Valley Center Road Corridor Concept Plan

Appendix A: Vehicular, Pedestrian, Bicycle, and Transit Analysis

1 Vehicular Analysis

Through various outreach and coordination efforts, the project team considered stakeholder input and additional analysis in developing the Valley Center Road Corridor Concept Plan (VCRCCP). The following explains the vehicular analysis process, including the evaluation of the VCRCCP per Level of Service (LOS) analysis guidelines. These analyses were conducted to look at existing traffic count data and forecasted traffic for a potential buildout year of 2035. Looking at those two timeframes, analysis outputs are provided based on the existing configuration of the corridor and per the VCRCCP, for comparison. LOS thresholds for road segments are established through the County of San Diego *Public Road Standards*. The *Public Road Standards* do not yet differentiate road segment LOS capacity based on the intersection control type (roundabout, traffic signal, or stop sign-controlled). Intersection LOS was analyzed using Sidra Intersection, which is a software package commonly used for transportation analysis, including intersection capacity.

1.1 METHODOLOGY

Vehicle Miles Traveled

As part of the California Environmental Quality Act (CEQA), Senate Bill (SB) 743 requires transportation impacts be evaluated based on vehicle miles traveled (VMT). Based on the County of San Diego's *Transportation Study Guidelines* (September 2022) certain types of projects do not require VMT analysis including, but not limited to, the following:

- Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets and that do not add additional motor vehicle capacity;
- Installation of roundabouts or traffic circles;
- Installation or reconfiguration of traffic calming devices;
- Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public right-of-way;
- Addition of Class I bike paths, trails, or multi-use paths, or other off-road facilities that serve non-motorized travel.

Therefore, a VMT analysis has not been included in this assessment.

Roadway Segment Analysis Methodology

The basis for roadway segment analysis is the ratio of daily volumes to LOS thresholds according to roadway classifications. The analysis results provide a planning-level assessment of whether a segment is under, approaching, or over capacity. **Table 1** presents the roadway segment capacity and LOS standards contained in the County of San Diego *Public Road Standards*. ADT in the table stands for Average Daily Traffic.

Table 1: Level of Service Criteria for Roadway Segments

Mobility Element Roads			Levels of Service (in ADT)				
Road Classification		Travel Lanes	A	B	C	D	E
Expressway (6.1)		6	<36,000	<54,000	<70,000	<86,000	<108,000
Prime Arterial (6.2)		6	<22,200	<37,000	<44,600	<50,000	<57,000
Major Road	w/ Raised Median (4.1A)	4	<14,800	<24,700	<29,600	<33,400	<37,000
	w/ Intermittent Turn Lanes (4.1B)		<13,700	<22,800	<27,400	<30,800	<34,200
Boulevard	w/ Raised Median (4.2A)	4	<18,000	<21,000	<24,000	<27,000	<30,000
	w/ Intermittent Turn Lanes (4.2B)		<16,800	<19,600	<22,500	<25,000	<28,000
Community Collector	w/ Raised Median (2.1A)	2	<10,000	<11,700	<13,400	<15,000	<19,000
	w/ Continuous Left Turn Lane (2.1B)		<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lanes (2.1C)		<3,000	<6,000	<9,500	<13,500	<19,000
	W/ Passing Lane (2.1D)		<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.1E)		<1,900	<4,100	<7,100	<10,900	<16,200
Light Collector	w/ Raised Median (2.2A)	2	<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Continuous Left Turn Lane (2.2B)		<3,000	<6,000	<9,500	<13,500	<19,000
	w/ Intermittent Turn Lanes (2.2C)		<3,000	<6,000	<9,500	<13,500	<19,000
	W/ Passing Lane (2.2D)		<3,000	<6,000	<9,500	<13,500	<19,000
	No Median (2.2E)		<1,900	<4,100	<7,100	<10,900	<16,200
	w/ Reduced Shoulder (2.2F)		<5,800	<6,800	<7,800	<8,700	<9,700
Minor Collector	w/ Raised Median (2.3A)	2	<3,000	<6,000	<7,000	<8,000	<9,000
	w/ Intermittent Turn Lanes (2.3B)		<3,000	<6,000	<7,000	<8,000	<9,000
	No Median (2.3C)		<1,900	<4,100	<6,000	<7,000	<8,000
Non-Mobility Element Roads			**Levels of Service (in ADT)**				
Road Classification		**Travel Lanes**	**A**	**B**	**C**	**D**	**E**
Residential Collector		2	-	-	<4,500	-	-
Rural Residential Collector		2	-	-	<4,500	-	-
Residential Road		2	-	-	<1,500	-	-
Rural Residential Road		2	-	-	<1,500	-	-
Residential Cul-de-Sac or Loop Road		2	-	-	<200	-	-

Source: County of San Diego, *Public Roads Standards* (March 2012).

Intersection Analysis Methodology

LOS is commonly used as a qualitative description of intersection operation. The intersection analysis conforms to the operational analysis methodology outlined the *Highway Capacity Manual (HCM) 6th Edition* and performed utilizing the *Synchro 10* and *Sidra 9* traffic analysis software.

The HCM analysis methodology describes the operation of an intersection using a range of level of service from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding stopped delay, in terms of seconds per vehicle (sec/veh). The criteria for the LOS grade designations are provided in **Table 2.**

Synchro reports average delays for a signalized intersection, which correspond to a particular LOS, to describe the overall operation of an intersection. Unsignalized intersection LOS for all-way stops is based on the average delay for all approaches. Delay for one-way or two-way stop-controlled intersections is based on available gaps in traffic flow on the non-controlled approach and LOS is based on the approach with the worst delay. Sidra reports average delays to determine LOS for roundabouts.

Table 2: Level of Service Criteria for Intersections

LOS	Control Delay (seconds/vehicle)		Description
	Signalized Intersections	Unsignalized & Roundabouts	
A	<10	<10	Operations with very low delay and most vehicles do not stop.
B	>10 and ≤20	>10 and ≤15	Operations with good progression but with some restricted movements.
C	>20 and ≤35	>15 and ≤25	Operations where a significant number of vehicles are stopping with some backup and light congestion.
D	>35 and ≤55	>25 and ≤35	Operations where congestion is noticeable, longer delays occur, and many vehicles stop. The proportion of vehicles not stopping declines.
E	>55 and ≤80	>35 and ≤50	Operations where there is significant delay, extensive queuing, and poor progression.
F	>80	>50	Operations that are unacceptable to most drivers, when the arrival rates exceed the capacity of the intersection.

Source: *Highway Capacity Manual, 6th Edition*

Traffic Volumes

Existing Conditions

Traffic count data was collected in 2019. This data was used to establish a baseline operating condition for the corridor. **Figure 1** illustrates the existing conditions daily and peak hour volumes used in this analysis.

Future Conditions

In order to derive baseline future year 2035 traffic volumes, the daily traffic volumes from the SANDAG Series 14 regional travel demand forecasting model (Series 14 model) used for the regional transportation plan were provided by SANDAG. This data was used to establish a forecast growth rate that was applied to existing traffic volumes for each roadway segment and study intersection along the Valley Center Road corridor.

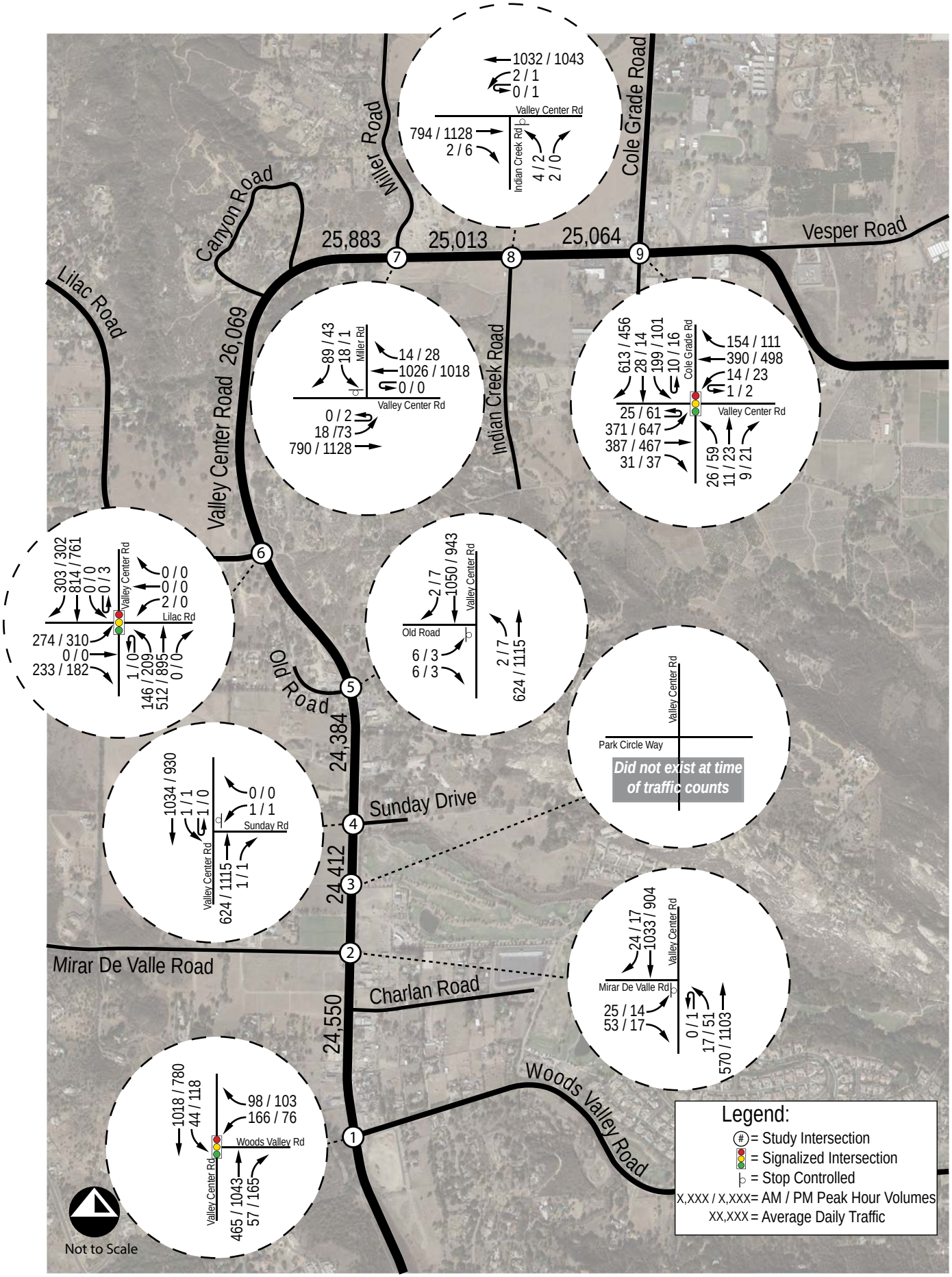
In addition, traffic associated with two approved developments that take access from Valley Center Road in the South Village were added to the forecast model traffic volumes based on trip generation and assignment information available from their respective traffic studies.

