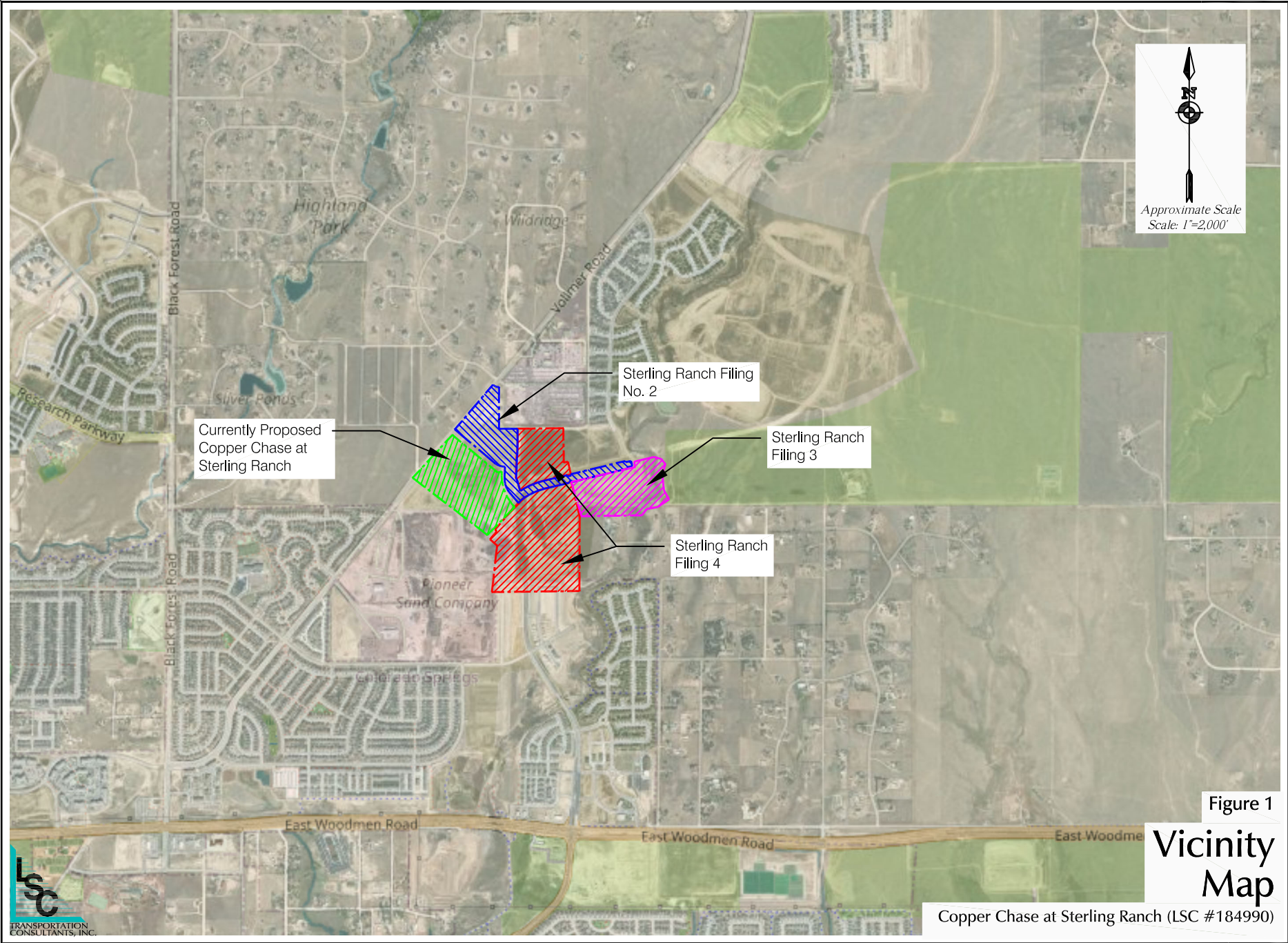
Source: LSC Transportation Consultants, Inc. Apr-23

**Table 4
Traffic Signal Warrant Analysis
Marksheffel Road/Sterling Ranch Road**

| Warrant Analysis ⁽³⁾ | | | | | | | | | | | | | | | | | | |
|--|-------------------------------------|---|--|-------------------------|--------------------------|----------------------------|--------------------|-------|-------------|-------|------------------------|-----------------|-----------------|--|--|------------------------------------|--|------------------------------------|
| Warrant 1: Eight Hour Vehicular Volume Evaluation | | | | | | | | | | | | | | Warrant 2: Four Hour Vehicular Volume Evaluation | | | | |
| Hour | Short-Term Background Traffic | | Copper Chase at Sterling Ranch Generated Traffic | | Short-Term Total Traffic | | Warrant Thresholds | | | | Warrant Threshold Met? | | | | Short-Term Background | | Short-Term Total | |
| | Major ⁽²⁾ Marksheffel | Minor ⁽³⁾ Sterling Ranch | Major Marksheffel | Minor Sterling Ranch | Major Marksheffel | Minor Sterling Ranch | Condition A | | Condition B | | Conditio n A | Conditio n B | Conditio n A | Conditio n B | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB | Warrant Threshold Minor Minimum | Warrant Threshold Met? WB |
| | | | | | | | Major | Minor | Major | Minor | | | | | | | | |
| | | | | | | | | | | | | | | | Minimum | WB | Minimum | WB |
| | | | | | | | | | | | | | | Minimum | WB | Minimum | WB | |
| Short-Term Total Traffic⁽⁴⁾ | | | | | | | | | | | | | | | | | | |
| 12-1 AM | 28 | 6 | 3 | 1 | 31 | 7 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 1-2 AM | 13 | 6 | 1 | 1 | 14 | 7 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 2-3 AM | 11 | 0 | 1 | 0 | 12 | 0 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 3-4 AM | 14 | 6 | 1 | 1 | 15 | 7 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 4-5 AM | 21 | 23 | 1 | 3 | 22 | 26 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 5-6 AM | 49 | 58 | 3 | 7 | 52 | 65 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 6-7 AM | 147 | 171 | 8 | 21 | 155 | 192 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 7-8 AM | 335 | 295 | 16 | 36 | 351 | 331 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 8-9 AM | 377 | 249 | 19 | 30 | 396 | 279 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 9-10 AM | 326 | 156 | 16 | 19 | 342 | 175 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 10-11 AM | 389 | 156 | 21 | 19 | 410 | 175 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | 385 | No |
| 11-12 PM | 455 | 148 | 27 | 18 | 482 | 166 | 600 | 150 | 900 | 75 | No | No | No | No | 363 | No | 349 | No |
| 12-1 PM | 460 | 148 | 28 | 19 | 488 | 167 | 600 | 150 | 900 | 75 | No | No | No | No | 360 | No | 346 | No |
| 1-2 PM | 476 | 156 | 31 | 20 | 507 | 176 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | 337 | No |
| 2-3 PM | 550 | 164 | 36 | 21 | 586 | 185 | 600 | 150 | 900 | 75 | No | No | No | No | 315 | No | 297 | No |
| 3-4 PM | 620 | 158 | 44 | 20 | 664 | 178 | 600 | 150 | 900 | 75 | Yes | No | Yes | No | 282 | No | 264 | No |
| 4-5 PM | 702 | 198 | 55 | 25 | 757 | 223 | 600 | 150 | 900 | 75 | Yes | No | Yes | No | 249 | No | 222 | Yes |
| 5-6 PM | 640 | 195 | 54 | 25 | 694 | 220 | 600 | 150 | 900 | 75 | Yes | No | Yes | No | 274 | No | 252 | No |
| 6-7 PM | 490 | 156 | 45 | 20 | 535 | 176 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | 323 | No |
| 7-8 PM | 335 | 114 | 32 | 14 | 367 | 128 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 8-9 PM | 316 | 82 | 33 | 10 | 349 | 92 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 9-10 PM | 218 | 63 | 24 | 8 | 242 | 71 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 10-11 PM | 112 | 29 | 12 | 4 | 124 | 33 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| 11-12 AM | 64 | 18 | 7 | 2 | 71 | 20 | 600 | 150 | 900 | 75 | No | No | No | No | Low Volume | No | Low Volume | No |
| Numbers of Hours the Warrant Thresholds Are Met | | | | | | | | | | | 3 | 0 | 3 | 0 | 0 | 1 | | |
| Warrant Met? | | | | | | | | | | | No | No | No | No | No | No | | |

Notes:
 (1) Thresholds are based on 2 or more lanes on the major approach and 1 lane on the minor approach (Warrant evaluation assuming the southbound left turn only for the minor street)
 (2) The major street traffic includes all movements (left, through, and right)
 (3) The minor street traffic includes only the left turns from the minor street
 (4) Off peak hour traffic volumes are based on the projected peak hour traffic volumes, 72-hour machine counts conducted on Vollmer Road in November 2020 and vehicle time-of-day distribution data for single-family residential published by the Institute of Transportation Engineers
 Source: LSC Transportation Consultants, Inc. Apr-23

Figures 1-14



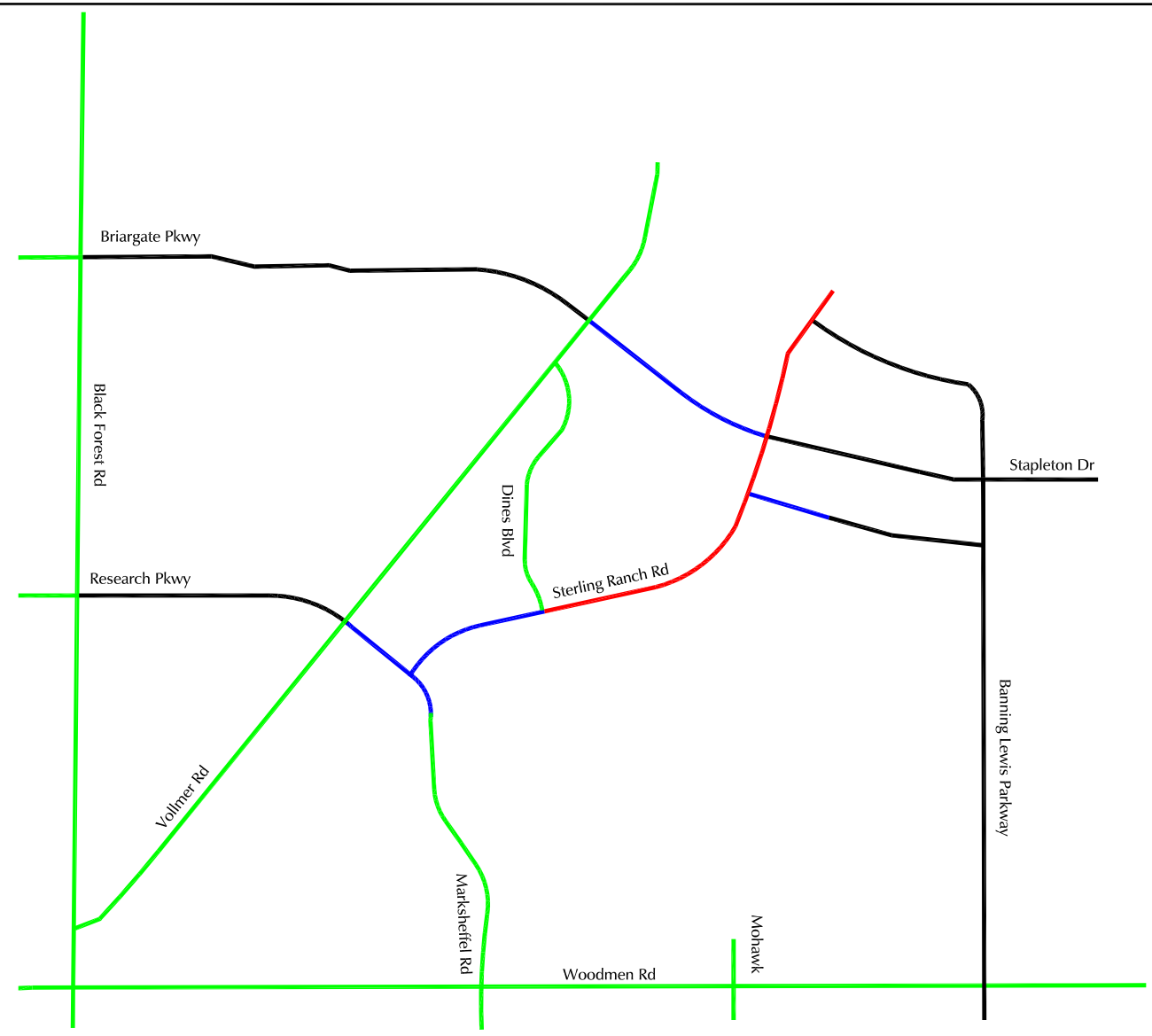
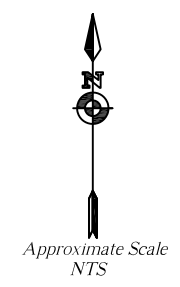
Approximate Scale
Scale: 1"=2,000'

Figure 1

Vicinity Map

Copper Chase at Sterling Ranch (LSC #184990)





- LEGEND:**
- Roadway connection planned with Sterling Ranch East Preliminary Plan 1
 - Roadway connection planned to be completed by the end of 2023
 - Existing Roadway
 - Future Roadway

Short-Term Roadway Connections
Copper Chase at Sterling Ranch (LSC #184990)



Figure 2

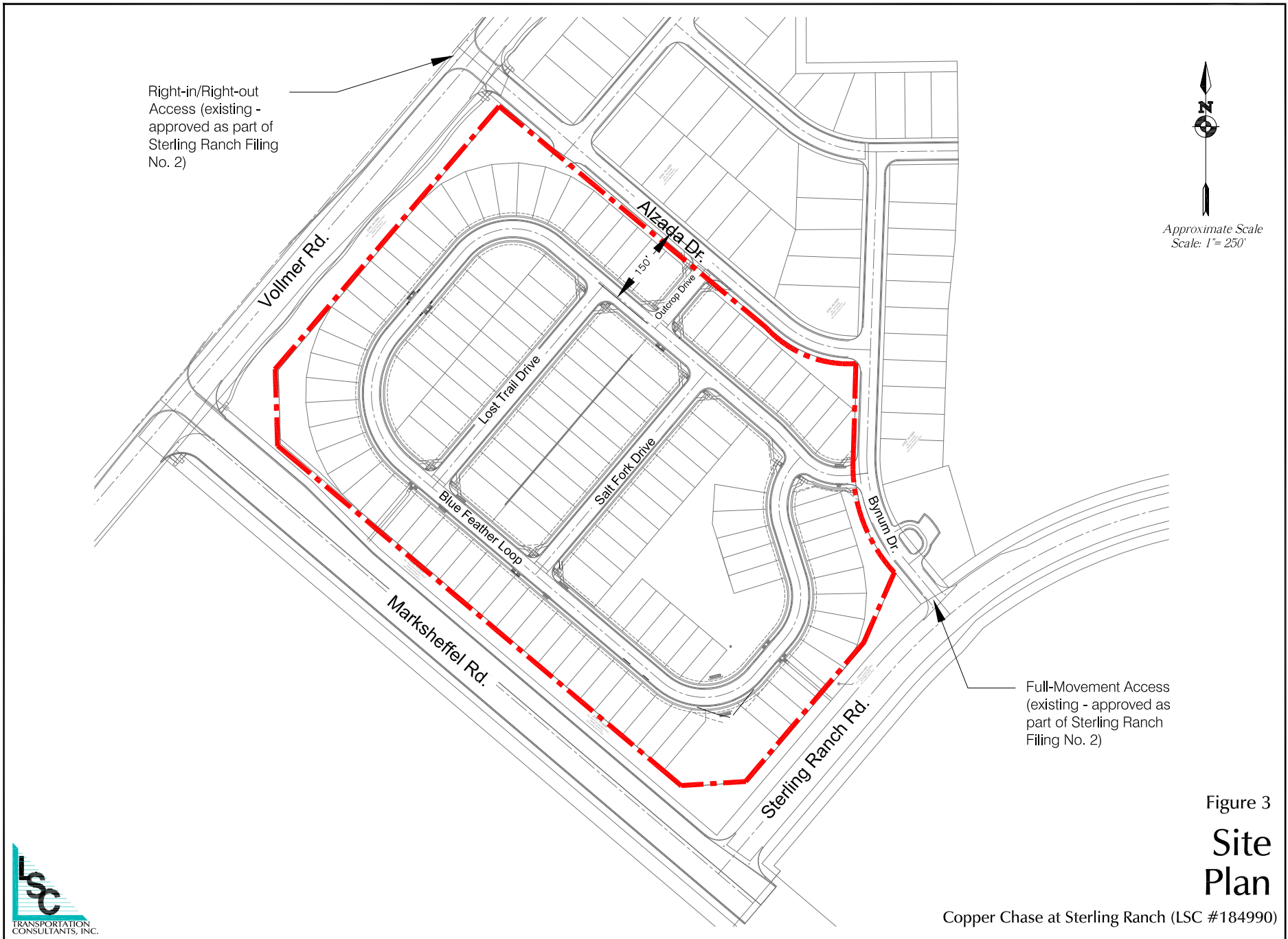


Figure 3
Site Plan

Copper Chase at Sterling Ranch (LSC #184990)

