

TRAFFIC IMPACT STUDY

To: El Paso County

From: Eli Farney, PE, PTOE

Date: June 21, 2022

Vollmer RV Storage

Lot A McClintock Station ~ 6.75 Miles East of I-25
El Paso County, CO

Owner/Developer:
Scott Belknap
3603 First Light Drive
Castle Rock , CO 80109

Prepared By:



Eli Farney, PE, PTOE
efarney@jrengineering.com
JR Engineering
7200 South Alton Way, Suite C400
Centennial, CO 80112



J·R ENGINEERING

PPR-22-045

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1 - Executive Summary

JR Engineering has prepared a comprehensive Traffic Impact Study (TIS) for the proposed Vollmer RV Storage site, on the southeast side of Vollmer Road approximately two miles east of Black Forest Road in El Paso County, Colorado.

The contents of this TIS include the objectives stated in **Table 1**:


Table 1 – Traffic Impact Study Objectives

Traffic Impact Study Objectives
2020 Existing Traffic Operations
2023 Opening Day Traffic Analysis
2045 Future Traffic Analysis

The methodology, content, and findings of this TIS are consistent with the following documents:

- **El Paso County** – Engineering Criteria Manual-Appendix 1 ^{Appendix B} (*Transportation Impact Study Guidelines*)

This TIS falls under the Transportation Memorandum category, since it is a small development with under 500 daily trips, and there are no expected increase in pedestrian and bicycle traffic volumes associated with the development of the site. The Study Area will include the new intersection with Vollmer Road that will serve the proposed site.

access 

Key Findings of this Traffic Impact Study:

- **Intersection Analysis – Existing Conditions** – Traffic operations in the southwest and northeast directions are satisfactory because there is no intersection in the existing condition.
- **Intersection Analysis – Opening Day** – Traffic operations in the southwest and northeast directions of Vollmer Road are expected to operate at Level of Service A or B with the proposed development traffic and new access driveway.
- **Intersection Analysis – 2045 Condition** – Traffic operations in the southwest and northeast directions of Vollmer Road are expected to operate at Level of Service A or B with the proposed development traffic and new access driveway.

2 - Introduction

JR Engineering (JR) has completed a review of the existing, Opening Day, and Future 2045 traffic operations along Vollmer road at the proposed driveway access point for the RV storage facility. **Figure 1** shows a vicinity map of the proposed site.



Figure 1: Proposed Vollmer RV Storage Facility - Vicinity Map

Facility Details

The proposed Vollmer RV Storage facility has a service area of 4.1 acres. The primary function of this facility is to store recreational vehicles (RV's). Total parking space for the site will not exceed 150 RV spots.

Public Input

There is no public or neighborhood input issues that have been reported in association with the development of this site.

Proposed Site Plan & Study Intersection

Figure 2 shows the proposed Site Plan and Study Intersection location.



Figure 2: Site Plan and Study Intersection Location

3 – Existing Conditions

Existing Traffic Volumes

Existing through movement traffic counts were taken from Homestead North Phase 1 Update Traffic Impact Study by LSC Transportation Consultants, Inc. dated August 2021 (Homestead North TIS). According to the Homestead North TIS the figure below shows the tube count location. Applicable excerpts, including traffic counts, from this report can be found in Appendix 1.

- **Through Movement Tube Counts** – Vollmer Road at Dines (North East of site access)
 - Collected by LSC in May 2020



Figure 3: Through Movement Tube Count Location

Traffic count data is available in [Appendix 1](#).

COVID-19 Traffic Volumes

According to the Homestead North TIS existing traffic counts were adjusted by LSC to account for COVID-19 related restrictions. "...volumes are estimates by LSC, based on the 2020 peak-hour counts and the ratio of peak-hour to daily traffic volumes from 24- hour counts conducted on Vollmer Road..." For more information on traffic adjustments made by LSC see referenced material in Appendix 1.

2020 Existing Traffic Volumes and Lane Geometry

Figure 4 shows the existing lane geometry and traffic volumes during the AM and PM peak hours.

Existing Conditions - Level of Service

There are no existing major intersections adjacent to the proposed development. Glider Loop intersects Vollmer road on the northwest side to the north and south of the proposed intersection. Glider Loop serves approximately 20 residential homes. Northeast and southwest bound through movements along Vollmer Road have satisfactory operation at all times due to an absence of conflicting movements.