The following is a description of the projects added to the forecast growth along the corridor:

- Park Circle (Darnell & Associates, TIA dated December 2016)
    - Mixed use development with 33,700 square feet of neighborhood commercial, 232 multi-family dwelling units, and 101 single family dwelling units
    - Located on the west side of Valley Center Road north Mirar De Valle Road
    - Estimated trip generation of 6,188 daily trips with 419 AM peak hour trips & 550 PM peak hour trips

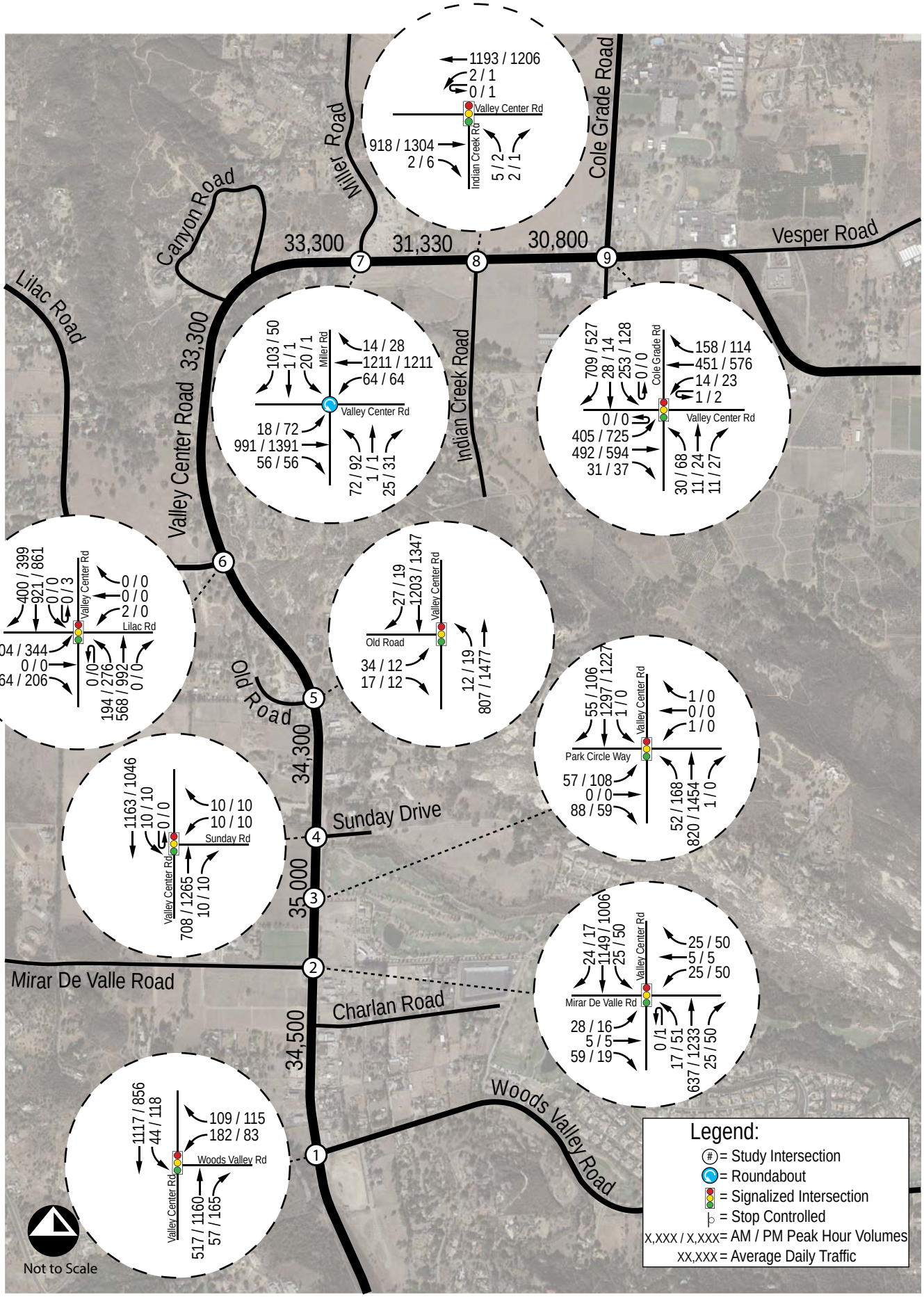
- Liberty Bell Plaza (Linscott, Law & Greenspan, TIA dated July 2019)
    - 85,000 square feet neighborhood shopping center
    - Located on the northeast corner of Valley Center Road and Mirar De Valle Road
    - Estimated trip generation of 7,956 daily trips with 318 AM peak hour trips & 612 PM peak hour trips

Future year 2035 traffic volumes calculated for the corridor and used to evaluate future operating conditions are provided in **Figure 2**.



Existing AM/PM Peak Hour Volumes, Daily Traffic Volumes with Existing Geometry and Traffic Control

Figure 1



Future Forecast 2035 AM/PM Peak Hour Volumes, Daily Traffic Volumes with VCRCCP Geometry and Traffic Control

Figure 2

1.2 ROADWAY SEGMENT ANALYSIS

Improvements proposed as part of the VCRCCP can primarily be constructed within the existing right-of-way. The existing curb-to-curb width of Valley Center Road will not be changed with the exception the additional right-of-way that would be obtained to construct the roundabout. Adding a raised median to the roadway segments that are currently constructed with a striped center median, would support the anticipated future capacity needs of the corridor. The addition of the raised median would change the "as constructed" classification from Boulevard with Intermittent Turn Lanes (2.4B) to Boulevard with Raised Median (4.2A), with an increased capacity from 27,000 vehicles per day to 30,000 vehicles per day. **Table 3** summarizes the roadway segment level of service for existing and future forecast year 2035 without and with the improvements proposed in the VCRCCP.

Table 3: Roadway Segment Level of Service Summary

Roadway	Segment	No. Lanes	Median Type	Roadway Classification [1]	LOS E Capacity	Existing		Future Year 2035	
						ADT	LOS	ADT	LOS
Existing Roadway Classification									
Valley Center Road	Woods Valley Road to Mirar de Valle Road	4	Undivided	Boulevard - 4.2B (w/ intermittent turn lanes)	28,000	24,550	D	34,500	F
	Mirar De Valle Road to Sunday Drive	4	Divided	Boulevard - 4.2B (w/ intermittent turn lanes)	28,000	24,412	D	35,000	F
	Sunday Drive to Lilac Road	4	Divided	Boulevard - 4.2B (w/ intermittent turn lanes)	28,000	24,384	D	34,300	F
	Lilac Road to Canyon Road	4	Divided	Major Road - 4.1A (w/ raised median)	37,000	26,069	C	33,300	D
	Canyon Road to Miller Road	4	Divided	Major Road - 4.1A (w/ raised median)	37,000	25,883	C	33,300	D
	Miller Road to Indian Creek Road	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	25,013	D	31,300	F
	Indian Creek Road to Cole Grade Road	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	25,064	D	30,800	F
With VCRCCP									
Valley Center Road	Woods Valley Road to Mirar de Valle Road	4	Undivided	Boulevard - 4.2A (w/ raised median)	30,000	24,550	D	34,500	F
	Mirar De Valle Road to Sunday Drive	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	24,412	D	35,000	F
	Sunday Drive to Lilac Road	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	24,384	D	34,300	F
	Lilac Road to Canyon Road	4	Divided	Major Road - 4.1A (w/ raised median)	37,000	26,069	C	33,300	D
	Canyon Road to Miller Road	4	Divided	Major Road - 4.1A (w/ raised median)	37,000	25,883	C	33,300	D
	Miller Road to Indian Creek Road	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	25,013	D	31,300	F
	Indian Creek Road to Cole Grade Road	4	Divided	Boulevard - 4.2A (w/ raised median)	30,000	25,064	D	30,800	F

Notes:
[1]Based on San Diego County General Plan, Valley Center Mobility Element Network Appendix. The Woods Valley Road to Mirar De Valle Road segment and the Sunday Drive to Lilac Road segment are currently built as Boulevard with intermittent turn lanes (4.2B), but the VCRCCP would bring these segments in line with the current Mobility Element Network planned classification of Boulevard with raised median (4.2A).
ADT = Average Daily Traffic
LOS = Level of Service

While the addition of the raised median does provide additional capacity along the corridor, the forecast traffic volume will exceed the capacity of the Boulevard classification. The future year 2035 condition results in LOS F conditions along all segments classified as Boulevard with Raised Median (4.2A), which includes the segments from Woods Valley Road to Lilac Road and Miller Road to Cole Grade Road). The capacity thresholds are set by the *County Public Road Standards*, which do not currently consider the positive effects of certain intersection controls (such as roundabouts) on traffic delay. The roundabout proposed would allow the North Village to avoid traffic congestion conditions typically associated with failing LOS.

Note that roadway segment LOS is generally used as a long-range planning guideline to determine the roadway capacity and classifications and are not always an accurate indicator of roadway performance. Typically, the performance and level of service of a roadway segment is heavily influenced by the ability of signalized intersections to accommodate peak hour flow. Therefore, peak hour operating conditions along the Valley Center Road corridor were evaluated.

1.3 INTERSECTION ANALYSIS

In April 2019, an *Existing Conditions Technical Memorandum* (found in Appendix I) was completed. As part of the analysis of the VCRCCP, the study area was expanded to include two additional intersections shown below in **bold**.

1. Valley Center Road / Woods Valley Road
2. Valley Center Road / Mirar De Valle Road
3. **Valley Center Road / Park Circle Way**
4. Valley Center Road / Sunday Drive
5. **Valley Center Road / Old Road**
6. Valley Center Road / Lilac Road
7. Valley Center Road / Miller Road
8. Valley Center Road / Indian Creek Road
9. Valley Center Road / Cole Grade Road

In order to determine the intersection operating conditions with the VCRCCP, the existing traffic volumes were evaluated with the intersection control included in the VCRCCP. **Table 4** summarizes the results of the existing conditions intersection analysis without and with the VCRCCP.

Under existing conditions, the intersection analysis showed all the study locations operate at acceptable LOS in the AM peak hour and two of the 9 study locations operate at LOS E or F during the PM peak hour with the signals and stop control that was in place at the time the traffic count data was collected. These include the unsignalized intersections of Valley Center Road / Mirar De Valle Road and Valley Center Road / Sunday Drive. With the VCRCCP and the existing traffic volumes, all the study locations are shown to operate at LOS C or better in the AM and PM peak hours.