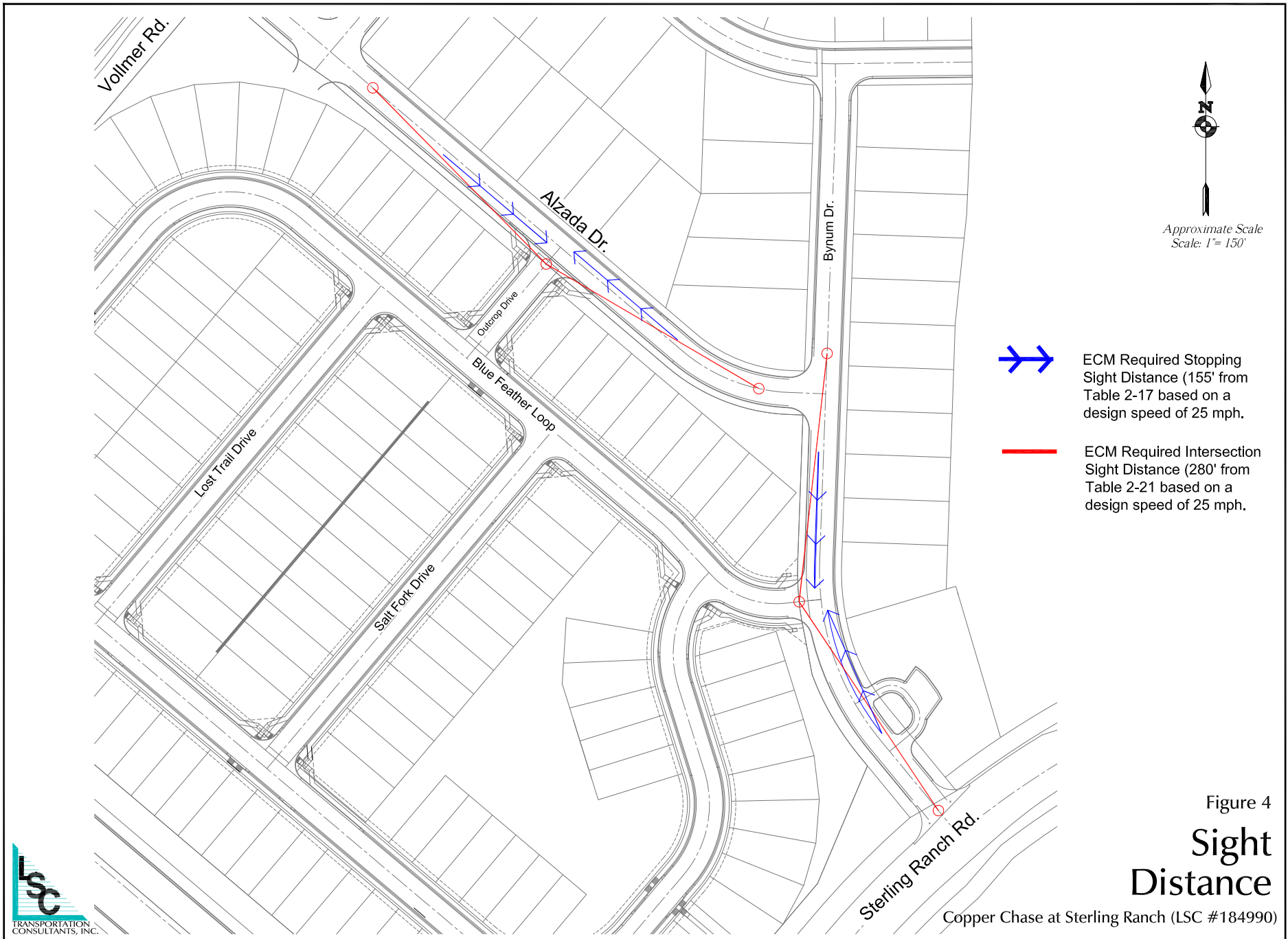
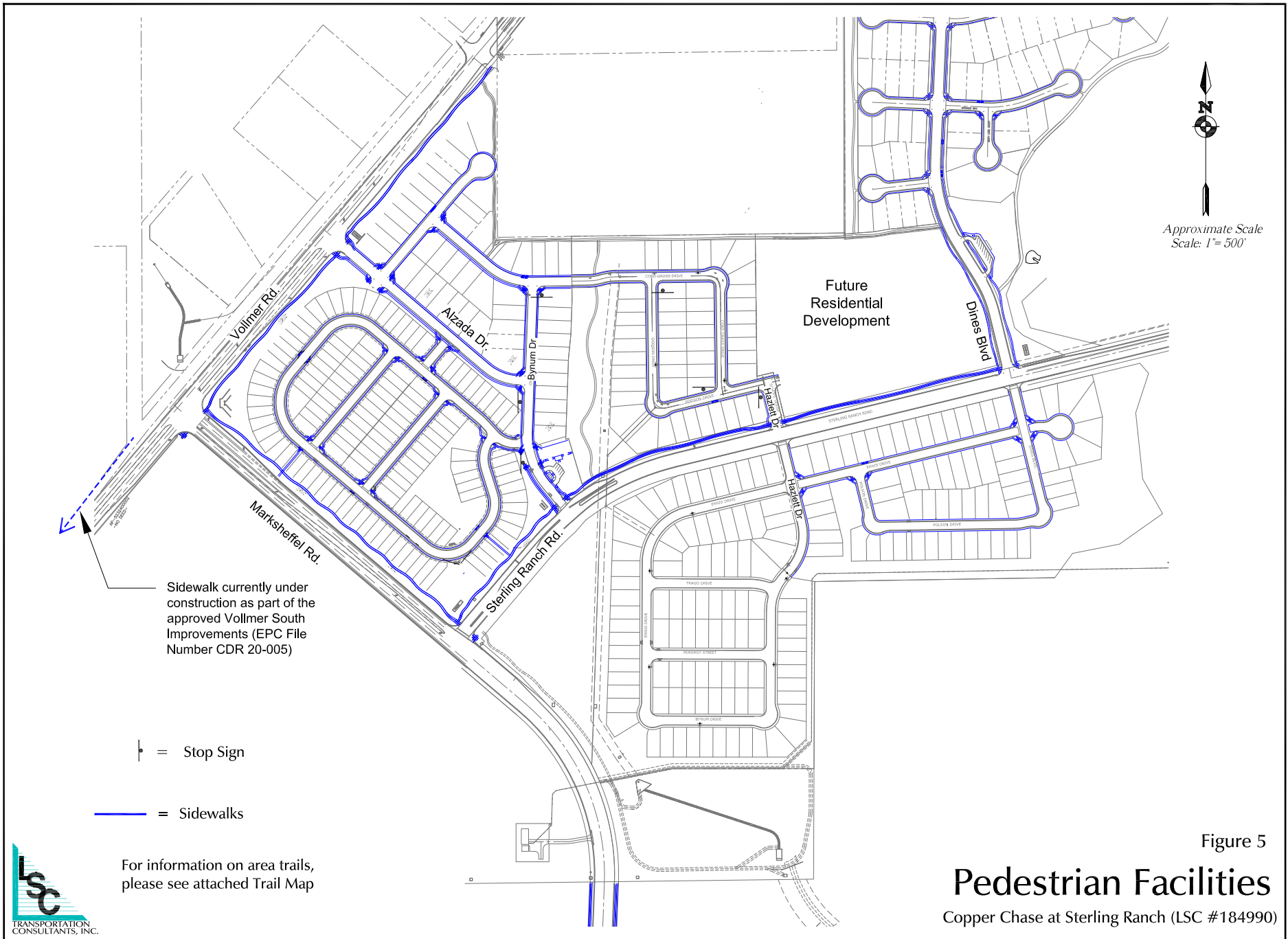


Figure 4
Sight Distance

Copper Chase at Sterling Ranch (LSC #184990)



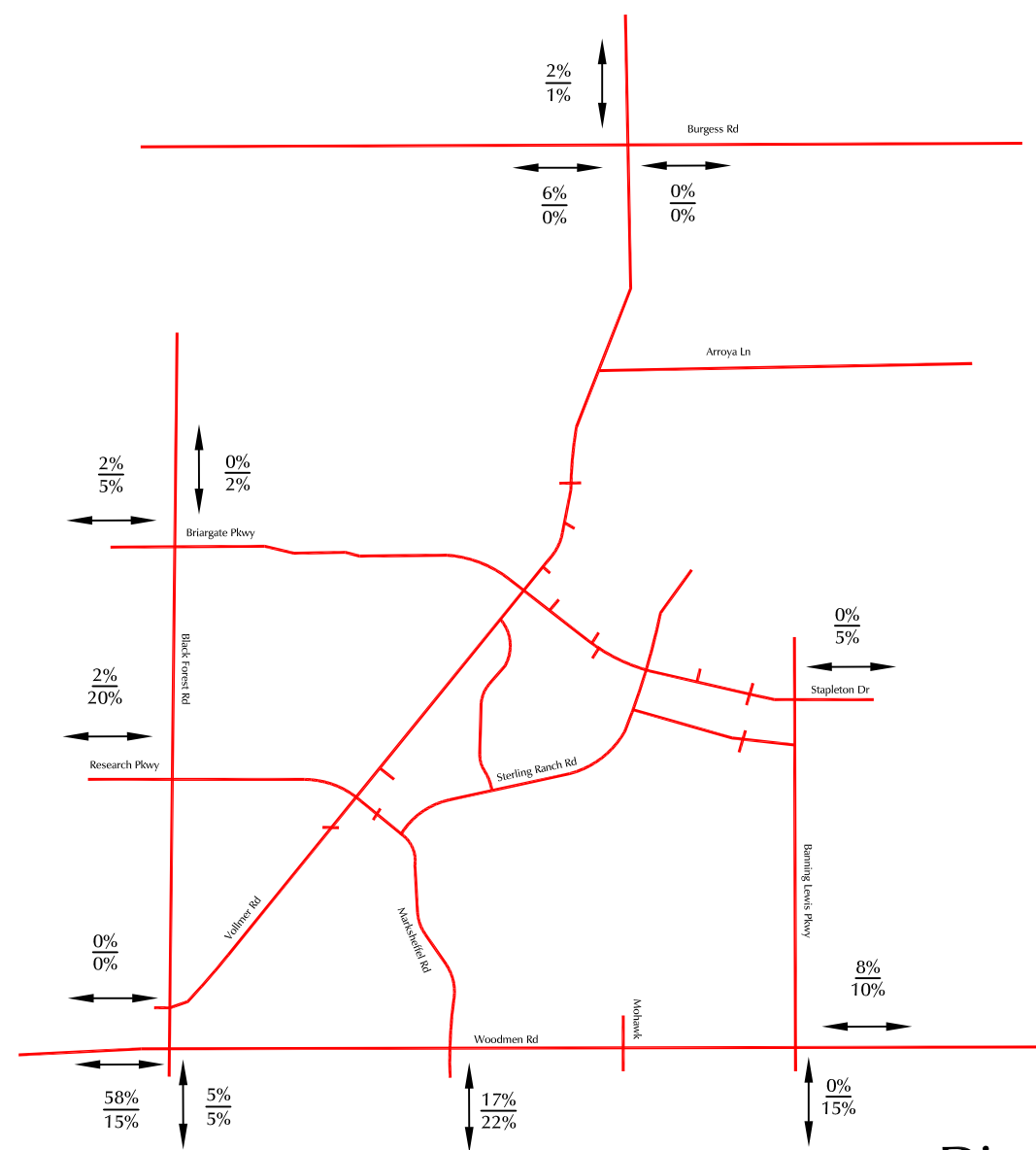
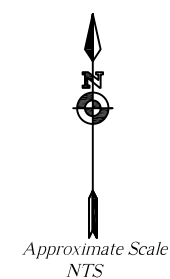


Figure 6

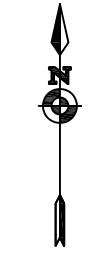
Directional Distribution of Site-Generated Traffic

Copper Chase at Sterling Ranch (LSC #184990)