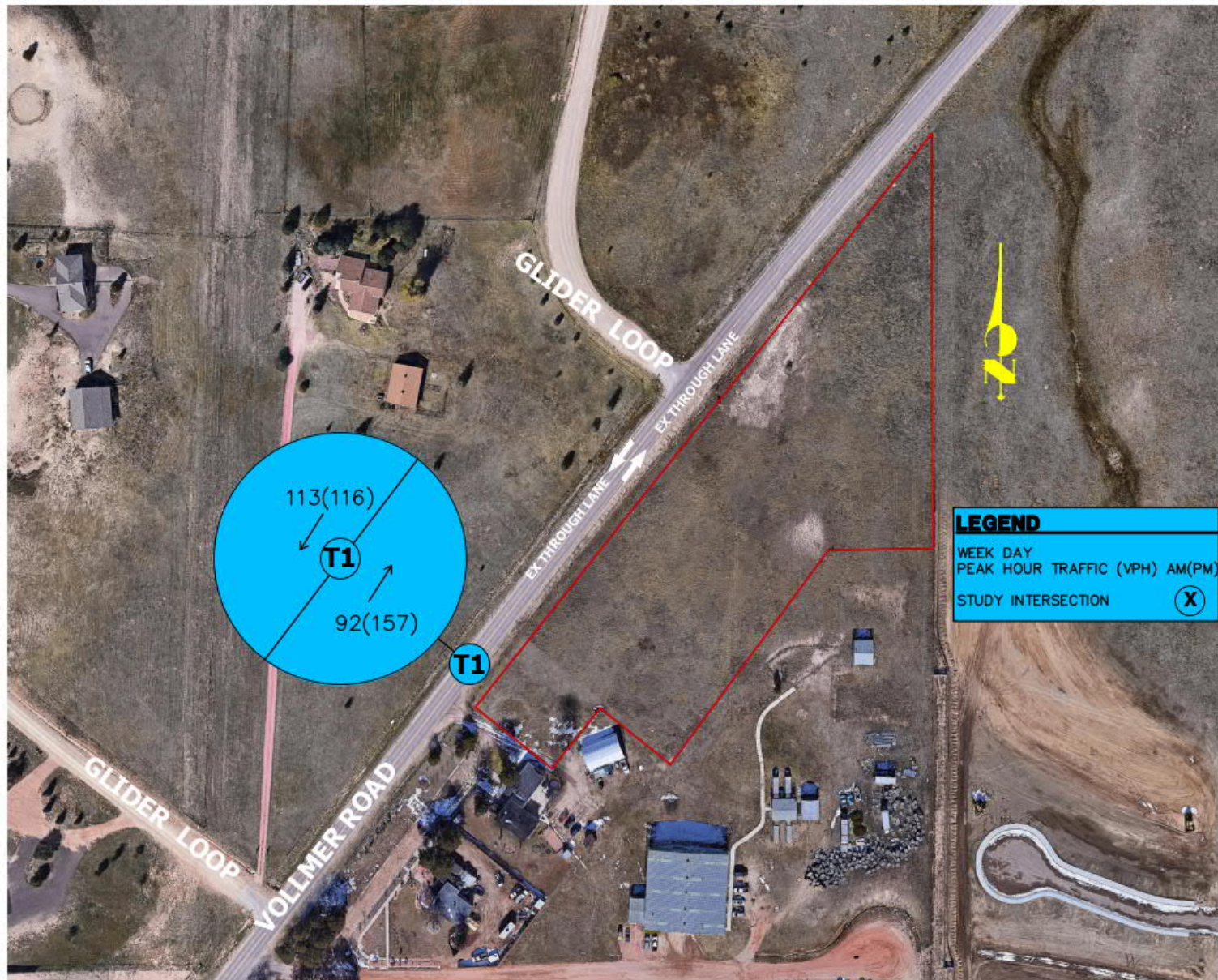


Figure 4: 2021 Existing Traffic Volumes

4 – Proposed Conditions

Traffic Growth Forecast

Based on the El Paso County Engineering Criteria Manual standards, an opening day and a future condition analysis are required.

Based on traffic volume forecasts, a standard 2.0% annual growth was assumed from 2020 to 2045. This growth rate was used to determine 2045 background traffic volumes. Based on the Homestead North TIS through movements at the intersection of Briargate Parkway and Vollmer Road were used to determine traffic volumes and patterns along Vollmer Road in the future.

Include in discussion that volumes from Homestead TIS were for 2040 and additional growth was used to obtain 2045 volumes shown on exhibit.

Trip Distribution

Traffic split appears to be around 50/50 due to very low site generated traffic volumes. Based on location of the site it is assumed that slightly more people will be entering and exiting the site to the southwest because the City of Colorado Springs is located to the southwest of the site.

Trip Generation

Trips to and from the site were estimated using ITE Trip Generation manual using Land Use Code 151 for Mini-warehouse.

Trip Estimate Based on ITE Trip Generation Manual 10th Edition

The ADT and turning movement counts were estimated using the standard ITE Land Use Code 151 for Mini-warehouse based on number units (parking spaces). This was determined to be the closest land use type contained in the ITE Trip Generation Manual for the proposed RV storage site. No adjustments were made for internal capture nor pass-by trips.

The proposed RV storage facility area of 4.1 acres produces the following volumes based on ITE:

- Average Daily Trips (ADT) = 36 trips
- AM Entering Site = 2 trips
- AM Exiting Site = 1 trips
- PM Entering Site = 2 trips
- PM Exiting Site = 2 trips

The Trip Generation report is included in **Appendix 2**.

Site-Generated Traffic Volumes and Distributions

Figure 5 shows the traffic volumes generated by the proposed development.

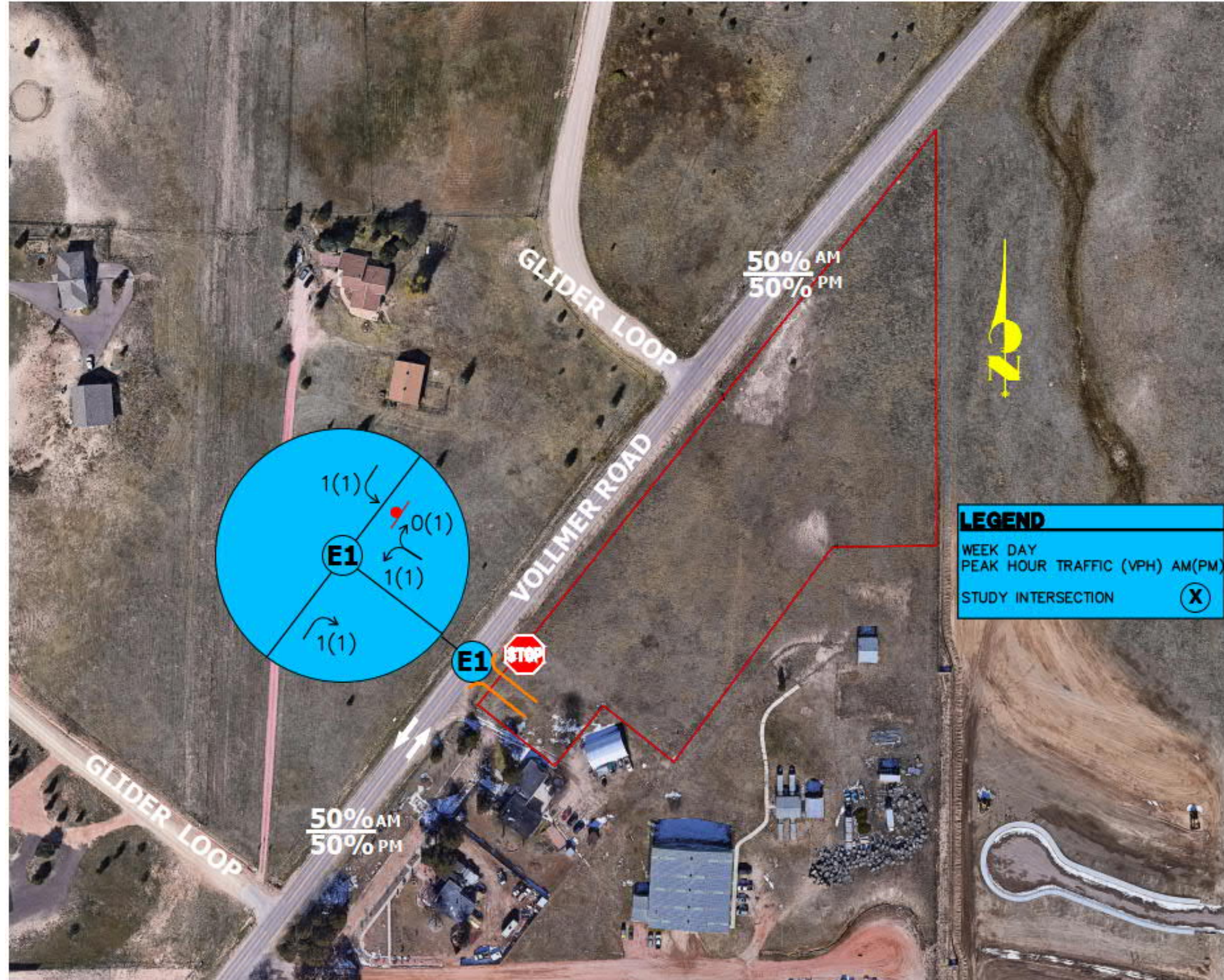


Figure 5: Site-Generated Traffic Volumes

2023 Opening Day – Total Traffic Volumes

Figure 6 shows the 2023 Opening Day total traffic volumes during the AM and PM peak hours.