Table 4: Modeled Intersection Performance Comparison of Existing Traffic Control and Final Valley Center Road Corridor Concept Plan – Based on Existing Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With Draft Final CCP		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.5 - A	9.0 - A	Signal	7.5 - A	9.0 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	29.7 - D	**45.2 - E**	Signal	11.4 - B	13.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	3.4 - A	3.7 - A	Signal	3.4 A	3.7 A
4-	Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**	Signal	4.2 - A	4.7 - A
5-	Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D	Signal	5.4 - A	5.6 - A
6-	Valley Center Road / Lilac Road	Signal	17.5 - B	13.5 - B	Signal	18.2 - B	14.0 - B
7-	Valley Center Road / Miller Road	STOP	27.3 - D	15.2 - C	Roundabout	7.8 - A	10.0 - A
8-	Valley Center Road / Indian Creek Road	STOP	16.9 - C	26.1 - D	Signal	6.4 - A	6.6 - A
9-	Valley Center Road / Cole Grade Road	Signal	31.3 - C	33.5 - C	Signal	27.1 - C	34.5 - C

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP) Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout STOP Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

Table 5 summarizes the results of the intersection analysis under future year 2035 without and with the VCRCCP conditions. As shown, the following locations are shown to operate at deficient levels of service by year 2035 with the existing intersection traffic control (signal and stop signs):

- Int 2 – Valley Center Road / Mirar De Valle Road (LOS E during AM peak hour; LOS F during PM peak hour)
- Int 4 – Valley Center Road / Sunday Drive (LOS F during the PM peak hour only)
- Int 5 – Valley Center Road / Old Road (LOS F during the AM & PM peak hours)
- Int 7 – Valley Center Road / Miller Road (LOS E during the AM peak hour only)

With the VCRCCP, intersection delays are reduced such that all study intersections are forecast to operate at LOS D or better in year 2035.

Table 5: Modeled Intersection Performance Comparison of Existing Traffic Control and Final Valley Center Road Corridor Concept Plan - Based on Future Year 2035 Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With Draft Final CCP		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.8 - A	10.0 - A	Signal	7.8 - A	10.0 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	**42.5 - E**	**70.8 - F**	Signal	15.1 - B	15.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	12.8 - B	18.4 - B	Signal	12.8 - B	6.7 - A
4-	Valley Center Road / Sunday Drive	STOP	32.7 - D	**72.9 - F**	Signal	5.6 - A	5.1 - A
5-	Valley Center Road / Old Road	STOP	**1338.7 - F**	**214.2 - F**	Signal	8.6 - A	6.3 - A
6-	Valley Center Road / Lilac Road	Signal	26.7 - C	20.5 - C	Signal	26.7 - C	19.4 - B
7-	Valley Center Road / Miller Road	STOP	**45.3 - E**	17.4 - C	Roundabout	9.0 - A	11.6 - B
8-	Valley Center Road / Indian Creek Road	STOP	19.8 - C	32.0 - D	Signal	6.5 - A	8.5 - A
9-	Valley Center Road / Cole Grade Road	Signal	42.2 - D	47.7 - D	Signal	40.2 - D	47.3 - D

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP) Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout STOP Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

1.4 TRAFFIC SIGNAL WARRANTS

Traffic signal warrants provide criteria to determine whether installation of a traffic signal is justified at a particular location using methodology outlined in the *MUTCD-CA*. Although a traffic signal warrant provides justification for installation of a traffic signal, other factors may also be considered including access, circulation, and connectivity in the community. Therefore, it is possible that a traffic signal may be installed that does not meet the *MUTCD-CA* warrants if the traffic signal improves safety, improves access, or serves as part of a corridor-wide traffic control strategy.

The *MUTCD-CA* provides several detailed warrants by which an intersection can be evaluated. Since this VCRCCP is a planning document, the detailed warrant analysis was not conducted but rather the planning level warrant was evaluated. The planning level warrant is based on daily traffic thresholds and used to provide a high level assessment whether the signals could meet the detailed warrants based on the existing or future daily traffic volumes through the intersection.

As shown in **Table 6**, none of the traffic signals identified in the VCRCCP meet the planning level warrant as outlined in the *MUTCD-CA* under existing conditions. Only the signals for the Old Road and Sunday Drive intersections are newly proposed with the VCRCCP. Under future year 2035 conditions, the planning level warrant is met for the intersection of Valley Center Road / Mirar De Valle Road. As mentioned in this report, the traffic count data was collected prior to the buildout

of the Park Circle development and did not include the traffic signal constructed in 2021 at the Park Circle Way intersection.

During final design of the corridor, new traffic count data should be collected for the corridor and detailed warrants should be conducted prior to installing the signals.

Table 6: Traffic Signal Warrants

Study Intersection		Planning Warrant			
		Existing Conditions		Forecast Year 2035 Conditions	
		Major/Minor ADT Volume	Warrant Met?	Major/Minor ADT Volume	Warrant Met?
2-	Valley Center Road / Mirar De Valle Road[1, 2]	24,400 / 780	No	35,000 / 870	YES
3-	Valley Center Road / Park Circle Way[1]	Constructed in 2021			
4-	Valley Center Road / Sunday Drive[1]	24,400 / 600	No	35,000 / 700	No
5-	Valley Center Road / Old Road[1]	24,800 / 100	No	34,300 / 120	No
8-	Valley Center Road / Indian Creek Road	25,000 / 100	No	31,300 / 120	No

[1] The existing conditions data collection occurred prior to the buildout of the Park Circle.

[2] At the time of this analysis, the Mirar De Valle signal was not constructed, but was expected to be constructed by the end of 2024.

2 Pedestrian Analysis

The project team analyzed pedestrian conditions along the corridor as part of the existing conditions phase of analysis. This section references that analysis of existing conditions and provides an analysis of pedestrian conditions that would be assumed upon implementation of the VCRCCP.

2.1 METHODOLOGY

A Pedestrian Gap Analysis (PGA) was included in the *Existing Conditions Technical Memorandum* (found in Appendix I) which analyzed the pedestrian facilities within the study area using the methodology outlined in the County of San Diego *Active Transportation Plan (ATP)*. A PGA is a qualitative pedestrian survey that assesses the quality of the walking environment along roadway segments and intersections. Pedestrian facilities are assigned a "Pedestrian Quality" grade based on the point system developed in the PGA. The PGA Criteria includes:

- The condition of sidewalk/pathway and associated characteristics such as obstructions, slope, grade, and curb ramp configuration (25 percent = 1,000 points);
- Distance from pedestrian generators (25 percent = 1,000 points);
- Health data supplied by the County Health and Human Services Agency (25 percent = 1,000 points);
- Socioeconomic data supplied by County Health and Human Services Agency (10 percent = 400 points);
- County Public Works / Capital Improvement Program project list (10 percent = 400 points); and
- Proximity to schools (5 percent = 200 points).

The evaluation of the existing condition of the sidewalk and paths was refined to focus on the critical conditions along the corridor including obstructions, sidewalk condition, driveway conditions, presence of curb ramps, and other factors. The physical conditions evaluated are clearly described in the *Existing Conditions Technical Memorandum*. The total points of individual street segments within the study area provide a comparison ranking utilizing weight allocation based on the six ranking factors stated above. Each street segment's points scored are displayed in color brackets based on the color-coding point brackets displayed in the PGA. The color bracket point ranges are presented on **Table 7**.

Table 7: Pedestrian Gap Analysis Point Ranges

Color Code	Pedestrian Quality	Point Range
	Very Good	215 - 627
	Good	628 - 1191
	Average	1192 - 1535
	Poor	1536 - 1824

2.2 ANALYSIS RESULTS

Out of the 28 segments analyzed along Valley Center Road summarized in **Table 8**, The PGA rates seven segments as very good, eight segments as good, 10 segments as average, and three segments as poor. The three segments that were rated poor include the east side of Valley Center Road from Charlan Road to Mirar De Valle Road, from Indian Creek Road to Old Town Center Plaza western boundary, and from Old Town Center Plaza eastern boundary to Cole Grade Road in the eastbound direction. There are no existing sidewalks, trails, or pedestrian facilities on these segments.

The quality of the existing marked crossings along and across Valley Center Road was evaluated by reviewing crosswalk amenities, design type and type of markings as shown in **Table 9** per the PGA methodology in the *ATP*. Marked crosswalks along the corridor are only provided at signalized intersections and at a limited number of side street stop-controlled intersections. As shown, the signalized intersection crosswalk locations are rated strong and the four unsignalized locations are rated as needs improvement due to the lack of crosswalks along side streets. Marked crossings across Valley Center Road are more than half a mile apart making crossing Valley Center Road challenging for pedestrians.

The VCRCCP includes elements that will improve pedestrian access, visibility and connectivity including connecting the numerous gaps in the sidewalk, constructing curb extensions to reduce the crossing distance, and striping continental crosswalks. New traffic signals will include improved pedestrian crossing amenities such as count-down timers, ADA pedestrian ramps with truncated domes, and oversized pedestrian push buttons. The existing Heritage Trail will remain on the north and west sides of the road through the corridor.

Table 8: Pedestrian Conditions without and with Concept Plan

Segment		Existing Conditions				With VCRCCP			
		East / South Side of Valley Center Rd.		West / North Side of Valley Center Rd.		East / South Side of Valley Center Rd.		West / North Side of Valley Center Rd.	
		Total Score	Rating	Total Score	Rating	Total Score	Rating	Total Score	Rating
Valley Center Road	Woods Valley Road to Charlan Road	1150	Good	901	Good	1139	Good	897	Good
	Charlan Road to Mirar De Valle Road	1646	Poor	1286	Average	1441	Average	1221	Average
	Mirar De Valle Road to 27634 Valley Center Road Driveway	1269	Average	1242	Average	1205	Average	1179	Good
	27634 Valley Center Road Driveway to Sunday Drive	601	Very Good	286	Very Good	312	Very Good	221	Very Good
	Sunday Drive to Old Road	685	Good	375	Very Good	441	Very Good	307	Very Good
	Old Road to Lilac Road	879	Good	769	Good	709	Good	769	Good
	Lilac Road to Valley Center Road bridge (S)	667	Good	1043	Good	488	Very Good	1020	Good
	Valley Center Road bridge(S) to Valley Center Road bridge(N)	392	Very Good	177	Very Good	288	Very Good	175	Very Good
	Valley Center Road bridge (N) to Canyon Road (N)	464	Very Good	376	Very Good	288	Very Good	360	Very Good
	Canyon Road (N) to Miller Road	596	Very Good	1127	Good	360	Very Good	1127	Good
	Miller Road to Indian Creek Road	552	Very Good	707	Good	383	Very Good	629	Good
	Indian Creek Road to Old Town Center Plaza west boundary	1596	Poor	1375	Average	1355	Average	1307	Average
	Old Town Center Plaza west boundary to east boundary	1338	Average	1398	Average	1203	Average	1245	Average
	Old Town Center Plaza east boundary to Cole Grade Road	1712	Poor	1424	Average	1409	Average	1409	Average

Note: Scores were derived from existing conditions observed in December 2018.