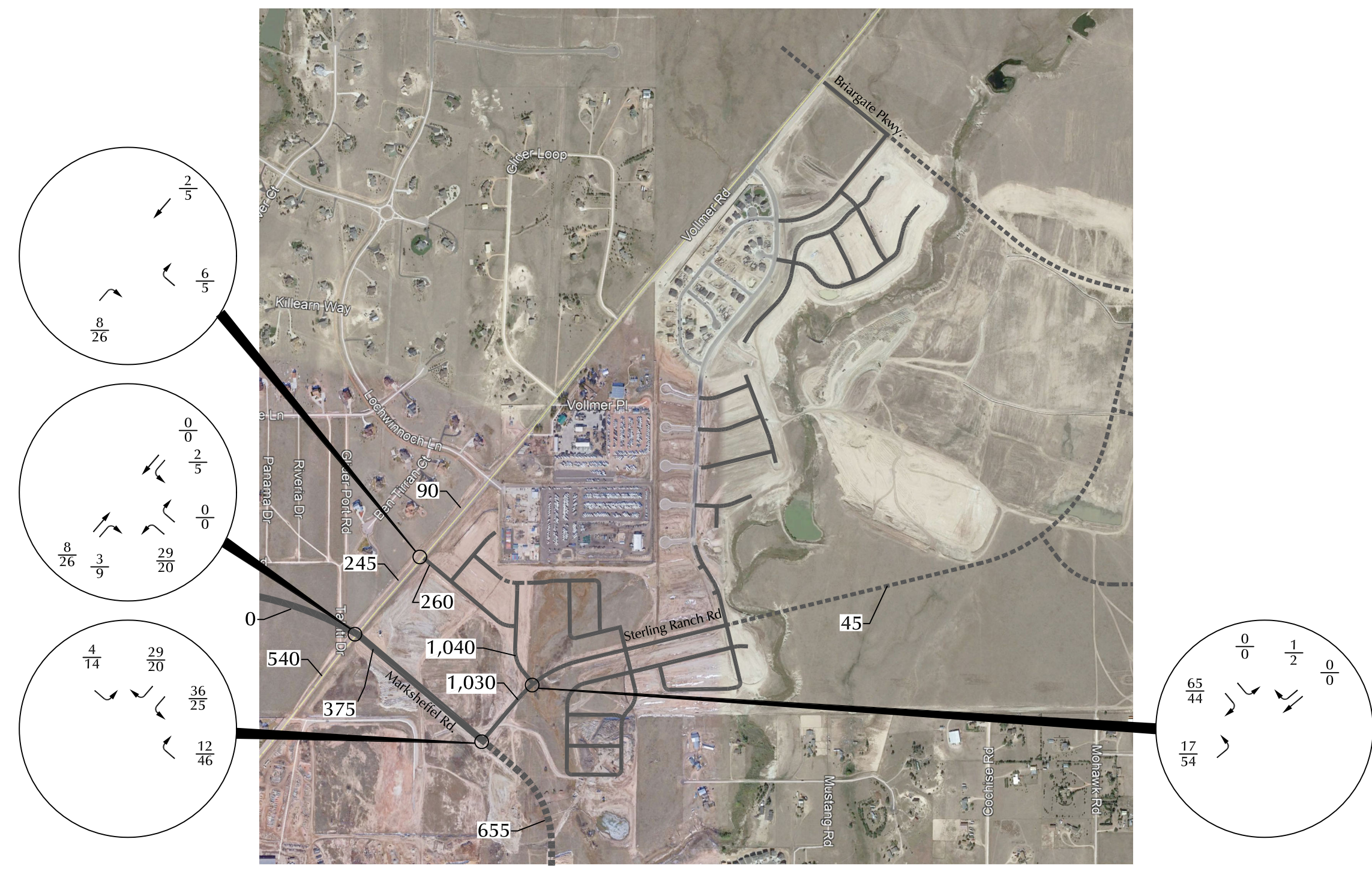


LEGEND:

$\frac{XX\%}{XX\%}$ = $\frac{\text{Short-Term Percent Directional Distribution}}{\text{Long-Term Percent Directional Distribution}}$



Approximate Scale
Scale: 1" = 1,000'



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 Daily Traffic (vehicles per day)



Figure 7

Short-Term Assignment of Site-Generated Traffic

Copper Chase at Sterling Ranch (LSC #184990)



Approximate Scale
Scale: 1" = 1,000'



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 Daily Traffic (vehicles per day)



Figure 8

Long-Term Assignment of Site-Generated Traffic

Copper Chase at Sterling Ranch (LSC #184990)



LEGEND:

⊥ = Stop Sign

⊞ = Traffic Signal

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

$\frac{XX}{XX}$ = 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

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

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

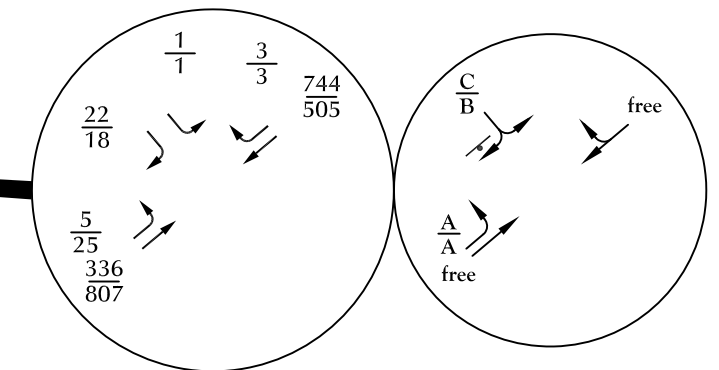
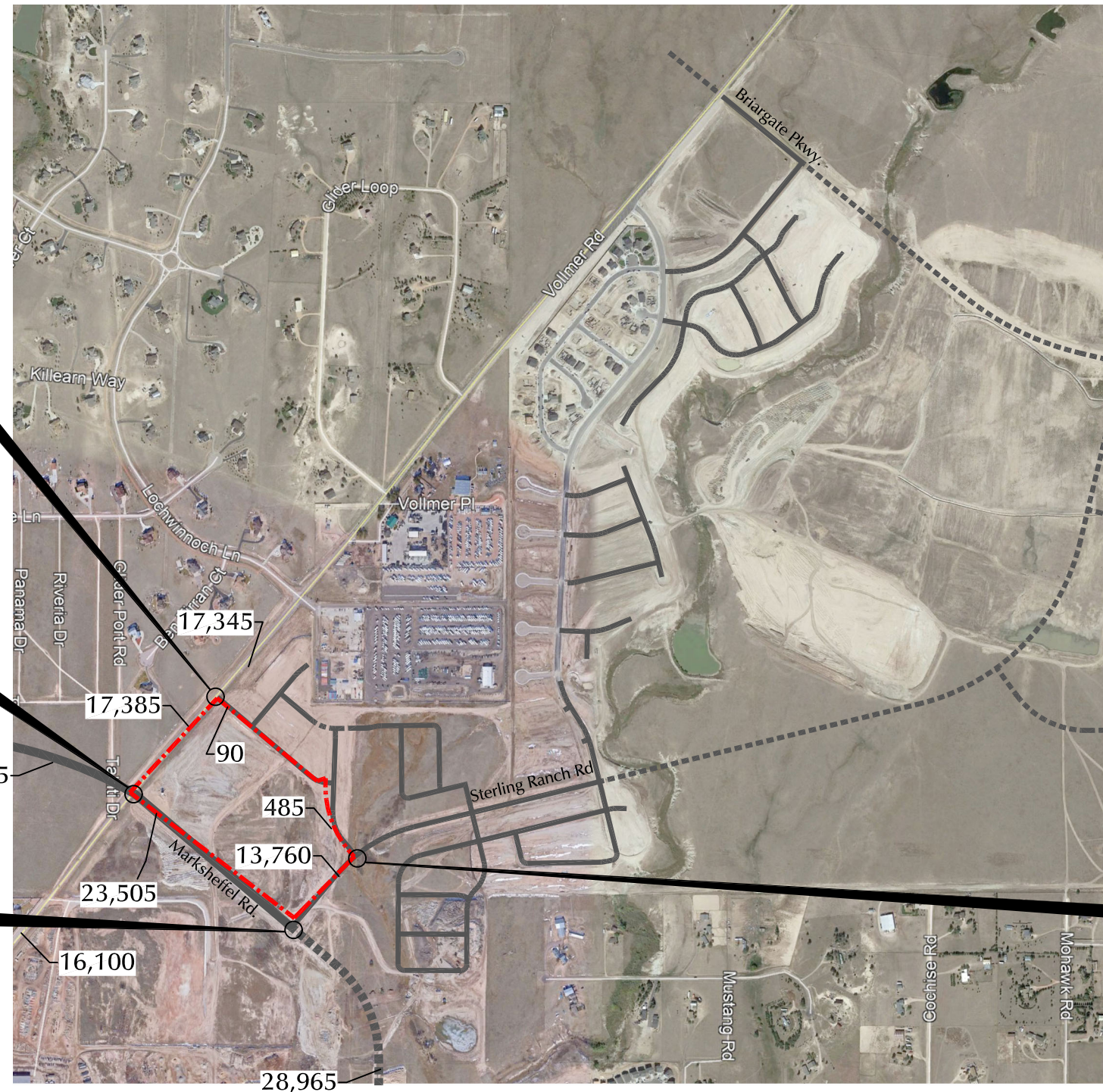
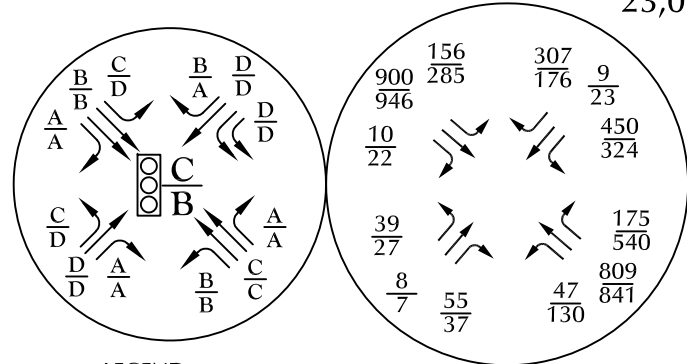
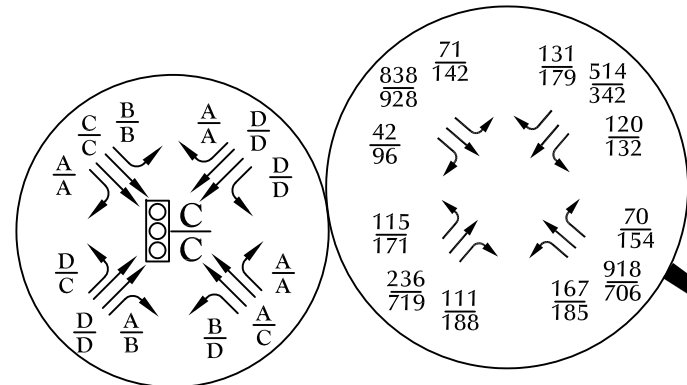
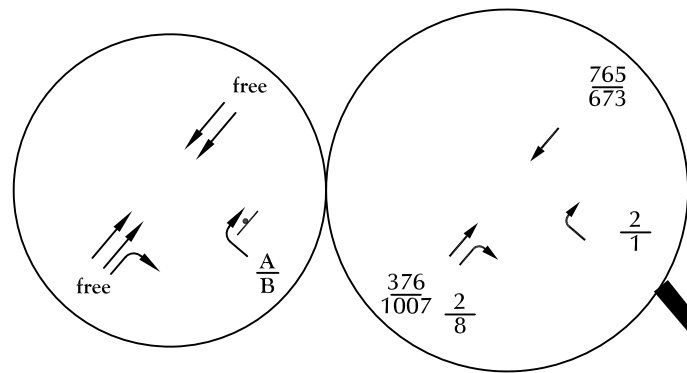
X,XXX = Average Daily Traffic (vehicles per day)



Figure 9
**Short-Term
Background Traffic, Lane Geometry,
Traffic Control and Level of Service**
Copper Chase at Sterling Ranch (LSC #184990)



Approximate Scale
Scale: 1" = 1,000'



LEGEND:

⊥ = Stop Sign

⓪ = Traffic Signal

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

$\frac{XX}{XX}$ = 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

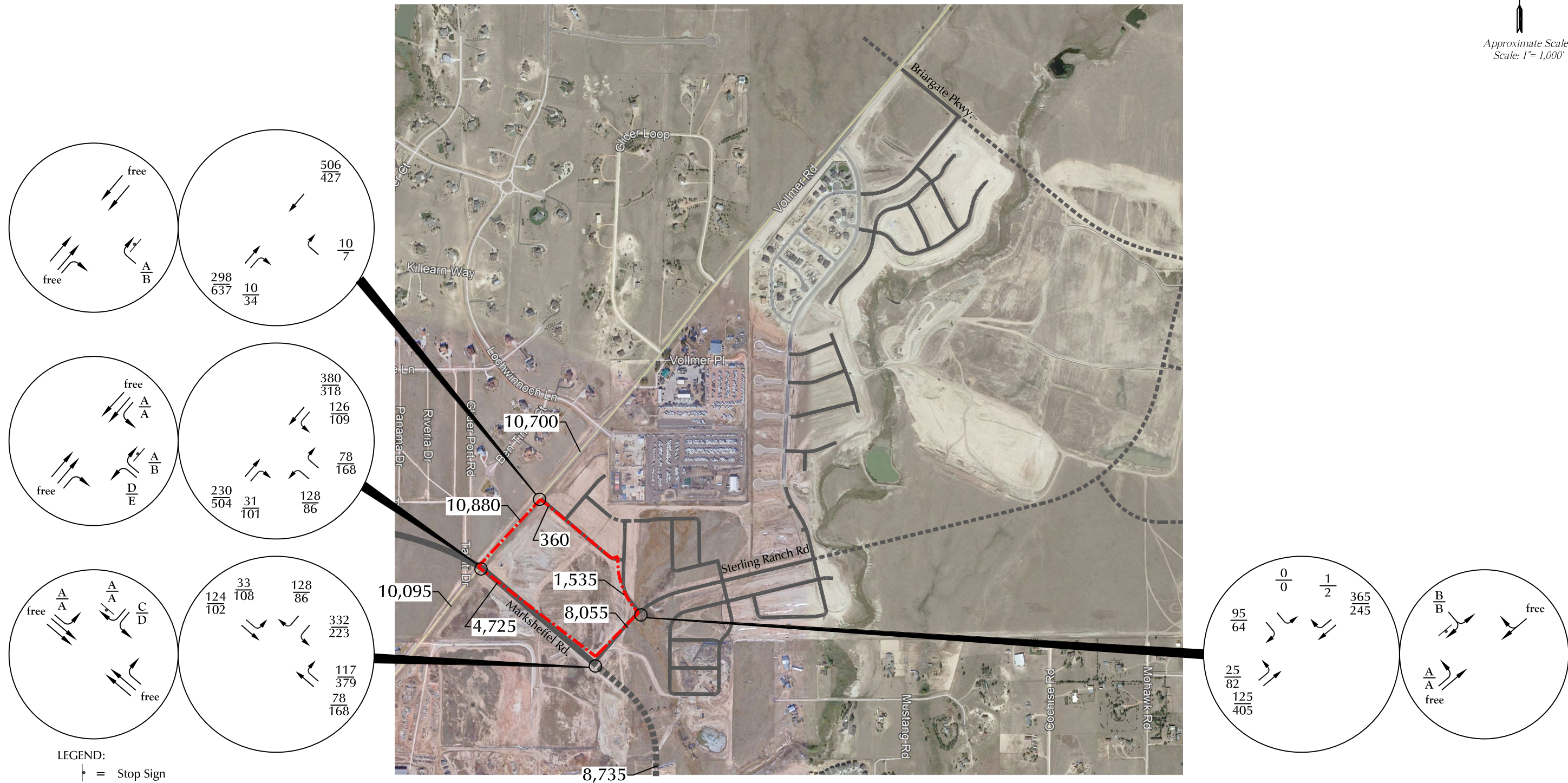
$\frac{C}{C}$ = AM Entire Intersection Peak-Hour Level of Service

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

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



Figure 10
2043 Background Traffic, Lane Geometry,
Traffic Control and Level of Service
Copper Chase at Sterling Ranch (LSC #184990)



LEGEND:

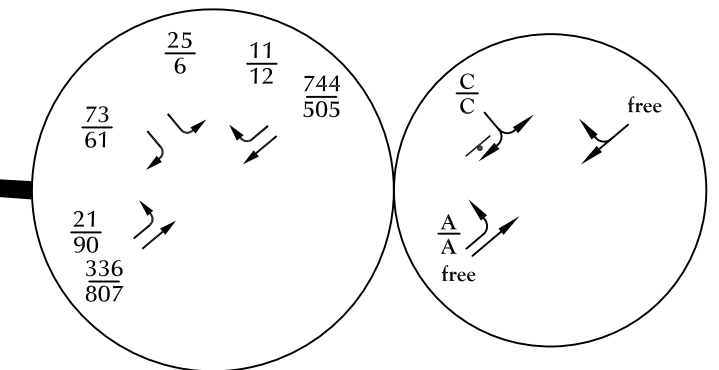
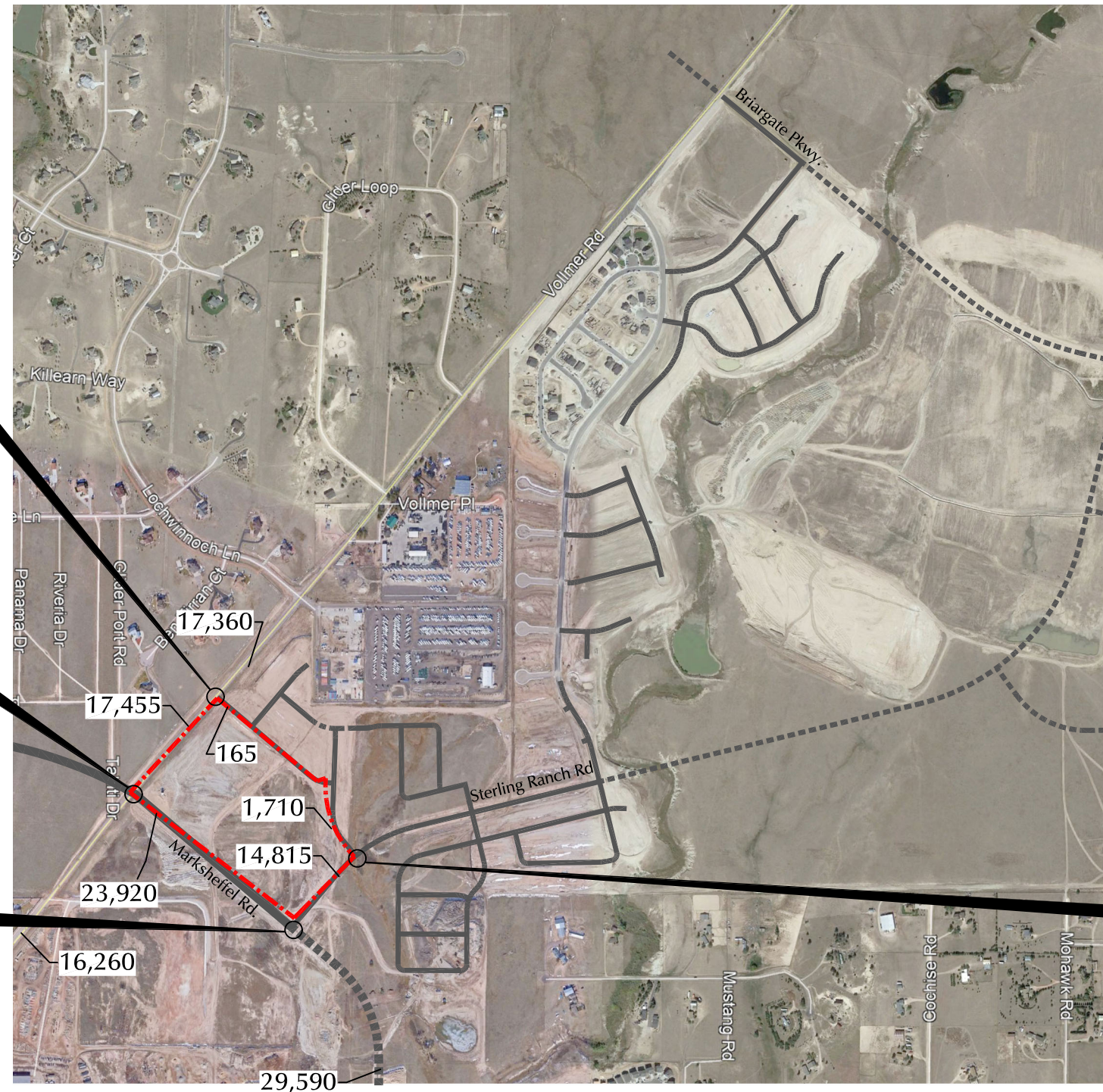
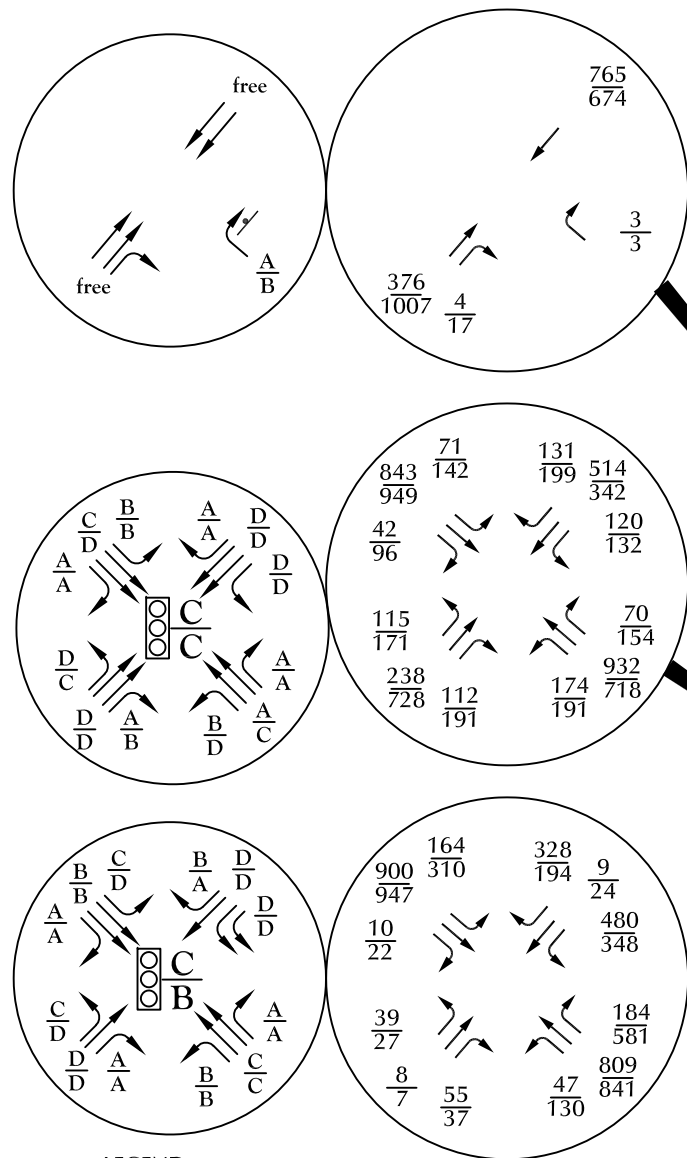
- ⊥ = Stop Sign
- ⊞ = Traffic Signal
- $\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour)
PM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
PM Individual Movement Peak-Hour Level of Service
- $\frac{C}{C}$ = AM Entire Intersection Peak-Hour Level of Service
PM Entire Intersection Peak-Hour Level of Service
- X,XXX = Average Daily Traffic (vehicles per day)



Figure 11
**Short-Term
Total Traffic, Lane Geometry,
Traffic Control and Level of Service**
Copper Chase at Sterling Ranch (LSC #184990)



Approximate Scale
Scale: 1" = 1,000'



LEGEND:

⊥ = Stop Sign

⊞ = Traffic Signal

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

$\frac{XX}{XX}$ = 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

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

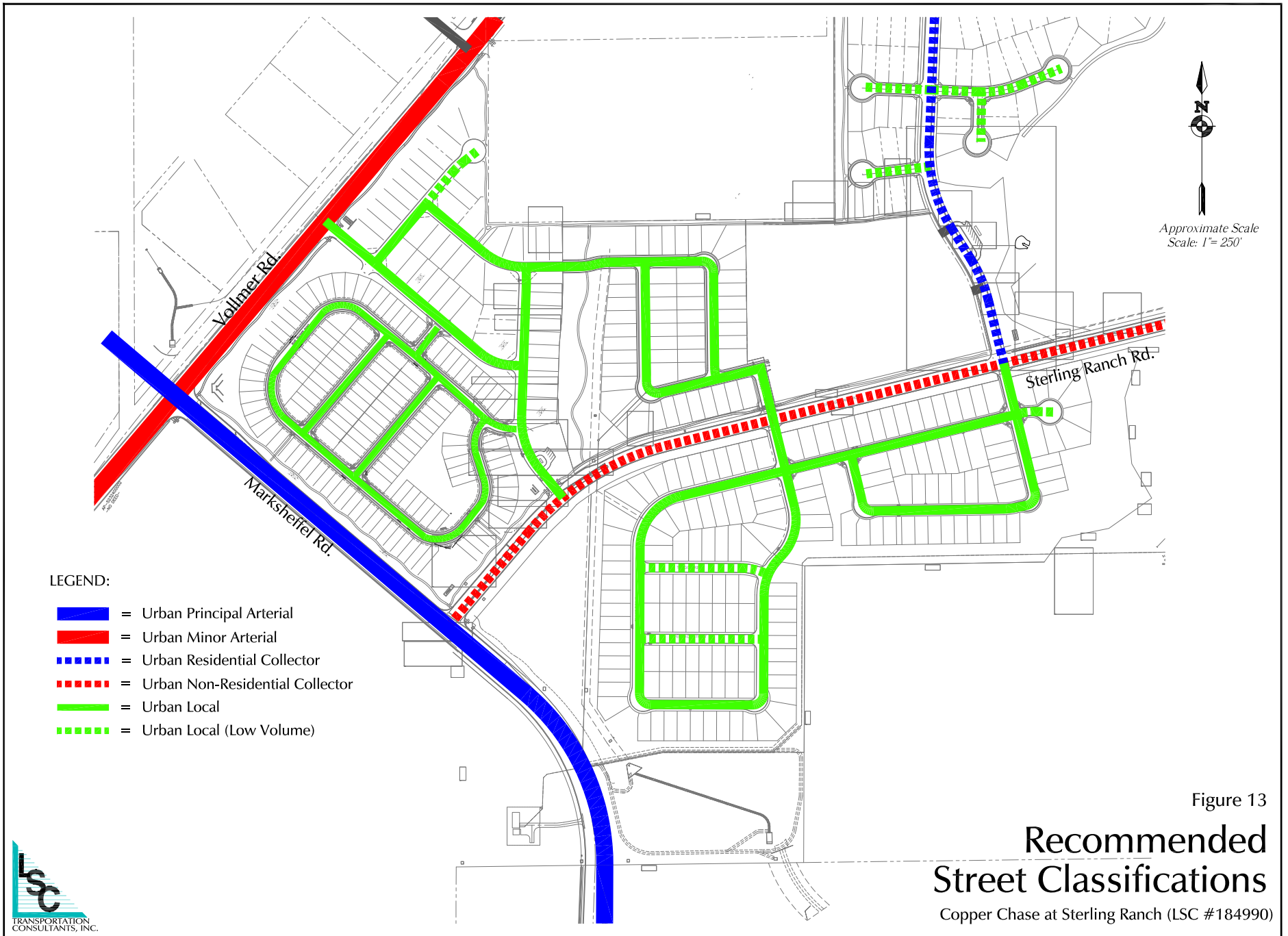
$\frac{C}{C}$ = PM Entire Intersection Peak-Hour Level of Service

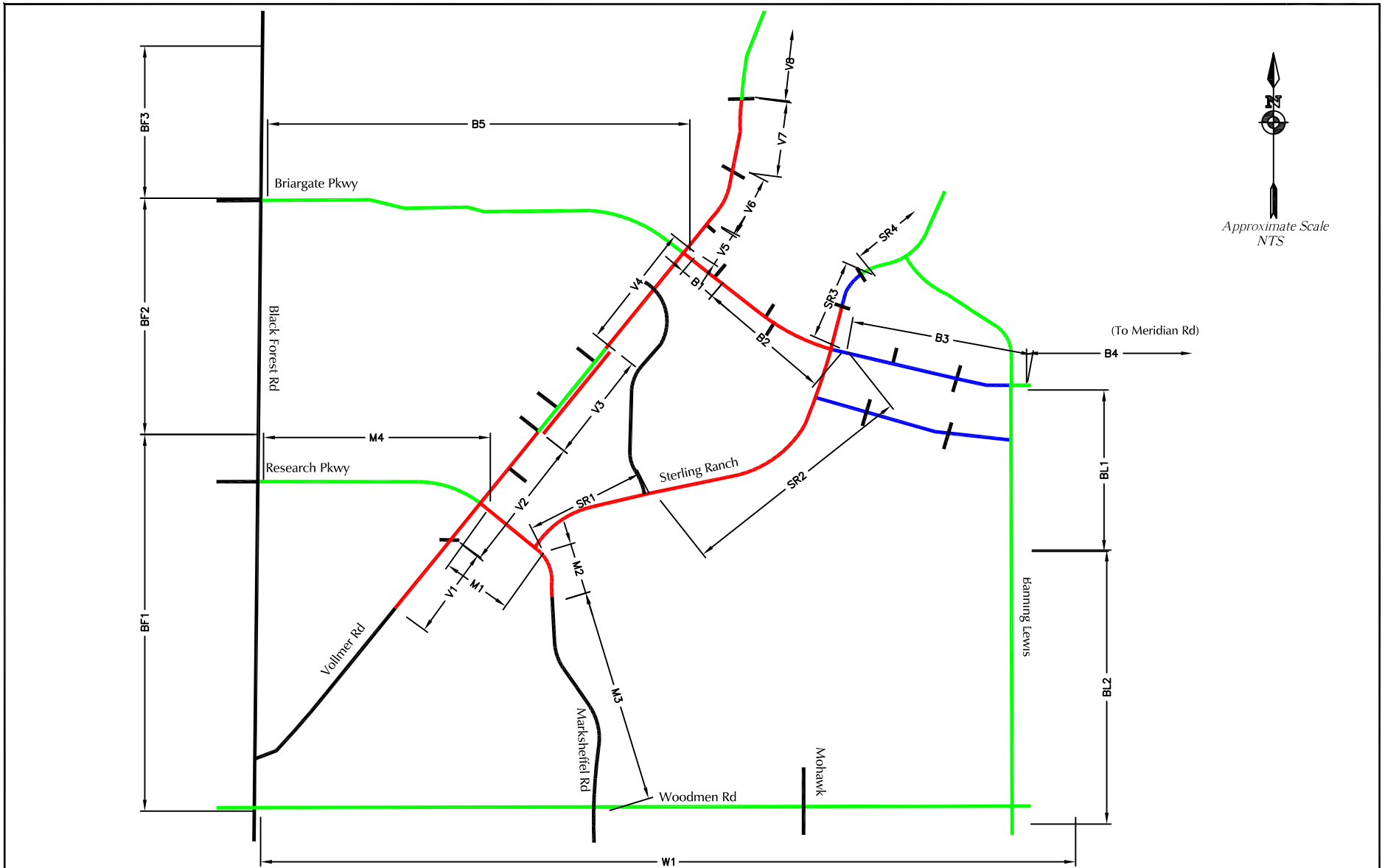
X,XXX = Average Daily Traffic (vehicles per day)