Figure 6: Opening Day 2023 Total Traffic Volumes

2045 Future– Total Traffic Volumes

Figure 7 shows the 2045 future total traffic volumes during the AM and PM peak hours.



Figure 7: Future 2045 Total Traffic Volumes

5 – Traffic Evaluation – Level of Service & Queue Lengths

Analysis Methodology

The premise of the Traffic Analysis methodology is as follows:

1. Estimate traffic volumes generated by the development
2. Input estimated volumes into Synchro and analyze the Study Intersection during peak hours
3. Determine operating Level of Service for the Study Intersection during peak hours

The Study intersection was analyzed using the HCM 6th Edition methodology for the 2023 Opening Day and future 2045 scenarios. No major operational concerns are anticipated for these scenarios. The Synchro report for both analysis is included in [Appendix 3](#).

Peak Hour Definition

Based on the traffic counts, [Table 2](#) shows the peak hours for Vollmer Road.


Table 2 – Peak Hour Definition

Peak Hour	Hours
Morning (AM Peak)	7:30 a.m. to 8:30 a.m.
Evening (PM Peak)	4:30 p.m. to 5:30 p.m.

Study Intersection – Opening Day 2023 Level of Service

The intersections were analyzed for the 2023 Opening Day scenario. **Table 3** indicates the 2023 Level of Service for the intersection.

Table 3 – Stop Controlled Intersection Level of Service – 2023 Opening Day



One-Way Stop Controlled Intersection	Direction	Opening Day Traffic LOS	
		AM Peak Hour	PM Peak Hour
1 –Vollmer Road & Access	NW	B	B
	SW	A	A

Study Intersection – Opening Day 2023 Queue Lengths

The intersection was analyzed for queue lengths in the 2023 Opening Day scenario. **Table 4** below indicates the 95th percentile queue length for each of the approaches of the intersection.


Table 4 – 95th Percentile Queue Lengths – 2023 Opening Day

Intersection	Approach/Movement	AM 95 th Percentile Queue (feet)	PM 95 th Percentile Queue (feet)	Recommended Storage Length for Turn Lanes (feet)
1 –Vollmer Road & Access	NW	<25	<25	N/A
	SW	<25	<25	N/A

Study Intersection –Future 2045 Level of Service

The intersections were analyzed for the 2045 scenario. **Table 5** indicates the 2045 Level of Service for the intersection.

Table 5 – Stop Controlled Intersection Level of Service – 2045



One-Way Stop Controlled Intersection	Direction	Opening Day Traffic LOS	
		AM Peak Hour	PM Peak Hour
1 –Vollmer Road & Access	NW	B	B
	SW	A	A

Study Intersection Future 2045 Queue Lengths

The intersection was analyzed for queue lengths in the 2045 scenario. **Table 6** below indicates the 95th percentile queue length for each of the approaches of the intersection.

Table 6 – 95th Percentile Queue Lengths – 2045

Intersection	Approach/ Movement	AM 95 th Percentile Queue (feet)	PM 95 th Percentile Queue (feet)	Recommended Storage Length for Turn Lanes (feet)
1 –Vollmer Road & Access	NW	<25	<25	N/A
	SW	<25	<25	N/A

6 – Improvement Analysis

Roadway & Intersection Modifications

Vollmer road is a **two-lane Arterial Roadway** with sparse development and large intersection and access spacing. The need for acceleration and deceleration lanes was determined based on the CDOT Access Code.

The following evaluations were considered:

- Right turn Acceleration Lane out of Site
- Right turn Deceleration Lane into Site
- Left-Turn Lane into Site
- Left turn Acceleration Lane out of Site

State of Colorado Highway Access Code – Turn Lane Requirements Check

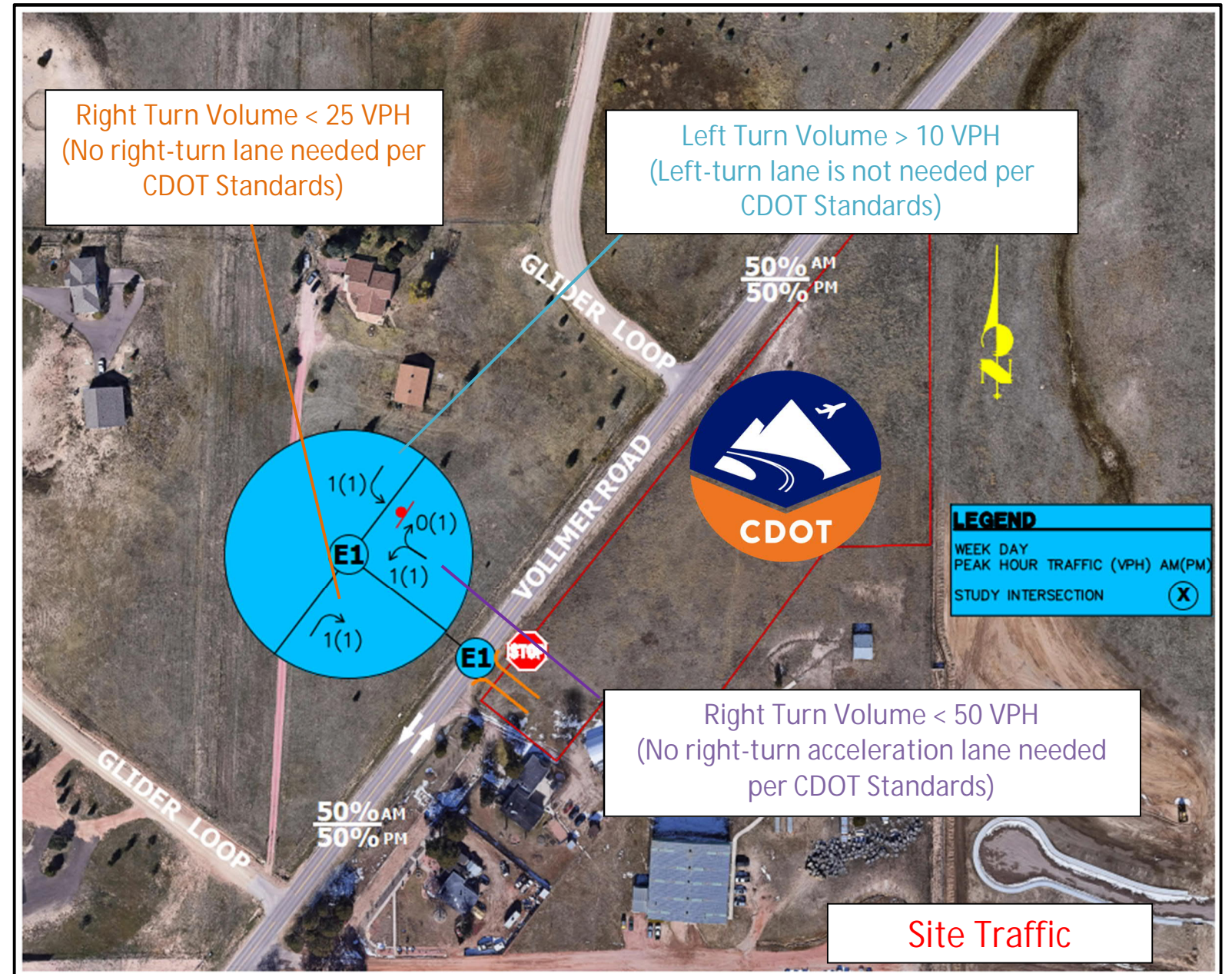
In addition to the El Paso County Engineering Criteria Manual, the Colorado Department of Transportation (CDOT) Highway Access Code was also used to determine if left and right turn lanes are needed to support the turning movements to the site.