Table 9: Existing Intersection Crosswalk Evaluation

Study Intersection		Existing Conditions			With VCRCCP		
		Traffic Control	Score	Rating	Traffic Control	Score	Rating
1 -	Valley Center Road / Woods Valley Road	Signal	4	Strong	Signal	4	Strong
2 -	Valley Center Road / Mirar De Valle Road	OWSC	74	Needs Improvement	Signal	4	Strong
3 -	Valley Center Road / Sunday Drive	OWSC	74	Needs Improvement	Signal	4	Strong
4 -	Valley Center Road / Lilac Road	Signal	4	Strong	Signal	4	Strong
5 -	Valley Center Road / Miller Road	OWSC	74	Needs Improvement	Roundabout	9	Strong
6 -	Valley Center Road / Indian Creek Road	OWSC	74	Needs Improvement	Signal	4	Strong
7 -	Valley Center Road / Cole Grade Road	Signal	4	Strong	Signal	4	Strong

Note: Scores were derived from existing conditions observed in December 2018.
OWSC = One Way Stop Control

3 Bicycle Analysis

Like the preceding analysis of pedestrian conditions, this section summarizes existing conditions analysis for bicycle facilities along the corridor and connects that to bicycle facility conditions that would be assumed upon implementation of the VCRCCP.

3.1 METHODOLOGY

Existing bicycle facilities were examined in the *Existing Conditions Technical Memorandum* using a level of traffic stress (LTS) analysis, which is a qualitative measure that assesses a bicyclist's level of discomfort or stress based on the quality of the bicycle environment and provided facilities. The LTS scoring criteria range from LTS 1 (most comfortable, least stressful) to LTS 4 (least comfortable, most stressful) and is consistent with the methodology outlined in the *ATP*. The four types of cyclists range from "no way no how," representing individuals who are not interested in biking, to "strong and fearless," which represents the most active and confident cyclists. People in the "interested but concerned" category, which represents approximately 60% of all bicycling activity, typically prefer to ride along facilities classified as LTS 1 or LTS 2. These facilities are physically separated from vehicular traffic with dedicated lanes for bicycling and minimal conflict points.

People in the "enthused and confident" category, representing 7% of all bicycling activity, feel comfortable bicycling along a facility with an LTS 3 or better. People in the "strong and fearless" category represent less than 1% of bicycling activity who may tolerate bicycling along an LTS 4 facility, as they are the most experienced and confident. These bicyclists are generally seasoned bicycle commuters or recreational cyclists. Those in the "no way no how" population segment will not ride a bicycle no matter how comfortable the facility is.

LTS analysis traditionally considers existing facilities—such as bike lanes, bike paths, bike routes, and any provided separation from vehicles. The data used included the number of lanes in each direction, presence and type of bicycle facility, presence and type of median, speed, and functional class of the roadway. **Table 10** summarizes the criteria for roadways with a Class I or Class II bike facility as defined in the *ATP*.

Table 10: Level of Traffic Stress Criteria for Roadways with Bicycle Facilities

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street Width (through lanes per direction)	1-2	2 if directions are separated by a raised/striped median	More than 2 or 2 without a raised/striped median	(no effect)
Bike Facility Type	Class I	Class II	(no effect)	(no effect)
Speed	<35 mph (unless Class I or Class IV)	(no effect)	35 mph	40 mph or more

3.2 ANALYSIS RESULTS

As shown in **Table 11**, the existing bicycle facilities along Valley Center Road result in a high level of bicycle stress (LTS 4) primarily attributed to the high vehicle speeds along the corridor. LTS 4 indicates that most confident bicyclists (categorized as the “strong and fearless”) would likely use the facility and less experienced or less confident bicyclists may not feel comfortable riding along Valley Center Road.

The VCRCCP will include elements that will improve the bicycle facilities within the corridor for all levels of bike user (LTS1 - LTS4) including the addition of a Class IV separated bikeway along the entire length of the corridor, adding green conflict striping (dashed green) across driveways and approaching intersections to raise awareness of potential cyclists, and adding transitional striping (solid green) in advance of intersections and driveways to indicate potential bicycle-vehicle conflict areas. At the roundabout, bike ramps will allow cyclists who do not feel comfortable traveling with vehicles through the roundabout to exit the roadway onto a multi-use path and ride around the perimeter of the roundabout outside of the vehicular travel lanes. Bicyclists can then re-enter the Class IV separated bikeway on the other side of the roundabout.

Table 11: Level of Traffic Stress (LTS) Summary

Roadway	Segment	No. Lanes	Facility Type	Roadway Classification	Posted Speed Limit (mph)	Dir.	Existing Conditions		With VCRCCP		
							LTS Score	Suitable for	Prop. Facility Type	LTS Score	Suitable for
Valley Center Road	Woods Valley Road to Mirar De Valle Road	4	Class II	Boulevard - 4.2A (w/ rasied median)[1]	45	NB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						SB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Mirar De Valle Road to Sunday Drive	4	Class II	Boulevard - 4.2A (w/ raised median)[1]	45	NB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						SB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Sunday Drive to Lilac Road	4	Class II	Boulevard - 4.2A (w/ raised median)[1]	45	NB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						SB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Lilac Road to Canyon Road	4	Class II	Major Road - 4.1A (w/ raised median)	45	NB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						SB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Canyon Road to Miller Road	4	Class II	Major Road - 4.1A (w/ raised median)	45	EB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						WB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Miller Road to Indian Creek Road	4	Class II	Boulevard - 4.2A (w/ raised median)	45	EB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						WB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
	Indian Creek Road to Cole Grade Road	4	Class II	Boulevard - 4.2A (w/ raised median)	45	EB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident
						WB	4	Strong and Fearless	Class IV	1	Interested but Concerned / Enthused and Confident

Notes:

[1] Based on San Diego County General Plan, Valley Center Mobility Element Network Appendix. The Woods Valley Road to Mirar De Valle Road segment and the Sunday Drive to Lilac Road segment are currently built as Boulevard with intermittent turn lanes (4.2B), but the VCRCCP would bring these segments in line with the current Mobility Element Network planned classification of Boulevard with raised median (4.2A).

4 Transit Assessment

North County Transit District (NCTD) operates the local bus service along Valley Center Road. As shown in **Figure 3,** NCTD's Route 388 travels along Valley Center Road between the Pala Casino and the Escondido Transit Center, connecting Pala, Rincon, Valley Center and Escondido. The Escondido Transit Center provides regional connections to ten other transit services, four FLEX routes, two MTS routes, SPRINTER, Greyhound, and Riverside Transit Authority (RTA).

Table 12 shows the existing amenities at the 11 bus stops within the study area.

A complete assessment of the existing amenities at the bus stop locations within the study area was included in the *Existing Conditions Technical Memorandum*.

Suggestions for improvements at bus stops include:

- New shelters
- New benches
- Additional trash receptacles
- Better safety lighting

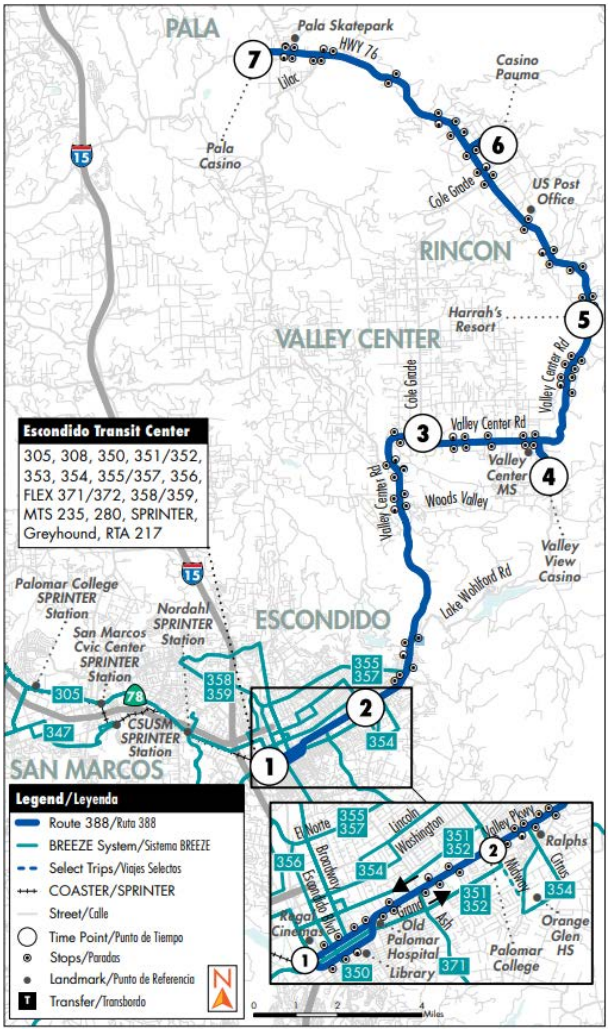


Figure 3: NCTD Route 388; Effective April 4, 2021

Table 12 also summarizes the opportunity areas for improving the available amenities and the bus stops to be relocated. These potential relocations are in consideration of best practices under ideal implementation circumstances (e.g., a County-initiated implementation project). The bus stop relocations are not required for VCRCCP consistency but may be considered during implementation coordination with the North County Transit District (NCTD), the operator of a bus route along the corridor.

Table 12: Suggestions for Bus Stop Amenities and Relocation

Stop Location (Direction)	Relocate Bus Stop?	Shelter	Bench	Trash Receptacle	Sign	Map	Lighting	Currently ADA Compliant
Woods Valley Road (NB)	Existing Location OK. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	✓	R	✓	✓	Yes
Mirar De Valle Road (NB)	Move from south to north side of intersection. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	✓	R	✓	✓	Yes
Old Road (NB)	Existing location OK. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	✓	✓	R	N	✓	No
Lilac Road (NB)	Move from south of intersection to north of intersection. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	✓	✓	R	✓	✓	Yes
Miller Road (EB)	Existing location OK. Stop curb adjacent along multi-use path approaching roundabout. Bikes travel on multiuse path.	✓	✓	✓	R	✓	✓	No
Cole Grade Road (WB)	Existing location OK. Construct curb extension for bus to stop curb adjacent. Bikes travel behind curb extension on Class IV separated bikeway.	R	R	N	R	N	✓	No
Miller Road (WB)	Existing location OK. Stop curb adjacent along multi-use path on exit to roundabout. Bicycles travel along multiuse path.	✓	✓	✓	R	N	✓	No
Lilac Road (SB)	Existing Location OK. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	R	R	✓	✓	Yes
Old Road (SB)	Existing location OK. Construct curb extension for bus to stop curb adjacent. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	R	R	✓	✓	No
Mirar De Valle Road (SB)	Existing location OK. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	R	R	✓	✓	No
Woods Valley Road (SB)	Existing location OK. Stop curb adjacent along curb extension. Bikes travel behind curb extension in Class IV separated bikeway.	✓	R	✓	R	✓	✓	Yes

Note: Bus stop locations are illustrated in **Figure 3 and Figure 4** of the Final VCRCCP.