Figure 12
2043 Total Traffic, Lane Geometry,
Traffic Control and Level of Service

Copper Chase at Sterling Ranch (LSC #184990)





LEGEND: V1, B4, SR3, etc - Segment Identifier (See Appendix Table 2 for recommended roadway segment improvements for each segment)

- Short-Term
- Intermediate-Term
- Long-Term

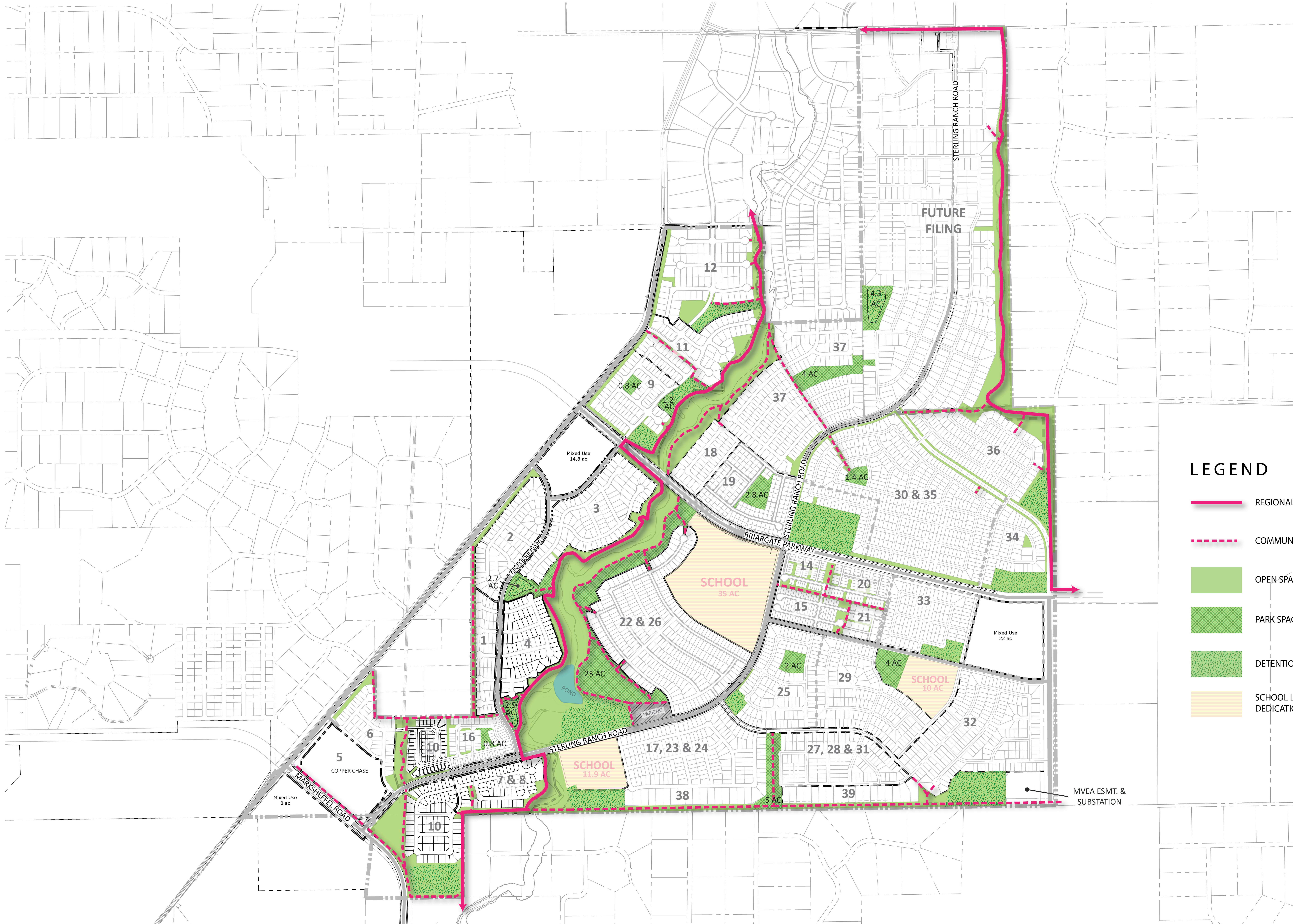
*Source: Sterling Ranch Sketch Plan
 Amendment Master Traffic Impact Study
 by LSC Transportation Consultants, Inc
 March 17, 2023

Figure 14
Roadway Improvement Segments*
 Copper Chase at Sterling Ranch (LSC #184990)



Trail Map





LEGEND

- REGIONAL TRAIL
- COMMUNITY TRAILS
- OPEN SPACE
- PARK SPACE
- DETENTION
- SCHOOL LAND DEDICATION

Levels of Service



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.5 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑↑ | ↗ | ↘ | ↑↑ |
| Traffic Vol, veh/h | 99 | 78 | 222 | 28 | 124 | 380 |
| Future Vol, veh/h | 99 | 78 | 222 | 28 | 124 | 380 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 155 | 300 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 116 | 92 | 261 | 33 | 146 | 447 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 777 | 131 | 0 | 0 | 294 |
| Stage 1 | 261 | - | - | - | - |
| Stage 2 | 516 | - | - | - | - |
| Critical Hdwy | 6.84 | 6.94 | - | - | 4.14 |
| Critical Hdwy Stg 1 | 5.84 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.84 | - | - | - | - |
| Follow-up Hdwy | 3.52 | 3.32 | - | - | 2.22 |
| Pot Cap-1 Maneuver | 334 | 894 | - | - | 1264 |
| Stage 1 | 759 | - | - | - | - |
| Stage 2 | 564 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 295 | 894 | - | - | 1264 |
| Mov Cap-2 Maneuver | 295 | - | - | - | - |
| Stage 1 | 759 | - | - | - | - |
| Stage 2 | 499 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 18.1 | 0 | 2 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|-------|-----|
| Capacity (veh/h) | - | - | 295 | 894 | 1264 | - |
| HCM Lane V/C Ratio | - | - | 0.395 | 0.103 | 0.115 | - |
| HCM Control Delay (s) | - | - | 24.9 | 9.5 | 8.2 | - |
| HCM Lane LOS | - | - | C | A | A | - |
| HCM 95th %tile Q(veh) | - | - | 1.8 | 0.3 | 0.4 | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 7.4 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | ↗ | ↘ | ↗ |
| Traffic Vol, veh/h | 29 | 124 | 78 | 104 | 295 | 99 |
| Future Vol, veh/h | 29 | 124 | 78 | 104 | 295 | 99 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 205 | 155 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 34 | 146 | 92 | 122 | 347 | 116 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-----------|
| Conflicting Flow All | 214 | 0 | - | 0 | 233 46 |
| Stage 1 | - | - | - | - | 92 - |
| Stage 2 | - | - | - | - | 141 - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 3.32 |
| Pot Cap-1 Maneuver | 1353 | - | - | - | 735 1014 |
| Stage 1 | - | - | - | - | 921 - |
| Stage 2 | - | - | - | - | 871 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1353 | - | - | - | 717 1014 |
| Mov Cap-2 Maneuver | - | - | - | - | 717 - |
| Stage 1 | - | - | - | - | 898 - |
| Stage 2 | - | - | - | - | 871 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 1.5 | 0 | 13.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-----|-----|-----|-------|-------|
| Capacity (veh/h) | 1353 | - | - | - | 717 | 1014 |
| HCM Lane V/C Ratio | 0.025 | - | - | - | 0.484 | 0.115 |
| HCM Control Delay (s) | 7.7 | - | - | - | 14.6 | 9 |
| HCM Lane LOS | A | - | - | - | B | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 2.7 | 0.4 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 4 | 298 | 3 | 0 | 504 |
| Future Vol, veh/h | 0 | 4 | 298 | 3 | 0 | 504 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 5 | 351 | 4 | 0 | 593 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 176 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 837 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 837 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 9.3 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 837 |
| HCM Lane V/C Ratio | - | - | 0.006 |
| HCM Control Delay (s) | - | - | 9.3 |
| HCM Lane LOS | - | - | A |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.7 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 8 | 125 | 365 | 0 | 0 | 29 |
| Future Vol, veh/h | 8 | 125 | 365 | 0 | 0 | 29 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 9 | 147 | 429 | 0 | 0 | 34 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 429 | 0 | - | 0 | 594 |
| Stage 1 | - | - | - | - | 429 |
| Stage 2 | - | - | - | - | 165 |
| 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 | 1130 | - | - | - | 468 |
| Stage 1 | - | - | - | - | 657 |
| Stage 2 | - | - | - | - | 864 |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1130 | - | - | - | 464 |
| Mov Cap-2 Maneuver | - | - | - | - | 464 |
| Stage 1 | - | - | - | - | 652 |
| Stage 2 | - | - | - | - | 864 |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.5 | 0 | 11.1 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1130 | - | - | - | 626 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.055 |
| HCM Control Delay (s) | 8.2 | - | - | - | 11.1 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.1 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 66 | 168 | 478 | 92 | 104 | 318 |
| Future Vol, veh/h | 66 | 168 | 478 | 92 | 104 | 318 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 155 | 300 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 78 | 198 | 562 | 108 | 122 | 374 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 993 | 281 | 0 | 0 | 670 |
| Stage 1 | 562 | - | - | - | - |
| Stage 2 | 431 | - | - | - | - |
| Critical Hdwy | 6.84 | 6.94 | - | - | 4.14 |
| Critical Hdwy Stg 1 | 5.84 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.84 | - | - | - | - |
| Follow-up Hdwy | 3.52 | 3.32 | - | - | 2.22 |
| Pot Cap-1 Maneuver | 242 | 716 | - | - | 916 |
| Stage 1 | 534 | - | - | - | - |
| Stage 2 | 623 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 210 | 716 | - | - | 916 |
| Mov Cap-2 Maneuver | 210 | - | - | - | - |
| Stage 1 | 534 | - | - | - | - |
| Stage 2 | 540 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 17.5 | 0 | 2.3 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|----------|-------|-------|-------|
| Capacity (veh/h) | - | - | 210 | 716 | 916 |
| HCM Lane V/C Ratio | - | - | 0.37 | 0.276 | 0.134 |
| HCM Control Delay (s) | - | - | 31.9 | 11.9 | 9.5 |
| HCM Lane LOS | - | - | D | B | A |
| HCM 95th %tile Q(veh) | - | - | 1.6 | 1.1 | 0.5 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.8 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | ↗ | ↘ | ↗ |
| Traffic Vol, veh/h | 94 | 102 | 168 | 338 | 198 | 66 |
| Future Vol, veh/h | 94 | 102 | 168 | 338 | 198 | 66 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 205 | 155 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 111 | 120 | 198 | 398 | 233 | 78 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-----------|
| Conflicting Flow All | 596 | 0 | - | 0 | 480 99 |
| Stage 1 | - | - | - | - | 198 - |
| Stage 2 | - | - | - | - | 282 - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 3.32 |
| Pot Cap-1 Maneuver | 976 | - | - | - | 515 937 |
| Stage 1 | - | - | - | - | 816 - |
| Stage 2 | - | - | - | - | 741 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 976 | - | - | - | 456 937 |
| Mov Cap-2 Maneuver | - | - | - | - | 456 - |
| Stage 1 | - | - | - | - | 723 - |
| Stage 2 | - | - | - | - | 741 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 4.4 | 0 | 18 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-----|-----|-----|-------|-------|
| Capacity (veh/h) | 976 | - | - | - | 456 | 937 |
| HCM Lane V/C Ratio | 0.113 | - | - | - | 0.511 | 0.083 |
| HCM Control Delay (s) | 9.2 | - | - | - | 20.9 | 9.2 |
| HCM Lane LOS | A | - | - | - | C | A |
| HCM 95th %tile Q(veh) | 0.4 | - | - | - | 2.8 | 0.3 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 3 | 637 | 8 | 0 | 422 |
| Future Vol, veh/h | 0 | 3 | 637 | 8 | 0 | 422 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 4 | 749 | 9 | 0 | 496 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 375 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 623 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 623 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 10.8 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 623 |
| HCM Lane V/C Ratio | - | - | 0.006 |
| HCM Control Delay (s) | - | - | 10.8 |
| HCM Lane LOS | - | - | B |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.6 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 27 | 405 | 245 | 1 | 0 | 20 |
| Future Vol, veh/h | 27 | 405 | 245 | 1 | 0 | 20 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 32 | 476 | 288 | 1 | 0 | 24 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 289 | 0 | - | 0 | 829 289 |
| Stage 1 | - | - | - | - | 289 - |
| Stage 2 | - | - | - | - | 540 - |
| 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 | 1273 | - | - | - | 340 750 |
| Stage 1 | - | - | - | - | 760 - |
| Stage 2 | - | - | - | - | 584 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1273 | - | - | - | 332 750 |
| Mov Cap-2 Maneuver | - | - | - | - | 332 - |
| Stage 1 | - | - | - | - | 741 - |
| Stage 2 | - | - | - | - | 584 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 0.5 | 0 | 10 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1273 | - | - | - | 750 |
| HCM Lane V/C Ratio | 0.025 | - | - | - | 0.031 |
| HCM Control Delay (s) | 7.9 | - | - | - | 10 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.9 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↕ | ↕ | ↘ | ↗ |
| Traffic Vol, veh/h | 128 | 78 | 230 | 31 | 126 | 380 |
| Future Vol, veh/h | 128 | 78 | 230 | 31 | 126 | 380 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 155 | 300 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 151 | 92 | 271 | 36 | 148 | 447 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 791 | 136 | 0 | 0 | 307 |
| Stage 1 | 271 | - | - | - | - |
| Stage 2 | 520 | - | - | - | - |
| Critical Hdwy | 6.84 | 6.94 | - | - | 4.14 |
| Critical Hdwy Stg 1 | 5.84 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.84 | - | - | - | - |
| Follow-up Hdwy | 3.52 | 3.32 | - | - | 2.22 |
| Pot Cap-1 Maneuver | 327 | 888 | - | - | 1250 |
| Stage 1 | 750 | - | - | - | - |
| Stage 2 | 561 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 288 | 888 | - | - | 1250 |
| Mov Cap-2 Maneuver | 288 | - | - | - | - |
| Stage 1 | 750 | - | - | - | - |
| Stage 2 | 495 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 22.5 | 0 | 2.1 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|-------|-----|
| Capacity (veh/h) | - | - | 288 | 888 | 1250 | - |
| HCM Lane V/C Ratio | - | - | 0.523 | 0.103 | 0.119 | - |
| HCM Control Delay (s) | - | - | 30.4 | 9.5 | 8.3 | - |
| HCM Lane LOS | - | - | D | A | A | - |
| HCM 95th %tile Q(veh) | - | - | 2.8 | 0.3 | 0.4 | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 8.4 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | ↗ | ↘ | ↗ |
| Traffic Vol, veh/h | 33 | 124 | 78 | 117 | 332 | 128 |
| Future Vol, veh/h | 33 | 124 | 78 | 117 | 332 | 128 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 205 | 155 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 39 | 146 | 92 | 138 | 391 | 151 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-----------|
| Conflicting Flow All | 230 | 0 | - | 0 | 243 46 |
| Stage 1 | - | - | - | - | 92 - |
| Stage 2 | - | - | - | - | 151 - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 3.32 |
| Pot Cap-1 Maneuver | 1335 | - | - | - | 724 1014 |
| Stage 1 | - | - | - | - | 921 - |
| Stage 2 | - | - | - | - | 861 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1335 | - | - | - | 703 1014 |
| Mov Cap-2 Maneuver | - | - | - | - | 703 - |
| Stage 1 | - | - | - | - | 894 - |
| Stage 2 | - | - | - | - | 861 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 1.6 | 0 | 14.3 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-----|-----|-----|-------|-------|
| Capacity (veh/h) | 1335 | - | - | - | 703 | 1014 |
| HCM Lane V/C Ratio | 0.029 | - | - | - | 0.556 | 0.149 |
| HCM Control Delay (s) | 7.8 | - | - | - | 16.3 | 9.2 |
| HCM Lane LOS | A | - | - | - | C | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 3.4 | 0.5 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.1 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 10 | 298 | 10 | 0 | 506 |
| Future Vol, veh/h | 0 | 10 | 298 | 10 | 0 | 506 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 12 | 351 | 12 | 0 | 595 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 176 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 837 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 837 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 9.4 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 837 |
| HCM Lane V/C Ratio | - | - | 0.014 |
| HCM Control Delay (s) | - | - | 9.4 |
| HCM Lane LOS | - | - | A |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.2 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 25 | 125 | 365 | 1 | 0 | 95 |
| Future Vol, veh/h | 25 | 125 | 365 | 1 | 0 | 95 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 29 | 147 | 429 | 1 | 0 | 112 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 430 | 0 | - | 0 | 635 430 |
| Stage 1 | - | - | - | - | 430 - |
| Stage 2 | - | - | - | - | 205 - |
| 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 | 1129 | - | - | - | 443 625 |
| Stage 1 | - | - | - | - | 656 - |
| Stage 2 | - | - | - | - | 829 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1129 | - | - | - | 431 625 |
| Mov Cap-2 Maneuver | - | - | - | - | 431 - |
| Stage 1 | - | - | - | - | 639 - |
| Stage 2 | - | - | - | - | 829 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 1.4 | 0 | 12 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1129 | - | - | - | 625 |
| HCM Lane V/C Ratio | 0.026 | - | - | - | 0.179 |
| HCM Control Delay (s) | 8.3 | - | - | - | 12 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.6 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.3 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | ↘ | ↗ | ↑↑ | ↗ | ↘ | ↑↑ |
| Traffic Vol, veh/h | 86 | 168 | 504 | 101 | 109 | 318 |
| Future Vol, veh/h | 86 | 168 | 504 | 101 | 109 | 318 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 155 | 300 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 101 | 198 | 593 | 119 | 128 | 374 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 1036 | 297 | 0 | 0 | 712 |
| Stage 1 | 593 | - | - | - | - |
| Stage 2 | 443 | - | - | - | - |
| Critical Hdwy | 6.84 | 6.94 | - | - | 4.14 |
| Critical Hdwy Stg 1 | 5.84 | - | - | - | - |
| Critical Hdwy Stg 2 | 5.84 | - | - | - | - |
| Follow-up Hdwy | 3.52 | 3.32 | - | - | 2.22 |
| Pot Cap-1 Maneuver | 227 | 699 | - | - | 884 |
| Stage 1 | 515 | - | - | - | - |
| Stage 2 | 614 | - | - | - | - |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | 194 | 699 | - | - | 884 |
| Mov Cap-2 Maneuver | 194 | - | - | - | - |
| Stage 1 | 515 | - | - | - | - |
| Stage 2 | 525 | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|-----|
| HCM Control Delay, s | 22.4 | 0 | 2.5 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | WBLn2 | SBL | SBT |
|-----------------------|-----|-----|-------|-------|-------|-----|
| Capacity (veh/h) | - | - | 194 | 699 | 884 | - |
| HCM Lane V/C Ratio | - | - | 0.522 | 0.283 | 0.145 | - |
| HCM Control Delay (s) | - | - | 42.2 | 12.2 | 9.8 | - |
| HCM Lane LOS | - | - | E | B | A | - |
| HCM 95th %tile Q(veh) | - | - | 2.7 | 1.2 | 0.5 | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 7.2 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↘ | ↑↑ | ↑↑ | ↗ | ↘ | ↗ |
| Traffic Vol, veh/h | 108 | 102 | 168 | 379 | 223 | 86 |
| Future Vol, veh/h | 108 | 102 | 168 | 379 | 223 | 86 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 300 | - | - | 205 | 155 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 127 | 120 | 198 | 446 | 262 | 101 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-----------|
| Conflicting Flow All | 644 | 0 | - | 0 | 512 99 |
| Stage 1 | - | - | - | - | 198 - |
| Stage 2 | - | - | - | - | 314 - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 3.32 |
| Pot Cap-1 Maneuver | 937 | - | - | - | 491 937 |
| Stage 1 | - | - | - | - | 816 - |
| Stage 2 | - | - | - | - | 714 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 937 | - | - | - | 424 937 |
| Mov Cap-2 Maneuver | - | - | - | - | 424 - |
| Stage 1 | - | - | - | - | 705 - |
| Stage 2 | - | - | - | - | 714 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 4.9 | 0 | 21.6 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|-----------------------|-------|-----|-----|-----|-------|-------|
| Capacity (veh/h) | 937 | - | - | - | 424 | 937 |
| HCM Lane V/C Ratio | 0.136 | - | - | - | 0.619 | 0.108 |
| HCM Control Delay (s) | 9.4 | - | - | - | 26.3 | 9.3 |
| HCM Lane LOS | A | - | - | - | D | A |
| HCM 95th %tile Q(veh) | 0.5 | - | - | - | 4.1 | 0.4 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.1 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 7 | 637 | 34 | 0 | 427 |
| Future Vol, veh/h | 0 | 7 | 637 | 34 | 0 | 427 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 8 | 749 | 40 | 0 | 502 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 375 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 623 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 623 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