Vollmer Road is a **CATEGORY R-B – Rural Highway** based on CDOT access code.

Table 7 – CDOT Requirements for Auxiliary Lanes

Auxiliary Lane Type	CDOT Volume Threshold	Proposed Volume (Peak Hours)	Notes
Right-Turn Acceleration Lane (Leaving Site)	< 50 VPH	1 VPH (AM) 2 VPH (PM)	Not Needed
Right-Turn Deceleration Lane (Entering Site)	< 25 VPH	1 VPH (AM) 1 VPH (PM)	Not Needed
Left-Turn Deceleration Lane (Entering Site)	< 10 VPH	1 VPH (AM) 1 VPH (PM)	Not Needed
+ Left-Turn Acceleration Lane (Leaving Site)	Various Factors	0 VPH (AM) 1 VPH (PM)	Not anticipated to be needed based on low turning volumes and through volumes

Table 7 above indicates the CDOT requirements for auxiliary lanes with a comparison to the volumes proposed for this project.



Sight Distance Analysis

Figure 8 includes the sight distance triangle for a vehicle exiting the site, per El Paso County Engineering Criteria Manual chapter 2.3. No issues with sight distance were identified.

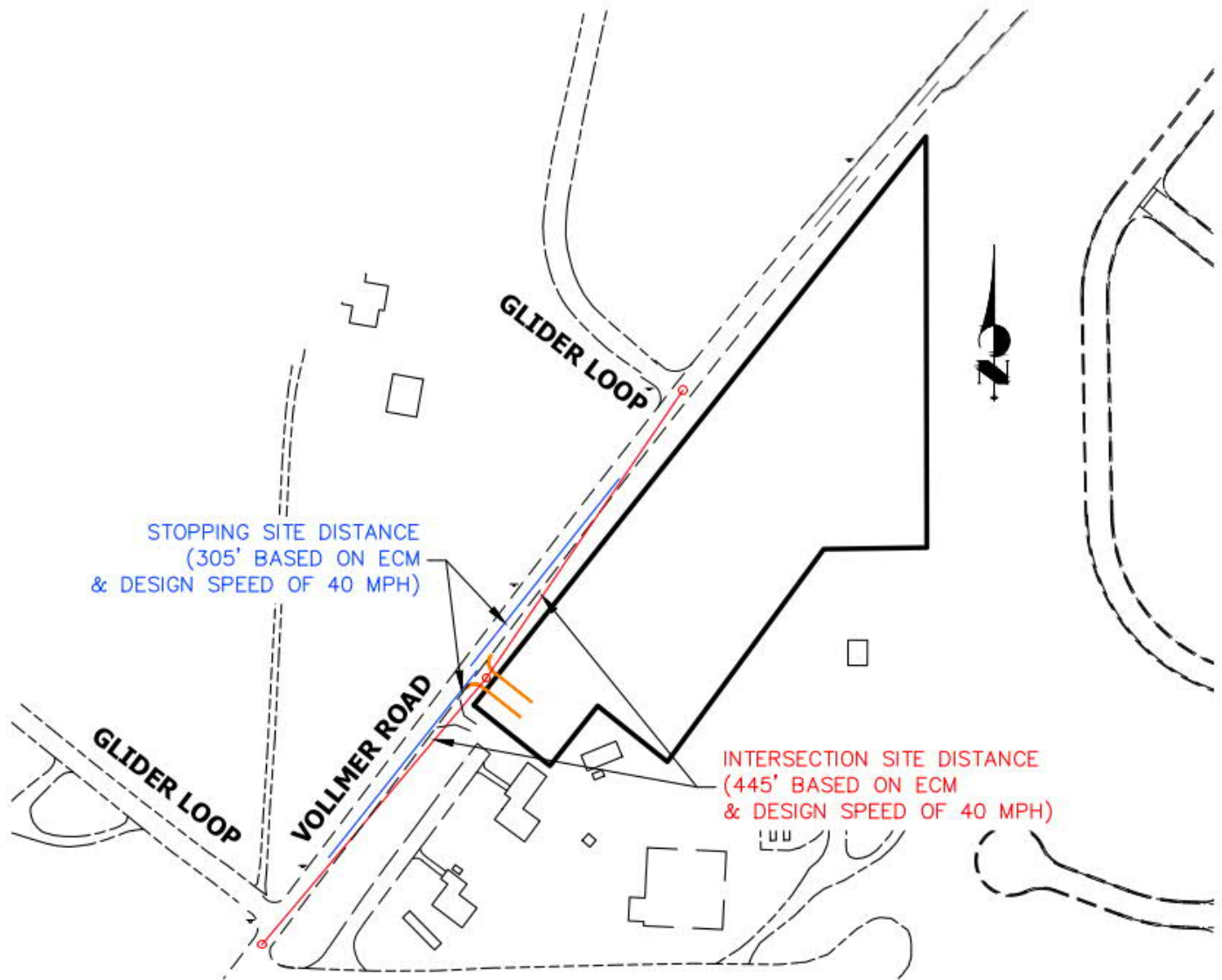


Figure 8: Sight Distance Triangle

Include a discussion on access spacing and an exhibit showing distances to closest accesses/intersections on either side.