Bus stops to be potentially relocated

Amenity improvement opportunity

R – reuse existing bench or sign; N – replace existing bench or sign; ✓ – does not exist, needs new bench, sign, map, lighting, etc.

Valley Center Road Corridor Concept Plan

Appendix B: 2023 Citygate Report on Emergency Response and Evacuation

CITYGATE
FIRE & EMS

REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS

FINAL REPORT

SAN DIEGO COUNTY

SEPTEMBER 26, 2023

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September 26, 2023

RE: REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS

This report and companion technical exhibits identify the key elements of the requested review regarding the potential impacts of the proposed traffic control options on fire and EMS response times associated with Valley Center Road Corridor Concept Plan (CCP) options.

The research work included:

- Review of the impacts of roundabouts on both emergency response times and disaster evacuation routes.
- Review of the 2022 Draft Corridor Concept Plan Report prepared by Michael Baker International (MBI).
- Comparison and contrast of the use of intersection controls on emergency response times and disaster evacuation routes, including traffic signals and roundabouts.
- Comparison of historical fire unit travel time records to CCP design traffic control models.
- Review of published practices regarding roundabouts and emergency responses.

CAPSTONE RECOMMENDATION

Based on the six findings included in this report and Citygate's research and professional experience in fire unit travel time planning, we find that fire and EMS unit response times will not be materially lengthened by either Option A or Option B CCP design concepts (Exhibits 1 and 2). Further, Citygate recommends the use of roundabouts as designed within CCP Options A and B, as they will slow response times the least compared to other design choices and will provide for smoother evacuation routing in comparison to traffic signals.

BACKGROUND AND BASELINE RESEARCH CONDUCTED

Citygate's review began with an understanding of the Draft Valley Center Road Corridor Concept Plan—the June 2022 Analysis Report; not the current, proposed project.[1] We took note that the CCP is intended to "create a sense of place within Valley Center and support a safer, more accessible roadway through the implementation of traffic calming measures and other multi-modal opportunities for all users, including pedestrians, cyclists, equestrians, and vehicles."

The Plan work begins with the as-is condition of the roadway between Cole Grade Road and Woods Valley Road. Current 85th percentile speeds along the corridor exceed the posted speed limit of 45 miles per hour,[1] and there were 300 collisions with three fatalities over an eight-year period, as noted in MBI Exhibit 3. The collision data indicated that most of the collisions were attributable to unsafe speeds, right-of-way violations, and improper turning. The deep planning effort also looked at growth in the area and the likely increase of traffic volumes on the corridor through the Forecast Year 2035. The planning documents reviewed by Citygate were consistent with what we commonly review from other agencies regarding vehicle and pedestrian safety planning.

Citygate also understands that, as is typical throughout California, current and future speed limits are determined in a rigorous process based on state laws outlined in the California Manual on Uniform Traffic Control Devices. The current posted speed limit of 45 mph along the subject roadway may change in the future. With the implementation of roadway safety treatments for vehicle and pedestrian safety considering the local driveways spaced along the corridor, the current 45 mph speed limit may be re-evaluated for a potential decrease.

The Valley Center Fire Protection District covers 84.5 square miles and serves a population of over 23,000 people by providing fire, emergency medical, and community risk reduction services along with responding to approximately 1,300 calls for service per year.[2] The District operates from two fire stations, with the primary station (Fire Station 1) location on Lilac Road, approximately 450 feet west of Valley Center Road. Citygate's analysis was to determine the impact of traffic control devices on fire and ambulance unit response times from Fire Station 1 along the CCP project's geographic scope—from the Woods Valley Road intersection to the Cole Grade Road intersection.

As of June 2023, the County was considering new options for traffic signals and roundabouts in addition to addressing other CCP components for road user safety. Both Option A and Option B—Exhibits 1 and 2 to this report—include the use of seven traffic signals (including two associated with private development requirements and two newly proposed), one pedestrian signal, and two

[1] https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/VCRoadStudy/DCCP-report.pdf
[2] https://www.valleycenterfire.com/about-us/

dual-lane roundabouts. Both options feature roundabouts at Woods Valley Road. Option A has a roundabout at Miller Road and a signal at Cole Grade Road. Option B has a signal at Miller Road and a roundabout at Cole Grade Road.

To understand the affect the traffic control devices would have on emergency response time, Citygate first needed to establish a baseline understanding of current fire unit travel times. The measures were from Fire Station 1 on Lilac Road to both the north and south ends of the CCP's geographic scope from Cole Grade Road to Woods Valley Road. Citygate, the Valley Center Fire Protection District, and their dispatch center identified incidents where a fire unit responded from Station 1 to an emergency occurring past the end of the CCP project's limits. The fire units have a GPS transponder, so the dispatch center knows to send the closest unit. This technology can also measure response travel time at intervals along a given route. Citygate / Fire District-provided Exhibits 10 and 11 are the result of these incident measures.

The incident data was used to compare to the modeling of intersection performance delay per CCP Options A and B (Exhibits 7 through 9 to this report). The fire unit travel time data was representative of other incidents the Fire District provided to Citygate between 2021 and 2023.

- The northern fire unit response travel time inside the CCP's geographic scope—from Fire Station 1 to the fire unit GPS waypoint just onto Cole Grade Road (approximately 1.5 miles)—was 3:32 minutes/seconds.

- The southern fire unit response travel time inside the CCP's geographic scope—from Fire Station 1 to the fire unit GPS waypoint just off Valley Center Road on Woods Valley Road (approximately 1.4 miles)—was 2:27 minutes/seconds.

The MBI model shows the present baseline travel times[3] to Cole Grade Road are 4:31 minutes/seconds and to Woods Valley, 2:49 minutes/seconds. Both times are close to the fire unit times, but not the same, being reflective of civilian traffic patterns. In Citygate's experience, these fire unit times are typical in an urban/suburban road network given the distances involved and a minimum number of controls such as stop signs and traffic lights. These fire unit speeds within the corridor are currently ranging from 17–60 mph.

Finding #1:	In Citygate's experience, the existing emergency response travel times for fire units are typical for suburban business districts as found within the corridor. The fire unit speeds reflect the existing four-lane boulevard design with intermittent medians and controls.

[3] See footnotes in Exhibit 9 for additional information regarding the baseline travel time calibration process, which was needed to isolate differences based on intersection controls.

In the United States, there are no staffing or response time requirements in federal or state law. It is a local policy choice made by cities, counties, and fire districts to fund the fire unit response coverage to match the risks to be protected within available funding. Many communities cannot fund the services necessary to guarantee optimum response times. Within nationally published best practice advice, and in Citygate's experience, fire/EMS travel time for the first-due unit in an urban environment is ideally planned for 4:00 to 5:00 minutes. In suburban areas, an 8:00-minute travel time for fire and/or paramedics to arrive is common. For rural communities, travel time can range up to 12:00 minutes or more.

In the Fire Department's data related to existing travel times on the unmodified roadway within the corridor, fire unit speeds are materially faster than a controlled roadway in an urban/suburban setting. Normally, fire units do not drive 5–10 mph faster than the posted speed limits on surface (not freeway) streets.

Roundabout and Traffic Signal Research

The Valley Center Road Corridor Concept Plan utilizes several traffic safety improvements, two of which are a combination of traffic signals and roundabouts. The conceptual design by MBI for the roundabouts uses typical engineered "turn templates." The CCP's layout of the roundabouts includes two circulating lanes, wide entry lanes, a truck apron on the innermost lane, and other features that will ensure large vehicles—including fire aerial ladder trucks, pumper trucks, and large commercial vehicles including tractor trailers or smaller, towed trailers—can easily and safely navigate the roundabouts mixed with the passenger vehicles. In reviewing the proposed roundabout design (MBI Exhibits 1 and 2), Citygate observes three key features of the roundabouts that provide easy access for large vehicles:

1. Wider entry lanes

2. An inside apron that can be driven over by rear wheels (as opposed to a high-sided curb with a planter bed)

3. Two wide lanes fully encircling each roundabout.

Turn templates have been provided (Exhibits 4, 5, and 6 to this report) to show how large vehicles will be able to navigate the roundabouts, including addressing the dimensions of the largest VCFPD vehicle (aerial ladder truck) and a Cal Fire truck with bulldozer trailer. In reviewing the current literature on roundabouts, Citygate determined the proposed roundabout design to represent best practice for both larger vehicles and higher-volume traffic throughput. Roundabouts may not be as common in the United States as they are abroad, but they are also not rare. Along with our legacy experience with traffic safety design impacts on emergency services, Citygate researched the most recent findings related to roundabouts both in the United States and abroad.

The articles and data reviewed by Citygate found that roundabouts moved higher volumes of traffic more efficiently than a standard signalized intersection. We did not find any research or professional journal articles stating that roundabouts slowed or hampered emergency unit travel. In fact, we did find relevant positive articles/media about the use of roundabouts for emergency evacuations. Two of them are provided by Citygate as Exhibits 12 and 13 to this report.

Further, in Citygate's review of relevant research, roundabout design was, in fact, perceived as safer, given that it eliminates "T-bone" intersection accidents with emergency vehicles. In a signalized intersection, even with traffic light preemption in the emergency unit's direction of travel, it can occur (and has occurred) that a driver does not notice their green light changing to red sooner than expected, or the driver is otherwise impaired or distracted and runs a red light, hitting the side of a fire or ambulance unit. Because of this, all fire and ambulance drivers are trained to *decrease* speed when traveling through intersections—even with a green light—until they can ensure that cross traffic has seen them and will stop. Thus, the basic premise of the California Vehicle Code for use of red lights / sirens is that these devices allow the emergency unit to "request the right-of-way" safely as to not endanger members of the public, who may not see or hear the red lights and sirens when the public otherwise has the right-of-way.

By comparison, where roundabouts are utilized, traffic is continually flowing and, as an emergency vehicle approaches a roundabout, cars that have not yet entered can normally pull over to the right. Vehicles inside the roundabout can exit and then also pull over to the right. The emergency unit flows through without coming to a complete stop, as could occur when requesting access through a stop sign or red light. While vehicles should clear the intersection when an emergency vehicle is approaching, it is possible that a car in the two-lane roundabout could stop in the outermost (right) lane and the emergency unit would still have the inside lane to use.