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

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 623 |
| HCM Lane V/C Ratio | - | - | 0.013 |
| HCM Control Delay (s) | - | - | 10.9 |
| HCM Lane LOS | - | - | B |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.7 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 82 | 405 | 245 | 2 | 0 | 64 |
| Future Vol, veh/h | 82 | 405 | 245 | 2 | 0 | 64 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 85 | 85 | 85 | 85 | 85 | 85 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 96 | 476 | 288 | 2 | 0 | 75 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 290 | 0 | - | 0 | 957 289 |
| Stage 1 | - | - | - | - | 289 - |
| Stage 2 | - | - | - | - | 668 - |
| 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 | 1272 | - | - | - | 286 750 |
| Stage 1 | - | - | - | - | 760 - |
| Stage 2 | - | - | - | - | 510 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1272 | - | - | - | 265 750 |
| Mov Cap-2 Maneuver | - | - | - | - | 265 - |
| Stage 1 | - | - | - | - | 703 - |
| Stage 2 | - | - | - | - | 510 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 1.4 | 0 | 10.3 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1272 | - | - | - | 750 |
| HCM Lane V/C Ratio | 0.076 | - | - | - | 0.1 |
| HCM Control Delay (s) | 8.1 | - | - | - | 10.3 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.2 | - | - | - | 0.3 |

Timings
12: Vollmer Rd & Marksheffel Rd

2042 Background Traffic
AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 71 | 838 | 42 | 167 | 918 | 70 | 115 | 236 | 111 | 120 | 514 | 131 |
| Future Volume (vph) | 71 | 838 | 42 | 167 | 918 | 70 | 115 | 236 | 111 | 120 | 514 | 131 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 8 | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 |
| Minimum Split (s) | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 |
| Total Split (s) | 12.0 | 66.0 | 66.0 | 12.0 | 66.0 | 66.0 | 12.0 | 30.0 | 30.0 | 12.0 | 30.0 | 30.0 |
| Total Split (%) | 10.0% | 55.0% | 55.0% | 10.0% | 55.0% | 55.0% | 10.0% | 25.0% | 25.0% | 10.0% | 25.0% | 25.0% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| All-Red Time (s) | 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) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | C-Max | C-Max | None | C-Max | C-Max | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 67.7 | 61.0 | 61.0 | 69.0 | 63.4 | 63.4 | 32.0 | 25.0 | 25.0 | 32.0 | 25.0 | 25.0 |
| Actuated g/C Ratio | 0.56 | 0.51 | 0.51 | 0.58 | 0.53 | 0.53 | 0.27 | 0.21 | 0.21 | 0.27 | 0.21 | 0.21 |
| v/c Ratio | 0.25 | 0.49 | 0.05 | 0.53 | 0.52 | 0.08 | 0.64 | 0.34 | 0.28 | 0.40 | 0.73 | 0.32 |
| Control Delay | 11.8 | 20.5 | 0.1 | 16.4 | 9.5 | 0.2 | 48.9 | 42.0 | 8.8 | 36.1 | 51.2 | 9.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 11.8 | 20.5 | 0.1 | 16.4 | 9.5 | 0.2 | 48.9 | 42.0 | 8.8 | 36.1 | 51.2 | 9.6 |
| LOS | B | C | A | B | A | A | D | D | A | D | D | A |
| Approach Delay | | 18.9 | | | 10.0 | | | 35.7 | | | 41.7 | |
| Approach LOS | | B | | | A | | | D | | | D | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 23.4
 Intersection LOS: C
 Intersection Capacity Utilization 69.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 12: Vollmer Rd & Marksheffel Rd



Timings
13: Sterling Ranch Rd & Marksheffel Rd

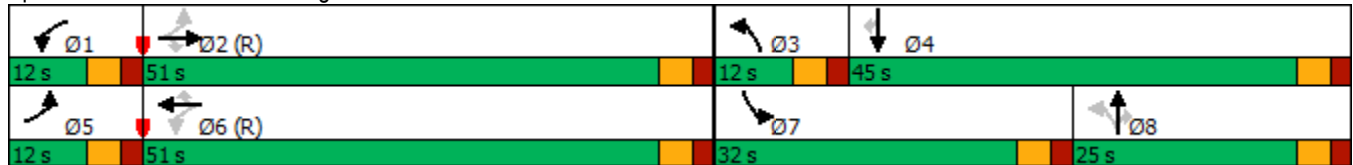
2042 Background Traffic
AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 158 | 900 | 10 | 47 | 809 | 175 | 39 | 8 | 55 | 450 | 9 | 307 |
| Future Volume (vph) | 158 | 900 | 10 | 47 | 809 | 175 | 39 | 8 | 55 | 450 | 9 | 307 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 8 | | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 8 | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 15.0 | 15.0 | 5.0 | 15.0 | 15.0 | 5.0 | 10.0 | 10.0 | 20.0 | 10.0 | 10.0 |
| Minimum Split (s) | 10.0 | 20.0 | 20.0 | 10.0 | 20.0 | 20.0 | 10.0 | 15.0 | 15.0 | 25.0 | 20.0 | 20.0 |
| Total Split (s) | 12.0 | 51.0 | 51.0 | 12.0 | 51.0 | 51.0 | 12.0 | 25.0 | 25.0 | 32.0 | 45.0 | 45.0 |
| Total Split (%) | 10.0% | 42.5% | 42.5% | 10.0% | 42.5% | 42.5% | 10.0% | 20.8% | 20.8% | 26.7% | 37.5% | 37.5% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| All-Red Time (s) | 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) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | C-Max | C-Max | None | C-Max | C-Max | None | None | None | None | None | None |
| Act Effct Green (s) | 74.8 | 65.7 | 65.7 | 66.7 | 59.8 | 59.8 | 14.6 | 10.0 | 10.0 | 22.5 | 25.0 | 25.0 |
| Actuated g/C Ratio | 0.62 | 0.55 | 0.55 | 0.56 | 0.50 | 0.50 | 0.12 | 0.08 | 0.08 | 0.19 | 0.21 | 0.21 |
| v/c Ratio | 0.43 | 0.49 | 0.01 | 0.15 | 0.48 | 0.21 | 0.21 | 0.05 | 0.21 | 0.74 | 0.02 | 0.60 |
| Control Delay | 20.0 | 15.2 | 0.0 | 12.0 | 22.8 | 3.7 | 32.9 | 51.6 | 1.8 | 53.2 | 35.8 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 20.0 | 15.2 | 0.0 | 12.0 | 22.8 | 3.7 | 32.9 | 51.6 | 1.8 | 53.2 | 35.8 | 13.3 |
| LOS | C | B | A | B | C | A | C | D | A | D | D | B |
| Approach Delay | | 15.8 | | | 19.1 | | | 17.4 | | | 37.0 | |
| Approach LOS | | B | | | B | | | B | | | D | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 22.5
 Intersection LOS: C
 Intersection Capacity Utilization 63.1%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 13: Sterling Ranch Rd & Marksheffel Rd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 2 | 376 | 2 | 0 | 765 |
| Future Vol, veh/h | 0 | 2 | 376 | 2 | 0 | 765 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 2 | 396 | 2 | 0 | 805 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 198 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 810 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 810 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 9.5 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 810 |
| HCM Lane V/C Ratio | - | - | 0.003 |
| HCM Control Delay (s) | - | - | 9.5 |
| HCM Lane LOS | - | - | A |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.5 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | ↙ | ↑ | ↗ | | ↘ | |
| Traffic Vol, veh/h | 5 | 336 | 744 | 3 | 6 | 22 |
| Future Vol, veh/h | 5 | 336 | 744 | 3 | 6 | 22 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 354 | 783 | 3 | 6 | 23 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 786 | 0 | - | 0 | 1149 785 |
| Stage 1 | - | - | - | - | 785 - |
| Stage 2 | - | - | - | - | 364 - |
| 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 | 833 | - | - | - | 219 393 |
| Stage 1 | - | - | - | - | 449 - |
| Stage 2 | - | - | - | - | 703 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 833 | - | - | - | 218 393 |
| Mov Cap-2 Maneuver | - | - | - | - | 218 - |
| Stage 1 | - | - | - | - | 446 - |
| Stage 2 | - | - | - | - | 703 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.1 | 0 | 16.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 833 | - | - | - | 335 |
| HCM Lane V/C Ratio | 0.006 | - | - | - | 0.088 |
| HCM Control Delay (s) | 9.3 | - | - | - | 16.8 |
| HCM Lane LOS | A | - | - | - | C |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.3 |