7 – Conclusion

The proposed development along Vollmer Road is expected to have no significant impact on traffic operations. Below is a summary of the findings of this TIS.

Conclusions

- **Intersection Analysis – 2023 Opening Day Conditions** – Traffic is expected to operate with minimal operational issues in the Opening Year 2023, with all approaches operating at LOS A or B.
- **Intersection Analysis – 2045 Future Conditions** – Traffic is expected to operate with minimal operational issues in 2045, with all approaches operating at LOS A or B.
- **Pedestrian and Bicycle Facilities**
 - There are no sidewalks or bike lanes adjacent to the site. No increase in foot or bike traffic is expected with the development of this site, and therefore no bike or pedestrian paths were analyzed.
- **Turn Lane Improvements**
 - No turn lanes will be required with the development of this site due to a small number of turning movements per hour.
- **Sight Distance**
 - Adequate sight distance is available with in the current Vollmer Road right of way and no sight distance easements will be required with the development of this site.

APPENDIX 1

Referenced Material

Homestead North Phase 1

Updated Traffic Impact Study

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

AUGUST 4, 2021

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

LSC #204380
SP-20-008



Study Area Access Plan

The access plan for the current study area is generally consistent with the access plan shown in the master traffic report. The following summarizes the changes:

- The Sterling Ranch access to Briargate Parkway just east of Vollmer Road (Wheatland Drive) was previously shown as a right-in/right-out-only intersection in the Sketch Plan. The south leg is now proposed as a three-quarter-movement (left-in/right-in/right-out-only) access. A deviation request for this access point has been submitted and approved. The north leg that will serve Homestead North Phase 1 is still proposed to be restricted to right-in/right-out only.
- An additional right-in-only access (Jane Kirkham Drive) is proposed from northbound Vollmer Road between Briargate Parkway and the first full-movement site access. The applicant is requesting this access to reduce the out-of-direction travel to the southern portion of the development for motorists arriving from the south, west, or southwest. As there is not sufficient intersection spacing for an eastbound left turn from Briargate Parkway (Stapleton) at Wheatland Drive, this access would be a good alternative to improve accessibility to the southern portion of the site. Future residents in the southern portion of the site would not need to travel about one-quarter mile up Vollmer, turn right at Sam Bass Drive, and backtrack through the north portion of the subdivision to reach the homes in the southern portion. The right-in-only connection would have a northbound right-turn deceleration lane on Vollmer and very minimal impact to Vollmer operations as only the right-in turning movement would be allowed.

These changes to the plan will result in some localized shifts in intersection turning movements shown in the master traffic study long-term traffic projections, but nothing significant requiring an update to the master study.

CURRENTLY PROPOSED LAND USE AND ACCESS

Land Use and Vehicle Access

Homestead North Phase 1 is planned to include 147 lots for single-family homes. A full-movement site access (Sam Bass Drive) is proposed to Vollmer Road about 1,410 feet north of Briargate Parkway and 1,370 feet south of Poco Road. An additional right-in-only access (Jane Kirkham Drive) is proposed to Vollmer Road 704 feet north of Briargate Parkway and about 704 feet south of Sam Bass Drive. An access is also proposed to Briargate Parkway 750 feet east of Vollmer Road aligning with Wheatland Drive. In the short term, full-movement access will be allowed at this intersection, as only a half section of Briargate Parkway is planned to be constructed between Vollmer Road and Wheatland Drive. Once Briargate Parkway is widened to the full Principal Arterial cross-section **and** the roadway is extended east of Wheatland, the north leg serving Homestead North will be restricted to right-in/right-out only and the south leg will be restricted to three-quarter movements (left-in/right-in/right-out only). In the future, Homestead North Phase 1 will also have access through future Homestead North phases and the Retreat at TimberRidge to Poco Road.

Sight Distance Analysis

Figure 3 shows a sight distance analysis at the future intersection of Vollmer Road/Sam Bass Drive. Based on a design speed of 40 miles per hour (mph) and the criteria contained in Table 2-21 of the *El Paso County Engineering Criteria Manual (ECM)*, the required intersection sight distance at the future intersections is 445 feet. Based on the criteria contained in Table 2-17 of the ECM, the required stopping sight distance approaching this intersection is 305 feet. As shown in Figure 4, the future intersection analyzed will meet the criteria.

Pedestrian and Bicycle Access

There are no existing schools within two miles of the site. However, there are planned future school sites within the Sterling Ranch Master Plan area south of Briargate Parkway. There are planned sidewalks on Vollmer Road and Briargate Parkway adjacent to the site. School crossings will be needed at the intersection of Briargate Parkway/Vollmer Road. School crossings should not be allowed at the intersection of Briargate Parkway/Wheatland Drive.

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 each of 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. In the southbound direction, Vollmer Road has a posted speed limit of 45 miles per hour (mph). South of Cowpoke Road, Vollmer Road has a 40-mph posted speed limit. The *2040 El Paso County Major Transportation Corridors Plan (MTCP)* and the Sterling Ranch master traffic study show Vollmer Road as a four-lane Urban Minor Arterial adjacent to the site. Vollmer Road is planned to transition to a 2-lane Rural Minor Arterial north of Poco Road. In the interim, auxiliary turn lanes will be completed on Vollmer Road at Briargate Parkway as part of the Homestead at Sterling Ranch Filing No. 2 development.

Marksheffel Road is a Principal Arterial extending north from the City of Fountain to Woodmen Road. Marksheffel Road is planned to ultimately be widened to six lanes and extended north and west from Woodmen Road to connect to Research Parkway at Black Forest Road. Marksheffel Road is shown as a six-lane Principal Arterial through the Sterling Ranch Master Plan area on the El Paso County MTCP.

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/Stapleton Road is planned ultimately to extend to Towner Drive. The section of Briargate Parkway between Vollmer Road

and the first Sterling Ranch access (Wheatland Drive) is planned to be constructed in the short term as a partial cross-section with the Homestead at Sterling Ranch Filing No. 2 development.

Poco Road is an existing gravel road which extends east for about three-quarters of a mile from Lochwinnoch Lane to Vollmer Road. Poco Road is planned to be extended east of Vollmer Road as an Urban Local Road to serve the Retreat at Timber Ridge Filing No. 1 (PCD-SF-19-009).