In traffic engineering flow models, data does exist which measures the lag time delay of a signalized intersection versus a roundabout. MBI Exhibits 7 and 8 of this report summarize the average delay per vehicle during AM and PM peak hours for all approaches at each of the studied intersections. These tables compare the existing traffic control to design Options A and B at high-demand traffic during AM and PM peak hours. As the table shows, the safety improvements' impact on travel times for non-emergency traffic—in order from what causes the most delay to what causes the least delay—are stop signs, traffic signals, and roundabouts. An option without roundabouts creates the greatest intersection delay of the options to consider.

The intersection performance tables shown in Exhibits 7 and 8 factored into the modeling of VCFPD travel times per Options A and B and a "no roundabout" option. MBI Exhibit 9 provides this modeling of VCFPD travel times. Citygate then compared the traffic safety control measure time delays to the overall impact on fire and ambulance response times.

Citygate observes that, northbound from the fire station on Lilac Road to Cole Grade Road, Option A, with a single roundabout in addition to the other proposed safety controls, is 0:24 seconds slower. Option B is 0:36 seconds slower. A "no roundabout" option is 1:00 minute slower.

As for fire unit travel southbound from the fire station, at Woods Valley Road and Valley Center Road, a traffic signal already exists. Under either design (Option A or Option B), a single roundabout delay in addition to the other proposed safety controls is just 0:14 seconds slower by comparison. A "no roundabout" option is 0:17 seconds slower.

Finding #2: The two roundabouts proposed in Option A and Option B are consistent with best practices and will impact fire unit travel times less than traffic signals while being safer for the motoring public and firefighters requesting emergency right-of-way. For both Options A and B, there are only two roundabouts proposed for the CCP—one north of Lilac Road, and one south of Lilac Road. Based on the location of Station 1 (Lilac Road), a Valley Center Fire unit would typically only encounter one roundabout during a response. The lag factor for multiple added traffic signals will be far greater than it will be for the one roundabout.

Given (1) the expected increase in traffic volume due to future development, and (2) the understanding that implementing any CCP safety design options will result in the addition of intersection controls, it is Citygate's experience that, after all envisioned safety improvements are made, the roadway will no longer facilitate emergency vehicles traveling materially faster (regularly and for long distances) above the posted speed limits. The question, then, is how much of a delay will be caused *in total* to either end of the corridor (CCP's geographic scope, extending from the Woods Valley Road intersection to the Cole Grade Road intersection) from Valley Center Fire Station 1, and will the resulting lag be significant enough to materially matter?

CCP Changes Modeled on Fire/EMS Response Times

Citygate used the historical Fire Department travel time data for comparison to the CCP traffic control modeling software outputs from MBI. Their computer software (Synchro v11) utilizes the Highway Capacity Manual (6th Edition) methodology, which is a widely accepted approach and is consistent with the County's requirements for intersection analysis as outlined in the County of San Diego Transportation Study Guidelines (September 2022). The software calculations consider many factors such as volume, speed, and intersection control designs. As of this writing, there are three options being analyzed in this modeling for the Valley Center Road Corridor Concept Plan—Option A, Option B, and a "no roundabout" option.

Fire/EMS unit travel time is a combination of the travel speeds along a given roadway segment and the delay at an intersection (i.e., red light at a traffic signal). The following travel time summary table from MBI is a "baseline (calibrated)" output. This is needed as prior uncontrolled, open road Fire/EMS travel times cannot be compared to the effort of just one CCP option change, be it a change in speed limit or intersection design. There must be an "apples to apples" model that accounts for what all the *collective* CCP changes will create, including different intersection types such as signals or roundabouts.

The baseline model uses a "ceiling cap" on all travel speeds of the (posted) 45 mph speed limit in all sections. Everything less than 45 mph remained the same as the raw data received from the historical fire Automatic Vehicle Location (AVL) maps. In practical terms, this means that the emergency vehicle is travelling with the flow of traffic, but no more than the posted speed limit. Added to this, the baseline traffic safety improvements are the primary delay variable from the intersection control modifications for both Option A, Option B, and the "no roundabout" option. Therefore, the comparisons for this emergency unit travel time study are the delay associated with the three intersection control design choices. The following comparison table (and in the attached MBI Exhibit 9) also forecast 2035 traffic as an additional variable contributing to future travel time delay.

Table 1—MBI Exhibit 9 – Valley Center Road Modeled VCFPD Travel Time Comparison

Scenario		Northbound / Eastbound	Southbound
		Lilac Road to Cole Grade Road	Lilac Road to Woods Valley Road
Based on Existing Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:31	2:49
Option A	Travel Time	4:55	3:03
	Difference	+0:24	+0:14
Option B	Travel Time	5:07	3:03
	Difference	+0:36	+0:14
No Roundabouts	Travel Time	5:31	3:06
	Difference	+1:00	+0:17
Based on Future Year 2035 Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:55	2:51
Option A	Travel Time	5:23	3:07
	Difference	+0:28	+0:16
Option B	Travel Time	5:40	3:07
	Difference	+0:45	+0:16
No Roundabouts	Travel Time	6:17	3:11
	Difference	+1:22	+0:20
Difference between Existing and Future Year 2035			
Baseline (Calibrated)		+0:24	+0:02
Option A		+0:28	+0:04
Option B		+0:33	+0:04
No Roundabouts		+0:46	+0:05

All times are shown in minutes : seconds

Notes:

- Baseline (Calibrated) scenario utilizes actual speeds provided by automatic vehicle location (AVL) data. For segments that were greater than the posted speed limit (45 mph), a ceiling cap of 45 mph was applied. For speeds lower than 45 mph, actual speeds were used.
- Options A and B assume the same segment speeds as the Baseline condition and only consider the change in delay associated with the intersection control modifications.
- South of Lilac Road, Option A and Option B have the same intersection controls and geometry. Therefore, the estimated travel times in the southbound direction are assumed to be identical.
- All travel time estimates utilize PM Peak-Hour intersection delays as this scenario is shown to be the worst-case study scenario.
- All travel time estimates utilize the approach delay for the direction of travel (i.e., northbound/eastbound or southbound approaches to the intersection).

The result from the integrated travel time model intersection controls on the *north* section of the corridor ranges from a 0:24-second to 0:36-second travel time *increase* from all intersection controls (one of which is a roundabout). The "no roundabout" option increases travel time by 1:00

minute. In the *south* section of the corridor, there is a 0:14-second increase (again, one control is a roundabout) and a "no roundabout" increase of 0:17 seconds. The Fire District's travel times from Fire Station 1 to incidents well past the corridor are typical of longer travel times to edge suburban and rural areas. The traffic safety plan control small increases of less than a maximum of 0:36 seconds is not long enough to materially change current Fire District customer service delivery.

Finding #3: In Citygate's experience, increased traffic and added development along the corridor will result in the need for additional intersection control requirements at some point in the near term—even without a Corridor Concept Plan. Therefore, response times will be affected by congestion, an increased number and use of side streets/driveways, and controls such as traffic signals.

Finding #4: Increasing traffic and resultant required traffic controls will lengthen emergency unit travel time. The current CCP strategies only lengthen travel times by 0:14 to 0:36 seconds compared to longer anticipated delays with other options.

Finding #5: The least traffic safety impact to response times will be the options with roundabouts proposed as part the CCP. The small roadway design impact on fire or ambulance unit travel time must be contrasted with the overall improvements in traffic and pedestrian safety.

ROUNDABOUTS AND EVACUATION ROUTE USE

Citygate reviewed the available professional publications in the United States and abroad and found *nothing* professionally published in fire service or traffic engineering literature citing that roundabouts would harm evacuation routing and thus should be banned where formal evacuation routes are planned. Valley Center Road is a formal evacuation route in either direction depending on the emergency. Should an evacuation or emergency event occur, Valley Center will need to evacuate while allowing mutual aid emergency responders into the community. Thus, corridor evacuation planning must include two options: (1) using standard road design to allow movement both in and out, or (2) "contra-flow" design where all lanes are used for outbound traffic only. The CCP roundabout design in Options A and B, with two lanes, provides for either flow option. In the event of any evacuation, human traffic control guidance is required at both traffic signals and roundabouts. In the event of a power failure, an officer may be required to direct traffic at signalized intersections. In the power failure situation, roundabouts still work and do not require

signal controls while also maintaining a smoother flow than a four-way stop without a traffic control officer.

Citygate found two sources regarding roundabouts in evacuation scenarios, and they also require human control with a handheld sign and traffic cones to restrict movement inside the roundabout to only one in to one out. There is an excellent video from Australia of a working roundabout during an evacuation (see the video web link in the footnote and screenshot image in Exhibit 12) and it shows that a roundabout has the capacity to move a large volume of traffic smoothly.[4]

Citygate also found one published article (Exhibit 13) from the Traffic Operations Manager of Clearwater Beach, Florida entitled "Round is Resilient."[5] As a result of Hurricane Charlie, the city had to contraflow and double the capacity of the main roundabout entering the City. The resultant plan worked, increasing capacity and only requiring minor oversight from a traffic officer.

Finding #6:	The proposed roundabouts in the CCP Options A and B will not slow or hamper evacuation route use and, in fact, would provide a smoother flow and higher capacity than a four-way intersection.