Timings
12: Vollmer Rd & Marksheffel Rd

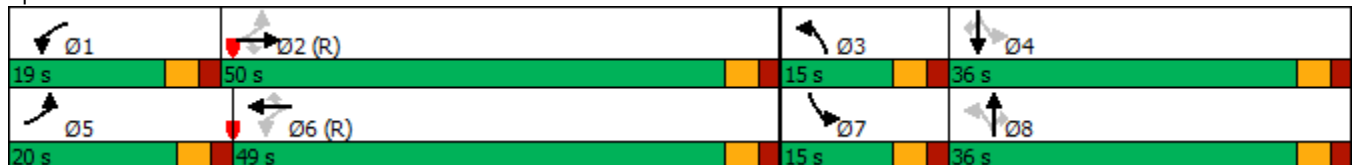
2042 Background Traffic
PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 142 | 928 | 96 | 185 | 706 | 154 | 171 | 719 | 188 | 132 | 342 | 199 |
| Future Volume (vph) | 142 | 928 | 96 | 185 | 706 | 154 | 171 | 719 | 188 | 132 | 342 | 199 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 8 | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 |
| Minimum Split (s) | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 |
| Total Split (s) | 20.0 | 50.0 | 50.0 | 19.0 | 49.0 | 49.0 | 15.0 | 36.0 | 36.0 | 15.0 | 36.0 | 36.0 |
| Total Split (%) | 16.7% | 41.7% | 41.7% | 15.8% | 40.8% | 40.8% | 12.5% | 30.0% | 30.0% | 12.5% | 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 | 3.0 | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | C-Max | C-Max | None | C-Max | C-Max | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 57.7 | 47.0 | 47.0 | 60.3 | 48.3 | 48.3 | 41.2 | 31.4 | 31.4 | 40.8 | 31.2 | 31.2 |
| Actuated g/C Ratio | 0.48 | 0.39 | 0.39 | 0.50 | 0.40 | 0.40 | 0.34 | 0.26 | 0.26 | 0.34 | 0.26 | 0.26 |
| v/c Ratio | 0.43 | 0.70 | 0.15 | 0.70 | 0.52 | 0.22 | 0.50 | 0.82 | 0.38 | 0.68 | 0.39 | 0.37 |
| Control Delay | 18.5 | 34.4 | 4.5 | 49.4 | 22.3 | 5.3 | 31.4 | 50.1 | 13.4 | 42.7 | 38.2 | 6.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 18.5 | 34.4 | 4.5 | 49.4 | 22.3 | 5.3 | 31.4 | 50.1 | 13.4 | 42.7 | 38.2 | 6.7 |
| LOS | B | C | A | D | C | A | C | D | B | D | D | A |
| Approach Delay | | 30.0 | | | 24.6 | | | 40.8 | | | 29.8 | |
| Approach LOS | | C | | | C | | | D | | | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 31.5
 Intersection LOS: C
 Intersection Capacity Utilization 79.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Vollmer Rd & Marksheffel Rd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 2 | 1007 | 8 | 0 | 673 |
| Future Vol, veh/h | 0 | 2 | 1007 | 8 | 0 | 673 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 2 | 1060 | 8 | 0 | 708 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 530 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 493 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 493 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 12.3 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 493 |
| HCM Lane V/C Ratio | - | - | 0.004 |
| HCM Control Delay (s) | - | - | 12.3 |
| HCM Lane LOS | - | - | B |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 25 | 807 | 505 | 3 | 1 | 18 |
| Future Vol, veh/h | 25 | 807 | 505 | 3 | 1 | 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 | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 26 | 849 | 532 | 3 | 1 | 19 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 535 | 0 | - | 0 | 1435 534 |
| Stage 1 | - | - | - | - | 534 - |
| Stage 2 | - | - | - | - | 901 - |
| 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 | 1033 | - | - | - | 147 546 |
| Stage 1 | - | - | - | - | 588 - |
| Stage 2 | - | - | - | - | 396 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1033 | - | - | - | 143 546 |
| Mov Cap-2 Maneuver | - | - | - | - | 143 - |
| Stage 1 | - | - | - | - | 573 - |
| Stage 2 | - | - | - | - | 396 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.3 | 0 | 12.9 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1033 | - | - | - | 475 |
| HCM Lane V/C Ratio | 0.025 | - | - | - | 0.042 |
| HCM Control Delay (s) | 8.6 | - | - | - | 12.9 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 3 | 376 | 4 | 0 | 765 |
| Future Vol, veh/h | 0 | 3 | 376 | 4 | 0 | 765 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 3 | 396 | 4 | 0 | 805 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 198 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 810 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 810 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|-----|----|----|
| HCM Control Delay, s | 9.5 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 810 |
| HCM Lane V/C Ratio | - | - | 0.004 |
| HCM Control Delay (s) | - | - | 9.5 |
| HCM Lane LOS | - | - | A |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.9 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 21 | 336 | 744 | 11 | 25 | 73 |
| Future Vol, veh/h | 21 | 336 | 744 | 11 | 25 | 73 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 22 | 354 | 783 | 12 | 26 | 77 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 795 | 0 | - | 0 | 1187 789 |
| Stage 1 | - | - | - | - | 789 - |
| Stage 2 | - | - | - | - | 398 - |
| 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 | 826 | - | - | - | 208 391 |
| Stage 1 | - | - | - | - | 448 - |
| Stage 2 | - | - | - | - | 678 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 826 | - | - | - | 202 391 |
| Mov Cap-2 Maneuver | - | - | - | - | 202 - |
| Stage 1 | - | - | - | - | 436 - |
| Stage 2 | - | - | - | - | 678 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.6 | 0 | 21.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 826 | - | - | - | 316 |
| HCM Lane V/C Ratio | 0.027 | - | - | - | 0.326 |
| HCM Control Delay (s) | 9.5 | - | - | - | 21.8 |
| HCM Lane LOS | A | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 1.4 |

Timings
12: Vollmer Rd & Marksheffel Rd

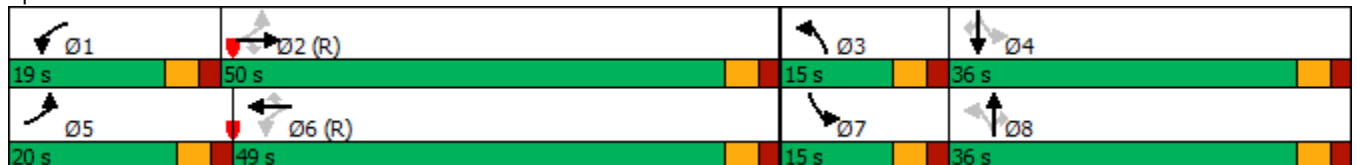
2042 Total Traffic
PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 142 | 949 | 96 | 191 | 718 | 154 | 171 | 728 | 191 | 132 | 342 | 199 |
| Future Volume (vph) | 142 | 949 | 96 | 191 | 718 | 154 | 171 | 728 | 191 | 132 | 342 | 199 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 8 | 4 | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 8 | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 |
| Minimum Split (s) | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 | 10.0 | 23.0 | 23.0 |
| Total Split (s) | 20.0 | 50.0 | 50.0 | 19.0 | 49.0 | 49.0 | 15.0 | 36.0 | 36.0 | 15.0 | 36.0 | 36.0 |
| Total Split (%) | 16.7% | 41.7% | 41.7% | 15.8% | 40.8% | 40.8% | 12.5% | 30.0% | 30.0% | 12.5% | 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 | 3.0 | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | C-Max | C-Max | None | C-Max | C-Max | None | Max | Max | None | Max | Max |
| Act Effct Green (s) | 57.4 | 46.7 | 46.7 | 60.6 | 48.3 | 48.3 | 41.2 | 31.4 | 31.4 | 40.8 | 31.2 | 31.2 |
| Actuated g/C Ratio | 0.48 | 0.39 | 0.39 | 0.50 | 0.40 | 0.40 | 0.34 | 0.26 | 0.26 | 0.34 | 0.26 | 0.26 |
| v/c Ratio | 0.43 | 0.73 | 0.15 | 0.73 | 0.53 | 0.23 | 0.50 | 0.83 | 0.39 | 0.68 | 0.39 | 0.37 |
| Control Delay | 18.7 | 35.3 | 4.5 | 53.2 | 22.5 | 5.5 | 31.4 | 50.7 | 13.7 | 43.5 | 38.2 | 6.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 18.7 | 35.3 | 4.5 | 53.2 | 22.5 | 5.5 | 31.4 | 50.7 | 13.7 | 43.5 | 38.2 | 6.7 |
| LOS | B | D | A | D | C | A | C | D | B | D | D | A |
| Approach Delay | | 30.8 | | | 25.5 | | | 41.2 | | | 29.9 | |
| Approach LOS | | C | | | C | | | D | | | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 32.1
 Intersection LOS: C
 Intersection Capacity Utilization 80.9%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Vollmer Rd & Marksheffel Rd



Timings
13: Sterling Ranch Rd & Marksheffel Rd

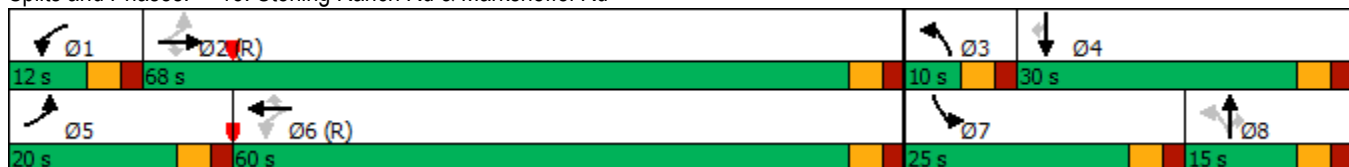
2042 Total Traffic
PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 310 | 946 | 22 | 130 | 841 | 581 | 27 | 7 | 37 | 348 | 24 | 194 |
| Future Volume (vph) | 310 | 946 | 22 | 130 | 841 | 581 | 27 | 7 | 37 | 348 | 24 | 194 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 8 | | 8 | | | 4 |
| Detector Phase | 5 | 2 | 2 | 1 | 6 | 6 | 3 | 8 | 8 | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 15.0 | 15.0 | 5.0 | 15.0 | 15.0 | 5.0 | 10.0 | 10.0 | 20.0 | 10.0 | 10.0 |
| Minimum Split (s) | 10.0 | 20.0 | 20.0 | 10.0 | 20.0 | 20.0 | 10.0 | 15.0 | 15.0 | 25.0 | 20.0 | 20.0 |
| Total Split (s) | 20.0 | 68.0 | 68.0 | 12.0 | 60.0 | 60.0 | 10.0 | 15.0 | 15.0 | 25.0 | 30.0 | 30.0 |
| Total Split (%) | 16.7% | 56.7% | 56.7% | 10.0% | 50.0% | 50.0% | 8.3% | 12.5% | 12.5% | 20.8% | 25.0% | 25.0% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| All-Red Time (s) | 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) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | C-Max | C-Max | None | C-Max | C-Max | None | None | None | None | None | None |
| Act Effct Green (s) | 80.7 | 69.1 | 69.1 | 69.5 | 62.6 | 62.6 | 11.0 | 10.0 | 10.0 | 20.0 | 23.0 | 23.0 |
| Actuated g/C Ratio | 0.67 | 0.58 | 0.58 | 0.58 | 0.52 | 0.52 | 0.09 | 0.08 | 0.08 | 0.17 | 0.19 | 0.19 |
| v/c Ratio | 0.76 | 0.49 | 0.02 | 0.41 | 0.48 | 0.55 | 0.20 | 0.05 | 0.12 | 0.64 | 0.07 | 0.44 |
| Control Delay | 40.3 | 10.5 | 0.0 | 12.9 | 20.9 | 3.6 | 37.8 | 51.4 | 0.8 | 52.4 | 39.2 | 8.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.3 | 10.5 | 0.0 | 12.9 | 20.9 | 3.6 | 37.8 | 51.4 | 0.8 | 52.4 | 39.2 | 8.5 |
| LOS | D | B | A | B | C | A | D | D | A | D | D | A |
| Approach Delay | | 17.6 | | | 13.8 | | | 19.6 | | | 36.8 | |
| Approach LOS | | B | | | B | | | B | | | D | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 19.0
 Intersection LOS: B
 Intersection Capacity Utilization 74.0%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 13: Sterling Ranch Rd & Marksheffel Rd



| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↗ | ↕ | ↗ | | ↕ |
| Traffic Vol, veh/h | 0 | 3 | 1007 | 17 | 0 | 674 |
| Future Vol, veh/h | 0 | 3 | 1007 | 17 | 0 | 674 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 3 | 1060 | 18 | 0 | 709 |

| Major/Minor | Minor1 | Major1 | Major2 | | |
|----------------------|--------|--------|--------|---|---|
| Conflicting Flow All | - | 530 | 0 | 0 | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - |
| Pot Cap-1 Maneuver | 0 | 493 | - | - | 0 |
| Stage 1 | 0 | - | - | - | 0 |
| Stage 2 | 0 | - | - | - | 0 |
| Platoon blocked, % | | | - | - | - |
| Mov Cap-1 Maneuver | - | 493 | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - |
| Stage 1 | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |

| Approach | WB | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 12.3 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBRWBLn1 | SBT |
|-----------------------|-----|----------|-------|
| Capacity (veh/h) | - | - | 493 |
| HCM Lane V/C Ratio | - | - | 0.006 |
| HCM Control Delay (s) | - | - | 12.3 |
| HCM Lane LOS | - | - | B |
| HCM 95th %tile Q(veh) | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 90 | 807 | 505 | 12 | 6 | 61 |
| Future Vol, veh/h | 90 | 807 | 505 | 12 | 6 | 61 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 150 | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 95 | 849 | 532 | 13 | 6 | 64 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 545 | 0 | - | 0 | 1578 539 |
| Stage 1 | - | - | - | - | 539 - |
| Stage 2 | - | - | - | - | 1039 - |
| 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 | 1024 | - | - | - | 120 542 |
| Stage 1 | - | - | - | - | 585 - |
| Stage 2 | - | - | - | - | 341 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1024 | - | - | - | 109 542 |
| Mov Cap-2 Maneuver | - | - | - | - | 109 - |
| Stage 1 | - | - | - | - | 531 - |
| Stage 2 | - | - | - | - | 341 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.9 | 0 | 15.9 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1024 | - | - | - | 400 |
| HCM Lane V/C Ratio | 0.093 | - | - | - | 0.176 |
| HCM Control Delay (s) | 8.9 | - | - | - | 15.9 |
| HCM Lane LOS | A | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | 0.6 |