Existing Traffic Volumes

Figure 4 shows the existing (2020) peak-hour traffic volumes at the intersections of Dines/Vollmer. The traffic volumes shown for the intersection of Dines/Vollmer were based on traffic counts conducted by LSC in May 2020. These traffic counts were conducted at a time when COVID-19 pandemic-related restrictions were in place. However, traffic counts conducted at the intersection of Black Forest Road/Vollmer Road in December 2019 (pre-pandemic) and repeated during the same week that the Dines/Vollmer counts were conducted indicate only minor impacts to traffic volumes on Vollmer Road due to these restrictions. The traffic count sheets are attached.

Figure 4 also shows the daily traffic volumes on Vollmer Road in the vicinity of the site. These volumes are estimates by LSC, based on the 2020 peak-hour counts and the ratio of peak-hour to daily traffic volumes from 24-hour traffic counts conducted on Vollmer Road just south of Poco Road by LSC in 2017.

BACKGROUND (BASELINE) CONDITIONS

Background traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development's trip generation of site-generated traffic volumes. Background traffic includes the through traffic and the traffic generated by nearby developments, but assumes zero traffic generated by Homestead North Phase 1.

Figure 5 shows the projected short-term background traffic volumes at the key area intersections. The short-term background volumes assume a half section of Briargate Parkway has been constructed between Vollmer Road and Wheatland Drive and that full-movement access is permitted at the intersection of Briargate/Wheatland. The short-term background traffic includes the existing traffic volumes (from Figure 3) plus increases in through traffic due to regional growth, plus traffic estimated to be generated by buildout of the Homestead at Sterling Ranch Filings 1 and 2, Branding Iron at Sterling Ranch Filings 1 and 2, Sterling Ranch Filing No. 2, Sterling Ranch Phase 2, and the Retreat at TimberRidge Filing No. 1 to be located generally northeast of the intersection of Vollmer Road and Poco Road.

Figure 6 shows the projected 2040 background traffic volumes at the key area intersections. 2040 background traffic volume estimates were based on 2040 volume projections in the *El Paso County Major Transportation Corridors Plan* (MTCP) and previous work completed in the area by LSC,

including the *Sterling Ranch Updated Traffic Impact Analysis* by LSC (dated June 5, 2008) and the *Retreat at TimberRidge Updated Traffic Impact Analysis* by LSC (dated January 25, 2018). The 2040 background traffic volumes assume buildout of the Sterling Ranch development, including future phases of Homestead North, and buildout of the Retreat at TimberRidge. The 2040 background traffic assumes Briargate Parkway/Stapleton Road has been constructed between Black Forest Road and Towner Avenue and that the intersection of Briargate/Wheatland is restricted to a three-quarter movement (left-in/right-in/right-out only) for the south leg and right-in/right-out only for the north leg. The 2040 background traffic also assumes a connection between the intersection of Wheatland/Briargate and Poco Road through the Homestead North area.

TRIP GENERATION

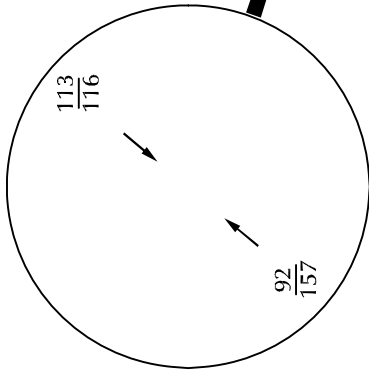
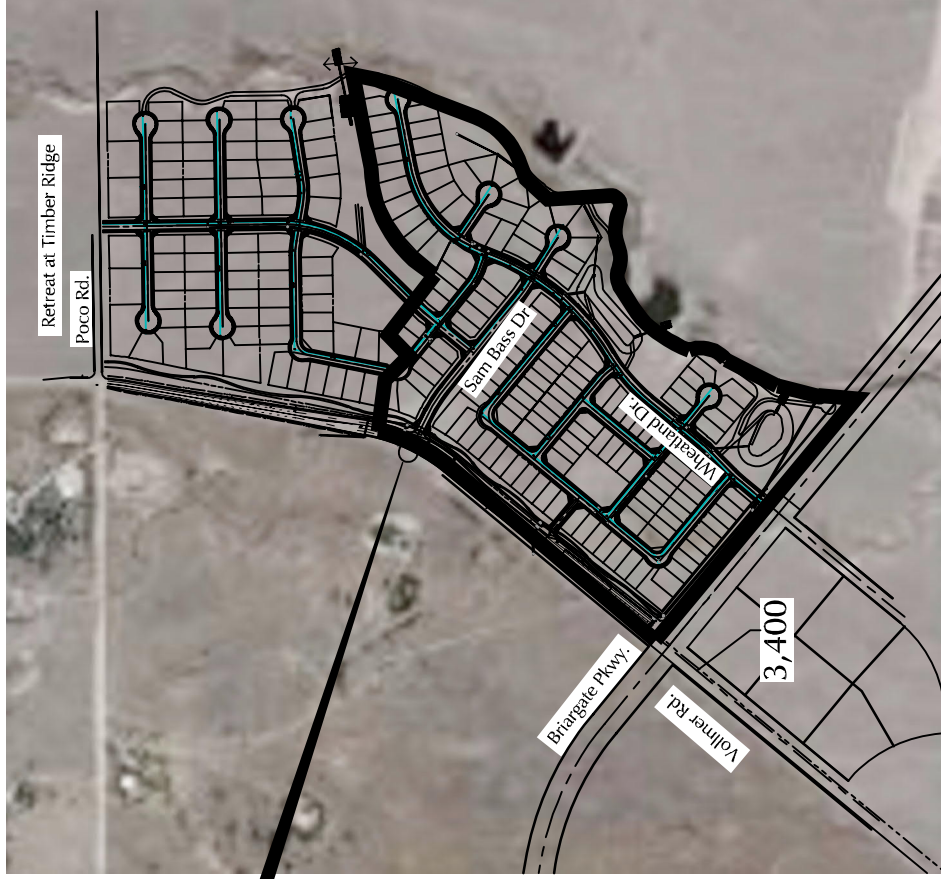
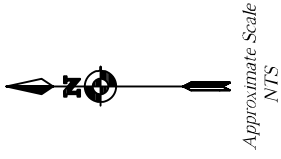
The site-generated vehicle trips were estimated using the nationally published trip-generation rates from *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 1 shows the trip-generation estimates.