[4] https://commons.wikimedia.org/wiki/File:Contraflow_traffic_through_roundabout_on_North_Beach_Road.ogv

[5] https://www.naplesgov.com/sites/default/files/fileattachments/streets_amp_stormwater/project/3361/fes_round_is_resilient.pdf

CITYGATE
FIRE & EMS

REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS

FINAL REPORT

EXHIBITS

SAN DIEGO COUNTY

SEPTEMBER 26, 2023

MBI EXHIBITS 1–9
CITYGATE EXHIBITS 10–13

CITYGATE
FIRE & EMS

WWW.CITYGATEASSOCIATES.COM

600 COOLIDGE DRIVE, SUITE 150
FOLSOM, CA 95630

PHONE: (916) 458-5100
FAX: (916) 983-2090

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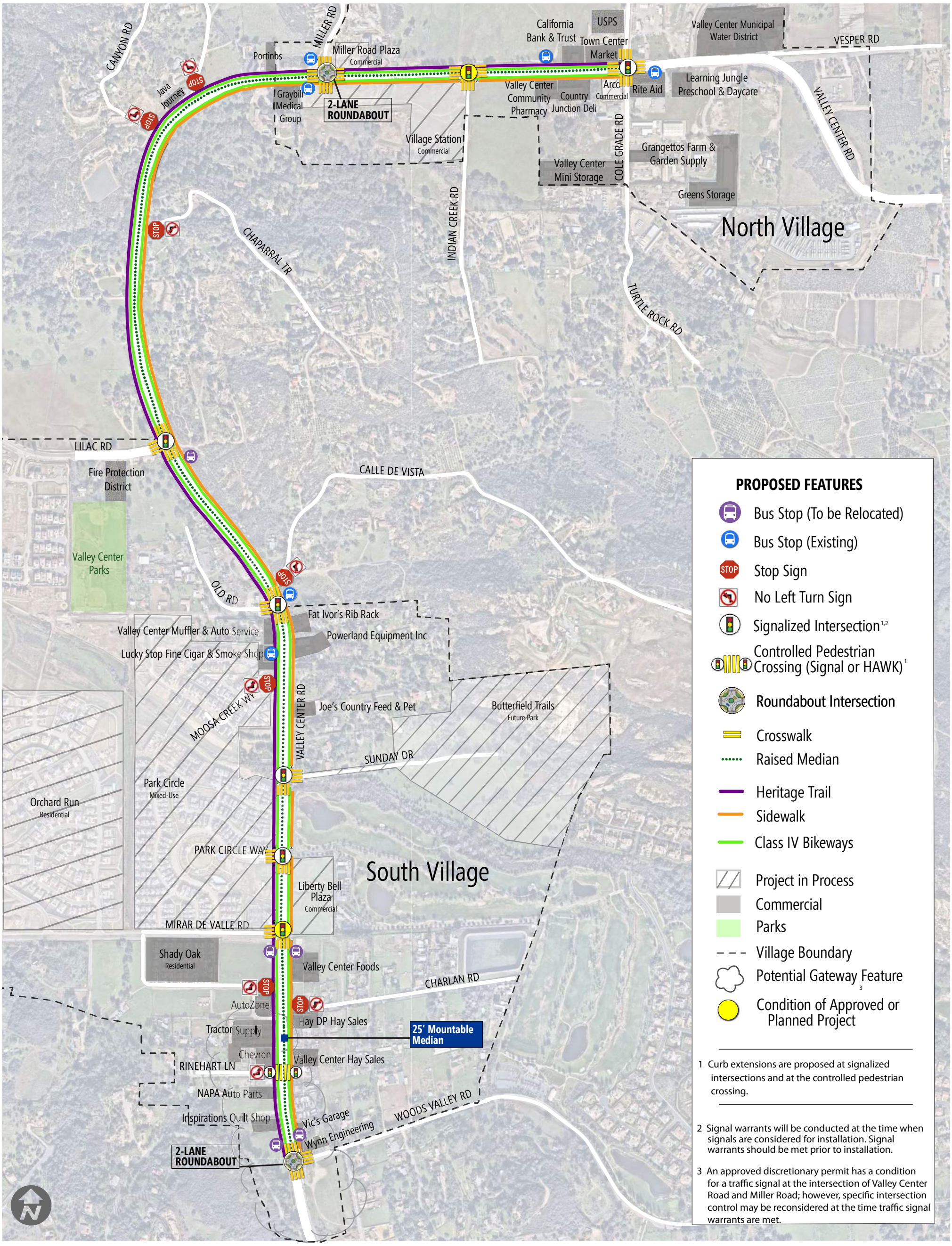
Exhibit 1 -
Draft CCP Option A



Michael Baker INTERNATIONAL

Draft Corridor Concept Plan-Option A

July 2023
H:\PDATA\170071_Valley Center Corridor\Traffic\Exhibits\Concept Maps

MULTI-USE TRAIL

BANBURY DR

R/W

12'
15'
15'
10'
16'
16'
12'
12'

FROM
TO
RELOCATE BUS STOP

HERITAGE TRAIL

5' 3'
11'
11'
12'
11'
11'
8'

QUILT SHOP

VALLEY CENTER RD

WOODS VALLEY RD

WYNN ENGINEERING

VIC'S GARAGE

N

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

PAPA BEARS & SORRENTINOS

RINEHART LN

CHEVRON

CENTER REFUGE AREA

25' MOUNTABLE MEDIAN WITH STAMPED CONCRETE

HERITAGE TRAIL

5' 3'
11'
11'
12'
11'
11'
5' 3'

CONTROLLED PEDESTRIAN CROSSING (HAWK OR SIGNAL)

VALLEY CENTER RD

CHARLAN RD

HOS HAY

VALLEY CENTER EQUIPMENT RENTAL

EL VALLE MARKET

VALLEY CENTER FOODS

N

MATCHLINE SHEET 2

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION A

SHEET 1 OF 6

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MATCHLINE SHEET 1

MATCHLINE BELOW LEFT

RELOCATE BUS STOP

FROM

TO

MIRAR DE VALLE

PARK CIRCLE

HERITAGE TRAIL

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

R/W

VALLEY CENTER RD

FROM

TO

RELOCATE BUS STOP

MATCHLINE ABOVE RIGHT

HERITAGE TRAIL

MOOSA CREEK WAY

ONLY

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

R/W

VALLEY CENTER RD

SUNDAY DR

JOE'S COUNTY FEED & PET

MATCHLINE SHEET 3

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION A

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MATCHLINE SHEET 2

MATCHLINE BELOW LEFT

LUCKY STOP FINE CIGAR & SMOKE

VALLEY CENTER MUFFLER & AUTO SERVICE

OLD RD

HERITAGE TRAIL

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

VALLEY CENTER RD

FAT IVORS RIB RACK

N

MATCHLINE ABOVE RIGHT

HERITAGE TRAIL

R/W

RELOCATE BUS STOP

TO

FROM

5' 3' 11' 11' 22' 11' 11' 5' 3'

3' 5' 11' 11' 2' 10' 10' 11' 11' 3' 5'

LILAC RD

VALLEY CENTER RD

FROM

RELOCATE BUS STOP

TO

MATCHLINE SHEET 4

N

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION A

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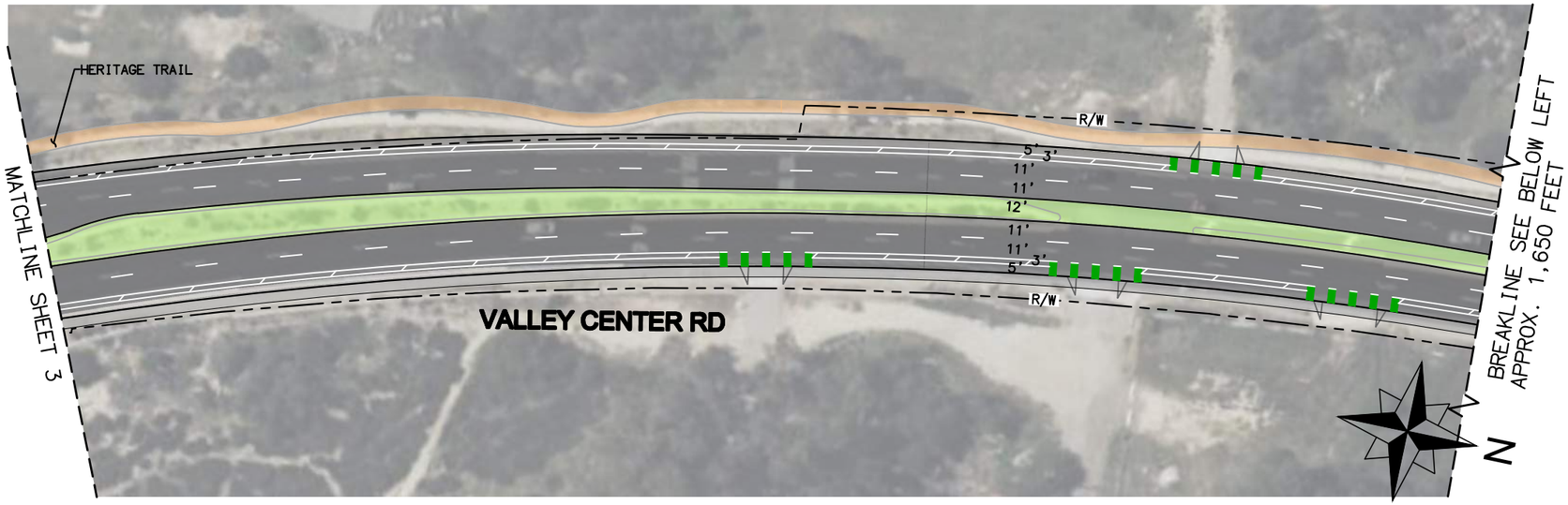

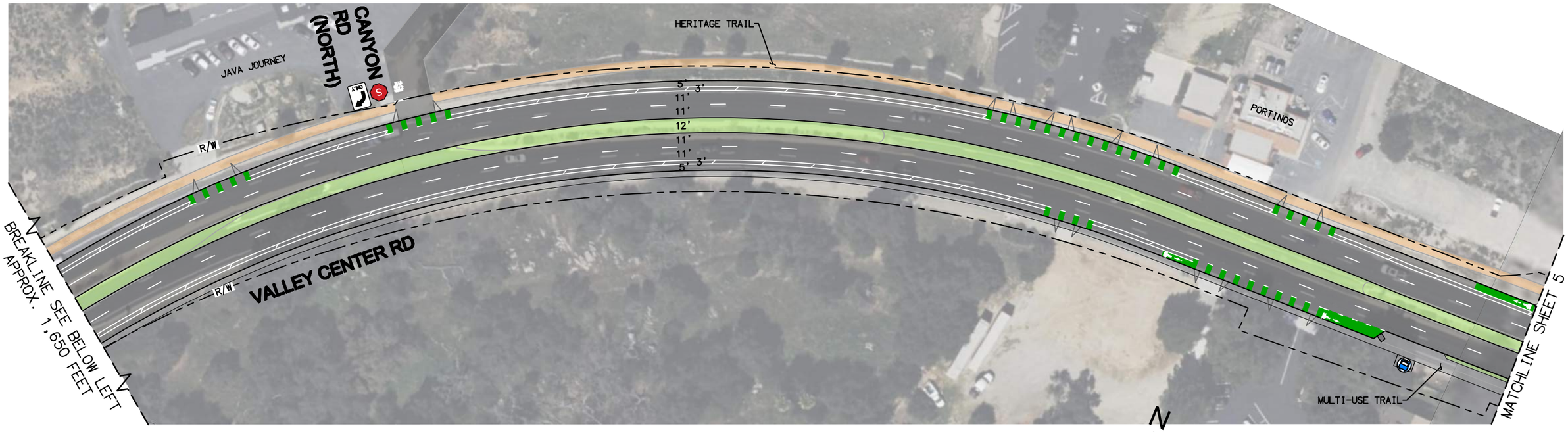

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
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- STOP SIGN
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- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION A