Appendix Table 1



**Appendix Table 1
Area Traffic Impact Studies
Copper Chase Sterling Ranch**

| Study | PCD File No⁽¹⁾ | Consultant | Date |
|---|---|-------------------------------------|-------------------------------|
| Sterling Ranch Reports | | | |
| Sterling Ranch Updated Traffic Impact Analysis | SKP07007 | LSC Transportation Consultants, Inc | June 5, 2008 |
| Sterling Ranch Phase 1 Traffic Impact Study | P151 | LSC Transportation Consultants, Inc | March 16, 2015 |
| Sterling Ranch Phases 1-3 Transportation Memorandum | SP1415 | LSC Transportation Consultants, Inc | October 2, 2017 |
| Branding Iron at Sterling Ranch Filing No. 1 and Homestead at Sterling Ranch Filing No. 1 Transportation | SF1724 SF1725 | LSC Transportation Consultants, Inc | December 19, 2017 |
| Sterling Ranch Filing No. 2 Transportation Memorandum | SF1820 | LSC Transportation Consultants, Inc | April 3, 2018 |
| Sterling Ranch Phase 2 Preliminary Plan Traffic Impact Study | SP203 | LSC Transportation Consultants, Inc | December 20, 2018 |
| Homestead at Sterling Ranch Filing No. 2 Transportation Memorandum | SF194 | LSC Transportation Consultants, Inc | March 3, 2020 |
| Branding Iron at Sterling Ranch Filing No. 2 Transportation Memorandum | SF1918 | LSC Transportation Consultants, Inc | May 6, 2020 |
| Sterling Ranch Filing No. 2 and Phase 2 Traffic Impact Study | SF2015 SP191 | LSC Transportation Consultants, Inc | June 23, 2021 |
| Sterling Ranch Filing No. 3 Transportation Memorandum | SF2132 | LSC Transportation Consultants, Inc | April 19, 2022 |
| Homestead North Phase 1 Updated Transportation Memorandum | SP208 | LSC Transportation Consultants, Inc | January 11, 2022 |
| Homestead North Filing No. 1 Traffic Technical Memorandum | SF2213 | LSC Transportation Consultants, Inc | February 2, 2022 |
| Homestead North Filing No. 2 Traffic Technical Memorandum | SF2218 | LSC Transportation Consultants, Inc | April 15, 2022 |
| Homestead North Filing 3 Traffic Impact Study | SF2229 | LSC Transportation Consultants, Inc | June 17, 2022 |
| The Villages at Sterling Ranch East Preliminary Plan/Traffic Generation Analysis | PUDSP226 | SM Rocha, LLC | July 1, 2022 |
| Sterling Ranch Sketch Plan Amendment Master Traffic Impact Study | SKP224 | LSC Transportation Consultants, Inc | March 17, 2023 |
| Sterling Ranch East - Rezoning & Preliminary Plan Traffic Impact Study | SP-22-004, P-22-012, P-22-013 | LSC Transportation Consultants, Inc | March 17, 2023 ⁽²⁾ |
| Sterling Ranch East Filing Nos 1 & 2 Traffic Technical Memorandum | SF2235 SF2237 | LSC Transportation Consultants, Inc | February 10, 2023 |
| Sterling Ranch Filing No. 4 Transportation Memorandum | SF2230 | LSC Transportation Consultants, Inc | February 21, 2023 |
| Foursquare at Sterling Ranch East Transportation Memorandum | SF2236 | LSC Transportation Consultants, Inc | April 20, 2023 |
| Retreat at TimberRidge Reports | | | |
| The Retreat at TimberRidge Traffic Impact Analysis | PUD173 | LSC Transportation Consultants, Inc | January 25, 2018 |
| The Retreat at TimberRidge Preliminary Plan Traffic Technical Memorandum | SP182 | LSC Transportation Consultants, Inc | June 29, 2018 |
| The Retreat at TimberRidge Filing No. 1 Traffic Technical Memorandum | SF199 | LSC Transportation Consultants, Inc | April 3, 2020 |
| The Retreat at TimberRidge Filing No. 2 Updated Traffic Technical Memorandum | SF2121 | LSC Transportation Consultants, Inc | October 4, 2021 |
| The Retreat at TimberRidge Filing No. 3 Traffic Technical Memorandum | SF2241 | LSC Transportation Consultants, Inc | July 1, 2022 |
| Other Area Reports | | | |
| Wolf Ranch School Site Traffic Impact Study | OAR1720 | Matrix Design Group, Inc. | 5-May-17 |
| The Ranch Sketch Plan Traffic Impact Analysis | SKP186 | LSC Transportation Consultants, Inc | July 9, 2019 |
| Lodge III Traffic Impact Study | OAR | LSC Transportation Consultants, Inc | December 13, 2019 |
| Continental 613 Traffic Impact Study | OAR2177 | LSC Transportation Consultants, Inc | July 16, 2021 |
| Solace at Black Forest Traffic Impact and Access Analysis | OAR2134 | LSC Transportation Consultants, Inc | August 13, 2021 |
| Traffic Impact Study Addendum for Percheron | OAR2173 | SM Rocha, LLC | October, 2021 |
| Woodmen East Commercial Center Traffic Impact Analysis | OAR2191 | LSC Transportation Consultants, Inc | December 8, 2021 |
| Traffic Impact Study for Jaynes Property | SKP225 | SM Rocha, LLC | May, 2022 |
| Traffic Impact Study for Rhetoric Site | P2216 | SM Rocha, LLC | June, 2022 |
| Briargate-Stapleton Corridor Study (DRAFT) | briargate-stapleton.com | Wilson & Company | December 9, 2021 |
| Notes: | | | |
| (1) Follow the links listed below to obtain the most recent version of each listed study. To obtain a copy of the version of each study used in preparing this report please contact LSC Transportation Consultants, Inc. | | | |
| (2) With minor revision 4/3/2023 | | | |
| Source: LSC Transportation Consultants, Inc. | | | |

Appendix Table 2⁽¹⁾

(Page 1 of 2)

Sterling Ranch

Roadway Segment Improvements

| Segment ID ⁽²⁾ (See Figure 14 for map) | Improvement Description | Timing | Design ADT (vpd) | Projected 2042 ADT (vpd) | Responsibility |
|--|--|--|---|--------------------------|---|
| V1 northbound | Per the City of Colorado Springs, an outside paved shoulder will need to be added along the east side of Vollmer Road from Dry Needle Place up to the south end of segment V2 improvements. | With Sterling Ranch Filing No. 4 but potentially complete concurrently with the construction of the right-turn lane at Pioneer Landscape Center access for the Sterling Ranch Recycling Facility (PCD No. PPR2241) | 5,500 (Directional northbound) | 16,275 | Sterling Ranch |
| V1 southbound | | | 10,000 (Directional southbound) | | |
| V1 | Improve Vollmer Road between Dry Needle Place and the Sterling Ranch south boundary to a standard 4-Lane Urban Minor Arterial Cross Section (add a second northbound through lane and painted center median). ⁽³⁾ | The need driven by anticipated traffic from each development impacting this section of Vollmer Road. | 20,000 | | Sterling Ranch, if necessary, prior to construction by others. |
| V2 | Improve Vollmer Road between the Sterling Ranch south boundary to Lochwinnoch Lane/Sterling property boundary to a standard 4-Lane Urban Minor Arterial Cross Section. ⁽³⁾ | Short-Term Future (With Sterling Ranch Fil No. 2 Or Sterling Ranch Phase 2) | 20,000 (Note: Existing Capacity 8,000 ⁽³⁾) | 17,475 | Sterling Ranch |
| V3 | Short Term: Improve Vollmer Road from Lochwinnoch Lane to Sterling Ranch boundary (northeast of Glider Loop) to provide 36' of pavement (existing pavement 1 approx. 23.38') and stripe for one through lane plus a 6' paved, striped outside shoulder in each direction. ⁽³⁾ | Short-Term Future (With Homestead North) | 11,000 (Note: Existing Capacity 8,000) | 17,380 | Sterling Ranch |
| | Long Term: Improve Vollmer Road from Lochwinnoch Lane to Sterling Ranch boundary (northeast of Glider Loop) to a standard 4-Lane Urban Minor Arterial Cross Section. ⁽³⁾ | Long-Term Future | 20,000 | | Sterling Ranch with potential County assistance with ROW acquisition - pursuant to the recent development agreement between Sterling Ranch and EPC. |
| V4 | Improve Vollmer Road from Sterling Ranch boundary (northeast of Glider Loop) to Briargate Parkway to a standard 4-Lane Urban Minor Arterial Cross Section. ⁽³⁾ | Short-Term Future-- May 2024 Updated 10/15/2022 - Sections V4, V5, V6 to be constructed by May 2024 (prior note: With Homestead North Filing 1) | 20,000 | 16,445 | Sterling Ranch |
| V5 | Improve Vollmer Road from Briargate Parkway to Jane Kirkham Drive to a standard 4-Lane Urban Minor Arterial Cross Section. ⁽³⁾ | Short-Term Future-- May 2024 Updated 10/15/2022 - Sections V4, V5, V6 to be constructed by May 2024 (prior note: prior note: With Homestead North Filing 1) | 20,000 | 11,690 | Sterling Ranch |
| V6 | Improve Vollmer Road from Jane Kirkham Drive to Sam Bass Drive to a standard 4-Lane Urban Minor Arterial Cross Section. ⁽³⁾ | Short-Term Future-- May 2024 Updated 10/15/2022 - Sections V4, V5, V6 to be constructed by May 2024 (prior note: prior note: With Homestead North Filing 2) | 20,000 | 11,425 | Sterling Ranch |
| V7 | Improve Vollmer Road between Sam Bass Drive and Poco Road to a 4-lane Urban Minor Arterial but with necessary lane transitions, redirect tapers, etc. south of Poco to adequately transition between the 4-Lane Urban Minor Arterial Cross Section and the 2-Lane Rural Arterial Cross Section north of Poco Road. | Short-Term Future - May 2024 Updated 10/15/2022 - Sections V4, V5, V6 to be constructed by May 2024 (prior note: With Homestead North Filing 3) | 20,000 | 10,030 | Sterling Ranch |
| V8 | Improve Vollmer Road from Poco Road to Shoup Road to a Rural 2-Lane Arterial Cross Section. ⁽³⁾ | Long-Term Future | 10,000 | 11,790 | El Paso County Project ID U-12 |

Part 1/2 of this table (see Part 2 on next page)

Notes:

(1) Source: This Appendix Table 2 is a copy of Table 6 from the Sterling Ranch East Phase 1 Rezoning and Preliminary Plan TIS, March 17, 2023 (with minor revisions April 3, 2023) with LSC notes regarding this Copper Chase project. Improvements needed prior to Copper Chase at Sterling Ranch have been highlighted in green.

(2) See Figure 14

(3) Adequate transition/redirect tapers would be needed between the various cross sections on Vollmer Road. Based on the criteria contained in Table 2-29 of the *El Paso Engineering Criteria Manual*, an appropriate taper ratio for a roadway with a design speed of 40 miles per hour is 20:1

(4) Source: Table 20 Road Impact Fee Study Updated November 16, 2016

Source: LSC Transportation Consultants, Inc. (April 26, 2023)

Appendix Table 2⁽¹⁾

(Page 2 of 2)

Sterling Ranch

Roadway Segment Improvements

| Segment ID ⁽²⁾ (See Figure 14 for map) | Improvement Description | Timing | Design ADT (vpd) | Projected 2042 ADT (vpd) | Responsibility |
|---|---|---|---------------------|--------------------------------|---|
| SR1 | Construct Sterling Ranch Road as an Urban Non-Residential Collector from Marksheffel Road to Dines Boulevard. | Short Term - with Sterling Ranch Fil No. 2 | 20,000 | 14,840 | Sterling Ranch |
| SR2 | Construct Sterling Ranch Road as an Urban Non-Residential Collector from Dines Boulevard to Briargate Parkway. | Short-Term | 20,000 | 10,275 | Sterling Ranch |
| SR3 | Construct Sterling Ranch Road as an Urban Collector from Briargate Parkway to Vancouver Street. | Short Term | 10,000 | 9,300 | Sterling Ranch |
| SR4 | Construct Sterling Ranch Road from Vancouver Street north to Arroya (or ultimate north terminus). | Long-Term Future | 10,000 | 4,260 | Sterling Ranch |
| M1 | Construct Marksheffel Road as an Urban Principal Arterial to City of Colorado Springs standards in 107' of right-of-way between Vollmer Road and Sterling Ranch Road. | Updated 10/15/2022: to be completed by the end of 2022 (prior note: With Sterling Ranch Fil No. 2) | 40,000 | 23,370 | Sterling Ranch |
| M2 | Construct Marksheffel Road as an Urban Principal Arterial to City of Colorado Springs standards in 107' of right-of-way between Sterling Ranch Road and the south boundary of the Sterling Ranch Master Plan Area. 10/16/2022 NOTE: With the completion of M2 in 2023, the connection between Vollmer and Woodmen Road (via M3) will be completed. | Short Term Updated 10/15/2022: to be completed in 2023 (prior note: With Sterling Ranch Phase 2) | 40,000 | 29,600 | Sterling Ranch |
| M3 | Construct Marksheffel Road between the south boundary of the Sterling Ranch Master Plan Area and Woodmen Road. (Note this segment is located within the City of Colorado Springs). 10/16/2022 NOTE: With the completion of M2 in 2023, the connection between Vollmer and Woodmen Road (via M3) will be completed. | Updated 10/15/2022: Completed (by Others) | 40,000 | 24,525 | Others (Completed) |
| M4 | Construct Marksheffel Road between Black Forest Road and Vollmer Road. | Long-Term Future | 40,000 | 27,910 | Others |
| B1 | Construct the south half section of Briargate Pkwy (4-Lane Principal Arterial) between Vollmer Road and Wheatland Drive [now full section by 2023]. | Short-Term Future Updated 10/15/2022: Full section to be completed in 2023 with Homestead at Sterling Ranch Filing No. 1 (prior note: With Homestead at Sterling Ranch Fil 2) | 20,000 | 24,745 | Sterling Ranch |
| | Construct the north half section of Briargate Pkwy (4-Lane Principal Arterial) between Vollmer Road and Wheatland Drive [now full section by 2023]. | Short-Term Future Updated 10/15/2022: Full section to be completed in 2023 with Homestead at Sterling Ranch Filing No. 1 (prior note: Long-Term Future) | 40,000 | | Sterling Ranch |
| B2 | Construct Briargate Pkwy (full section) as a 4-Lane Principal Arterial between Wheatland Dr and Sterling Ranch Road. | Short-Term Future Updated 10/15/2022: Full section to be completed in 2023 or Spring 2024 (prior note: Long-Term Future) | 40,000 | 26,375 | Sterling Ranch |
| B3 | Construct Briargate Pkwy as a 4-Lane Principal Arterial between Sterling Ranch Road and Banning Lewis Parkway. | Intermediate Term | 40,000 | 22,365 | Sterling Ranch |
| B4 | Construct Stapleton Road as a 4-Lane Principal Arterial between Banning Lewis Parkway and Meridian Road (including upgrade of existing rural two-lane segment between Towner and Meridian). | Long-Term Future | 40,000 | 17,945 | Others |
| B5 | Construct Briargate Pkwy as a 4-Lane Principal Arterial between Black Forest Road and Vollmer Road. | Long-Term Future | 40,000 | 24,340 | Others; PPRTA A List Project |
| BL1 | Construct Banning Lewis Parkway as a 4-Lane Principal Arterial between the south Sterling Ranch boundary and Briargate Pkwy. | Long-Term Future | 40,000 | 20,320 | Financial assurances for half-section, Sterling Ranch half-section or full-section w/ cost recovery |
| BL2 | Construct Banning Lewis Parkway as a 4-Lane Principal Arterial between Woodmen Road and the south Sterling Ranch boundary. (Note this segment will be located within the City of Colorado Springs) | Long-Term Future | 40,000 | 28,480 | Others |
| W1 | Widen Woodmen Road from 4-lane to 6-lane section from Powers Boulevard to US 24. | Long-Term Future | 72,000 | 66,690 | PPRTA A-List Project; City of Colorado Springs ConnectCOS Index No.476 |
| B1 | Widen Black Forest Road between Woodmen Road to just north of Research Road to two northbound and southbound through lanes. | Black Forest Widening Project | 40,000 | 28,420 | City of Colorado Springs |
| B2 | Widen Black Forest Road from just north of Research Road to Briargate Parkway. | Long-Term Future | 40,000 | 25,145 | Others/City of Colorado Springs |
| B3 | Widen Black Forest Rd from Briargate Pkwy to Old Ranch Rd as a 4-lane Principal Arterial with bike and pedestrian facilities. | Long-Term Future | 40,000 | 19,135 | PPRTA B List Project ConnectCOS Index No. 479 |

Part 2/2 of this table

Notes:

(1) Source: This Appendix Table 2 is a copy of Table 6 from the Sterling Ranch East Phase 1 Rezoning and Preliminary Plan TIS, March 17, 2023 (with minor revisions April 3, 2023) with LSC notes regarding this Copper Chase project. Improvements needed prior to Copper Chase at Sterling Ranch have been highlighted in green.

(2) See Figure 14

Source: LSC Transportation Consultants, Inc. (April 26, 2023)