Homestead North Phase 1 is projected to generate about 1,388 new external 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 27 vehicles would enter and 82 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 92 vehicles would enter and 54 vehicles would exit the site.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated traffic volumes on the street and roadway system serving the site is one of the most important factors in determining the site's traffic impacts. The specific short-term and long-term distribution estimates are shown in Figure 7. The directional distribution estimates are based on the following factors: the location of the site with respect to the Colorado Springs metropolitan area, the planned access system for the site, the street and roadway system serving the site, the land uses proposed for the site, and the distribution of existing traffic volumes at the intersection of Dines Boulevard/Vollmer. The short-term distribution estimate assumes only the short section of Briargate Parkway between Vollmer Road and Wheatland Drive has been constructed in the vicinity of the site and the long-term distribution estimate assumes full buildout of the future roadway network in the vicinity of the site.

When the distribution percentages (from Figure 7) are applied to the trip-generation estimates (from Table 1), the resulting site-generated traffic volumes can be determined. Figures 8 and 9 show the short-term and 2040 site-generated traffic volume estimate for Homestead North Phase 1. The short-term site-generated traffic volumes assume the intersection of Briargate/Wheatland as an interim full-movement intersection. The long-term site-generated traffic volumes assume the north leg of this intersection has been restricted to right-in/right-out only.



LEGEND:

- $\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour) Based on counts by LSC May 2020
- $\frac{XX}{XX}$ = PM Weekday Peak-Hour Traffic (vehicles per hour)
- XXX = Average Weekday Traffic (vehicles per day) Estimate by LSC

Note: Counts may be impacted by restrictions due to the COVID-19 pandemic.

Figure 4

Existing Traffic

Homestead North Phase 1 (LSC #204380)



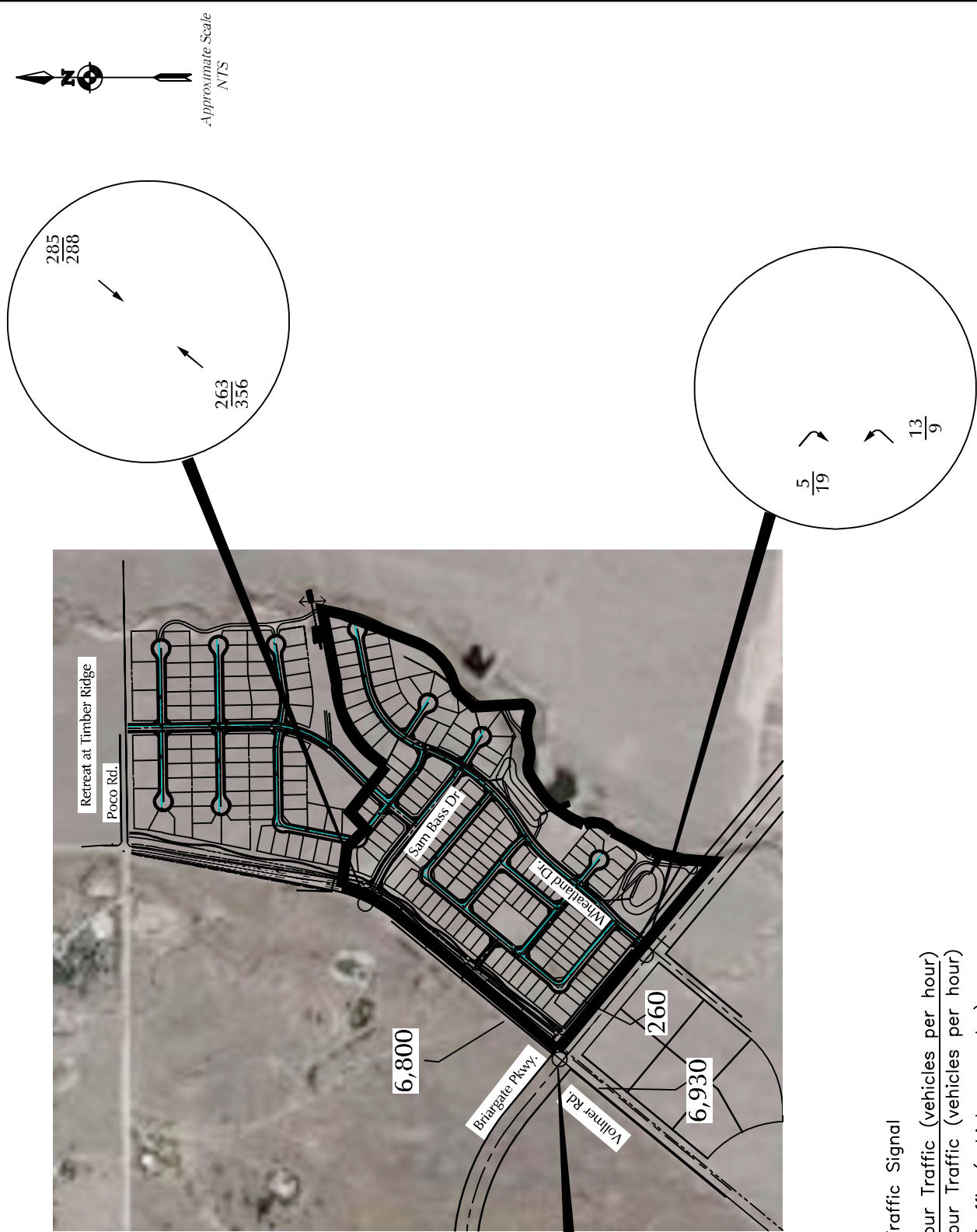
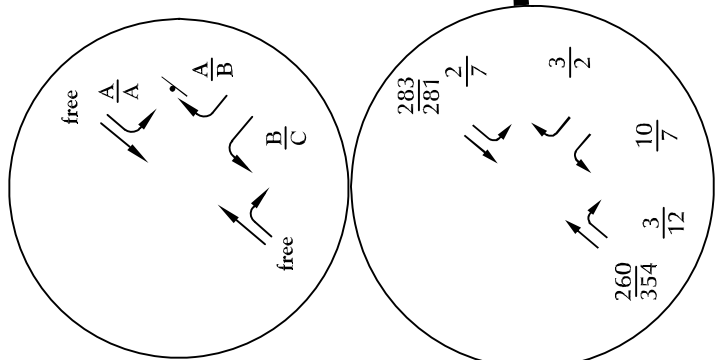


Figure 5
Short-term Background Traffic
 Homestead North Phase 1 (LSC #204380)



- 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)
 - XXX = Average Weekday Traffic (vehicles per day)
 - $\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
 - $\frac{A}{B}$ = PM Individual Movement Peak-Hour Level of Service
 - $\frac{C}{D}$ = AM Entire Intersection Peak-Hour Level of Service
 - $\frac{C}{D}$ = PM Entire Intersection Peak-Hour Level of Service



APPENDIX 2

Trip Generation Report

Detailed Land Use Data
 For 2 Storage Units (100s) of MWAREHOUSE 1
 (151) Mini-Warehouse

Open Date: 4/19/2022
 Analysis Date: 4/19/2022

Project: Vollmer RV

<u>Day / Period</u>	<u>Total Trips</u>	<u>Pass-By Trips</u>	<u>Avg Rate</u>	<u>Min Rate</u>	<u>Max Rate</u>	<u>Std Dev</u>	<u>Avg Size</u>	<u>% Enter</u>	<u>% Exit</u>	<u>Use Eq.</u>	<u>Equation</u>	<u>R2</u>
Weekday Average Daily Trips Source : Trip Generation Manual 10th Edition	36	0	17.96	12.25	33.33	4.13	5	50	50	False	$T = 18.86(X) - 4.09$	0.96
Weekday AM Peak Hour of Adjacent Street Traffic Source : Trip Generation Manual 10th Edition	3	0	1.39	0.81	1.7	0.33	6	51	49	False	$T = 1.98(X) - 3.79$	0.98
Weekday PM Peak Hour of Adjacent Street Traffic Source : Trip Generation Manual 10th Edition	4	0	1.95	0.92	8.33	1.4	5	50	50	False	$T = 1.52(X) + 2.02$	0.61

Trip Generation Summary

Alternative: Alternative 1

Phase:

Open Date: 4/19/2022

Project: Vollmer RV

Analysis Date: 4/19/2022

ITE	Land Use	Weekday Average Daily Trips			Weekday AM Peak Hour of Adjacent Street Traffic			Weekday PM Peak Hour of Adjacent Street Traffic					
		*	Enter	Exit	Total	*	Enter	Exit	Total	*	Enter	Exit	Total
151	MWAREHOUSE 1 2 Storage Units (100s)		18	18	36		2	1	3		2	2	4
Unadjusted Volume			18	18	36		2	1	3		2	2	4
Internal Capture Trips			0	0	0		0	0	0		0	0	0
Pass-By Trips			0	0	0		0	0	0		0	0	0
Volume Added to Adjacent Streets			18	18	36		2	1	3		2	2	4

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

APPENDIX 3

Synchro Report

Lanes, Volumes, Timings
3: Vollmer & Site Access

04/19/2022



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	1	0	260	1	1	283
Future Volume (vph)	1	0	260	1	1	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	1863	0	0	1863
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	1863	0	0	1863
Link Speed (mph)	20		45			45
Link Distance (ft)	200		1492			272
Travel Time (s)	6.8		22.6			4.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	0	283	1	1	308
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	0	284	0	0	309
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	25.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
3: Vollmer & Site Access

04/19/2022

Intersection						
Int Delay, s/veh	0					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	1	0	260	1	1	283
Future Vol, veh/h	1	0	260	1	1	283
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	283	1	1	308

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	594	284	0	0	284	0
Stage 1	284	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	468	755	-	-	1278	-
Stage 1	764	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	468	755	-	-	1278	-
Mov Cap-2 Maneuver	468	-	-	-	-	-
Stage 1	764	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	12.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	468	1278
HCM Lane V/C Ratio	-	-	0.002	0.001
HCM Control Delay (s)	-	-	12.7	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

Lanes, Volumes, Timings
3: Vollmer & Site Access

04/19/2022



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	1	1	354	1	1	281
Future Volume (vph)	1	1	354	1	1	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.932					
Fl _t Protected	0.976					
Satd. Flow (prot)	1694	0	1863	0	0	1863
Fl _t Permitted	0.976					
Satd. Flow (perm)	1694	0	1863	0	0	1863
Link Speed (mph)	20		45			45
Link Distance (ft)	200		1492			272
Travel Time (s)	6.8		22.6			4.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1	385	1	1	305
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	386	0	0	306
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
3: Vollmer & Site Access

04/19/2022

Intersection						
Int Delay, s/veh	0					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	1	1	354	1	1	281
Future Vol, veh/h	1	1	354	1	1	281
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	1	385	1	1	305

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	693	386	0	0	386	0
Stage 1	386	-	-	-	-	-
Stage 2	307	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	409	662	-	-	1172	-
Stage 1	687	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	409	662	-	-	1172	-
Mov Cap-2 Maneuver	409	-	-	-	-	-
Stage 1	687	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	506	1172
HCM Lane V/C Ratio	-	-	0.004	0.001
HCM Control Delay (s)	-	-	12.1	8.1
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

Lanes, Volumes, Timings
3: Vollmer & Site Access

04/19/2022



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	1	0	146	1	1	342
Future Volume (vph)	1	0	146	1	1	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.999					
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	1861	0	0	1863
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	1861	0	0	1863
Link Speed (mph)	20		50		50	
Link Distance (ft)	200		1492		272	
Travel Time (s)	6.8		20.3		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	0	159	1	1	372
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	0	160	0	0	373
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0		0	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
3: Vollmer & Site Access

04/19/2022

Intersection						
Int Delay, s/veh	0					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	1	0	146	1	1	342
Future Vol, veh/h	1	0	146	1	1	342
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	0	159	1	1	372

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	534	160	0	0	160	0
Stage 1	160	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	507	885	-	-	1419	-
Stage 1	869	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	506	885	-	-	1419	-
Mov Cap-2 Maneuver	506	-	-	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	695	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	506	1419
HCM Lane V/C Ratio	-	-	0.002	0.001
HCM Control Delay (s)	-	-	12.1	7.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

Lanes, Volumes, Timings
3: Vollmer & Site Access

04/19/2022



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	1	1	447	1	1	236
Future Volume (vph)	1	1	447	1	1	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932					
Flt Protected	0.976					
Satd. Flow (prot)	1694	0	1863	0	0	1863
Flt Permitted	0.976					
Satd. Flow (perm)	1694	0	1863	0	0	1863
Link Speed (mph)	20		50		50	
Link Distance (ft)	200		1492		272	
Travel Time (s)	6.8		20.3		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1	486	1	1	257
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	487	0	0	258
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0		0	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
3: Vollmer & Site Access

04/19/2022

Intersection						
Int Delay, s/veh	0					
Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	1	1	447	1	1	236
Future Vol, veh/h	1	1	447	1	1	236
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	1	486	1	1	257

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	746	487	0	0	487	0
Stage 1	487	-	-	-	-	-
Stage 2	259	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	381	581	-	-	1076	-
Stage 1	618	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	381	581	-	-	1076	-
Mov Cap-2 Maneuver	381	-	-	-	-	-
Stage 1	618	-	-	-	-	-
Stage 2	783	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NERNWLn1	SWL	SWT
Capacity (veh/h)	-	-	460	1076
HCM Lane V/C Ratio	-	-	0.005	0.001
HCM Control Delay (s)	-	-	12.9	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

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