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MATCHLINE SHEET 4

MILLER RD

VALLEY CENTER RD

HERITAGE TRAIL

R/W

12'
15'
15'
10'
16'
16'
12'
12'
12'
5'
3'
11'
11'
12'
11'
11'
5'
3'

MULTI-USE TRAIL

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

FUTURE INDIAN CREEK ROAD EXTENSION

VALLEY CENTER RD

HERITAGE TRAIL

CALIFORNIA BANK

R/W

5'
3'
11'
11'
12'
11'
11'
5'
3'

R/W

INDIAN CREEK RD

MATCHLINE SHEET 6

N

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION A

SHEET 5 OF 6

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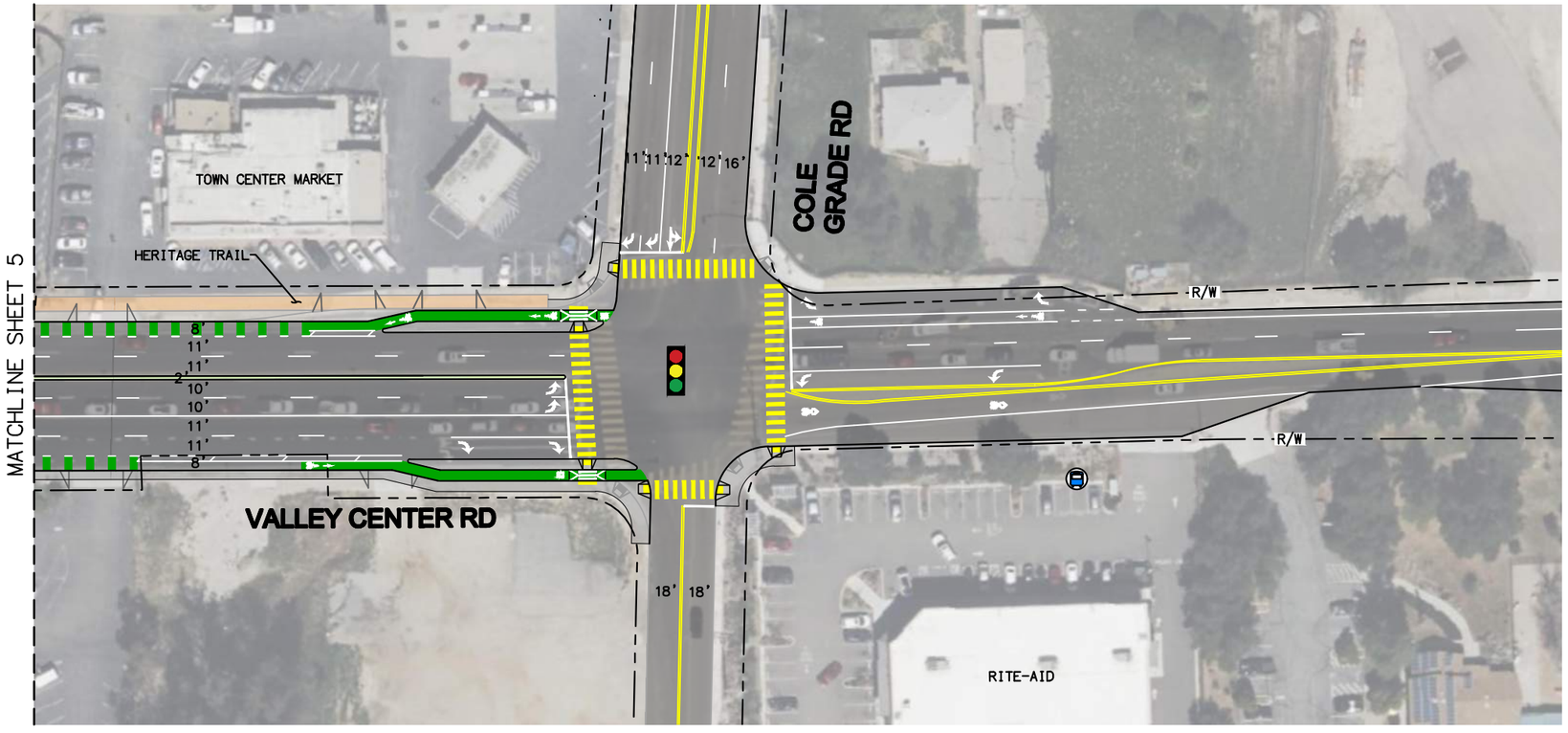

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION A

SHEET 6 OF 6

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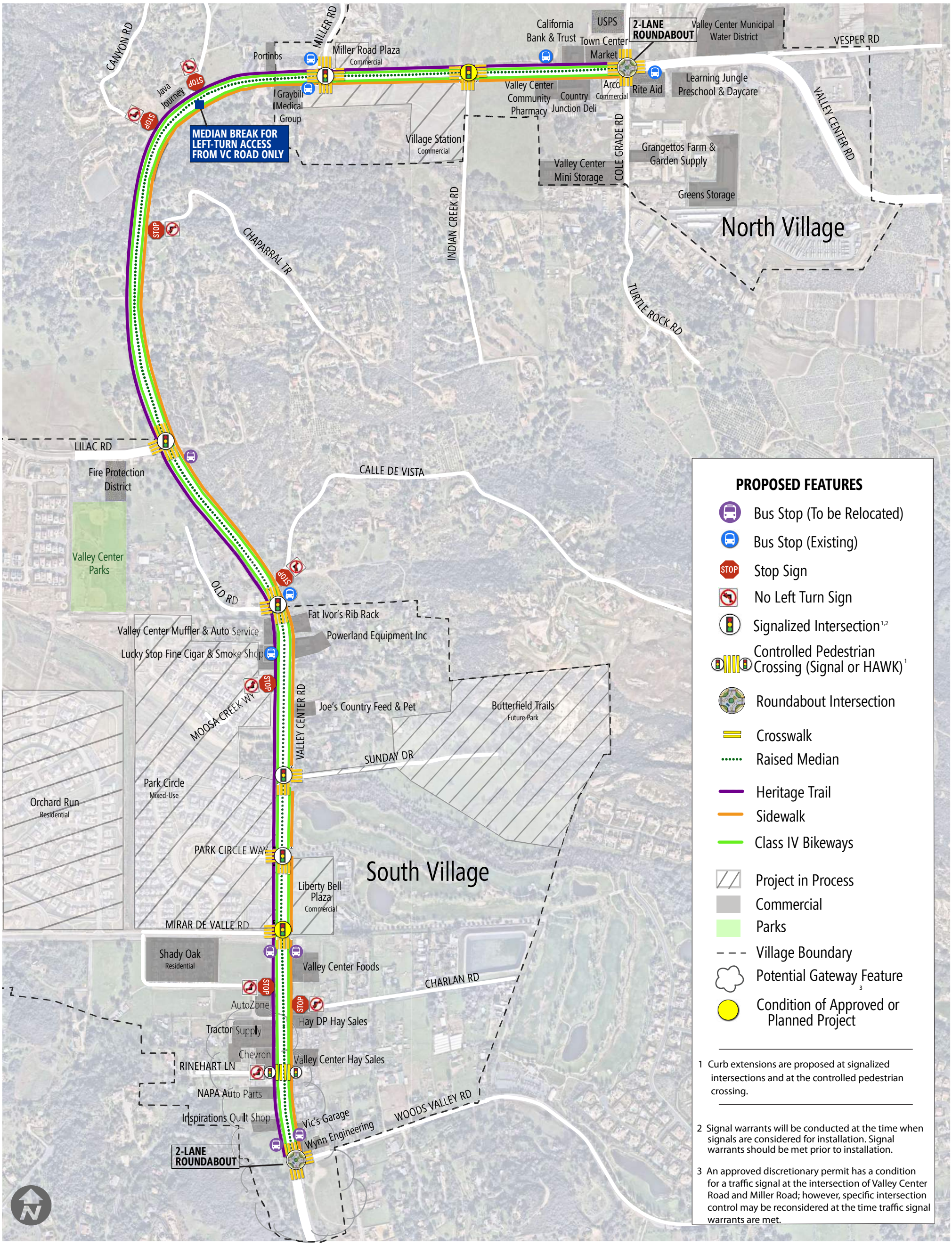
Exhibit 2 –
Draft CCP Option B



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Draft Corridor Concept Plan-Option B

July 2023
H:\PDATA\170071_Valley Center Corridor\Traffic\Exhibits\Concept Maps

MATCHLINE ABOVE RIGHT

MATCHLINE BELOW LEFT

MATCHLINE SHEET 2

MULTI-USE TRAIL

BANBURY DR

R/W

12'
15'
15'
10'
16'
16'
12'
12'

FROM
TO
RELOCATE BUS STOP

HERITAGE TRAIL

5' 3'
11'
11'
12'
11'
11'
8'

QUILT SHOP

VALLEY CENTER RD

WOODS VALLEY RD

WYNN ENGINEERING

VIC'S GARAGE

N

PAPA BEARS & SORRENTINOS

RINEHART LN

CHEVRON

CENTER REFUGE AREA

HERITAGE TRAIL

5' 3'
11'
11'
12'
11'
11'
5' 3'

CONTROLLED PEDESTRIAN CROSSING (HAWK OR SIGNAL)

VALLEY CENTER RD

CHARLAN RD

HOS HAY

VALLEY CENTER EQUIPMENT RENTAL

EL VALLE MARKET

VALLEY CENTER FOODS

N

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION B

SHEET 1 OF 6

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MATCHLINE SHEET 1

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

MATCHLINE SHEET 3

RELOCATE BUS STOP

FROM

TO

MIRAR DE VALLE

PARK CIRCLE

HERITAGE TRAIL

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

VALLEY CENTER RD

FROM

TO

RELOCATE BUS STOP

MOOSA CREEK WAY

ONLY

SUNDAY DR

JOE'S COUNTY FEED & PET

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
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- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION B

SHEET 2 OF 6

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MATCHLINE SHEET 2

MATCHLINE BELOW LEFT

LUCKY STOP FINE CIGAR & SMOKE

VALLEY CENTER MUFFLER & AUTO SERVICE

OLD RD

HERITAGE TRAIL

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

VALLEY CENTER RD

FAT IVORS RIB RACK

N

MATCHLINE ABOVE RIGHT

HERITAGE TRAIL

R/W

RELOCATE BUS STOP

TO

FROM

5' 3' 11' 11' 12' 11' 11' 5' 3'

22'

5' 3' 11' 11' 11' 11' 10' 10' 11' 11' 3' 5'

VALLEY CENTER RD

LILAC RD

RELOCATE BUS STOP

FROM

TO

N

MATCHLINE SHEET 4

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION B

SHEET 3 OF 6

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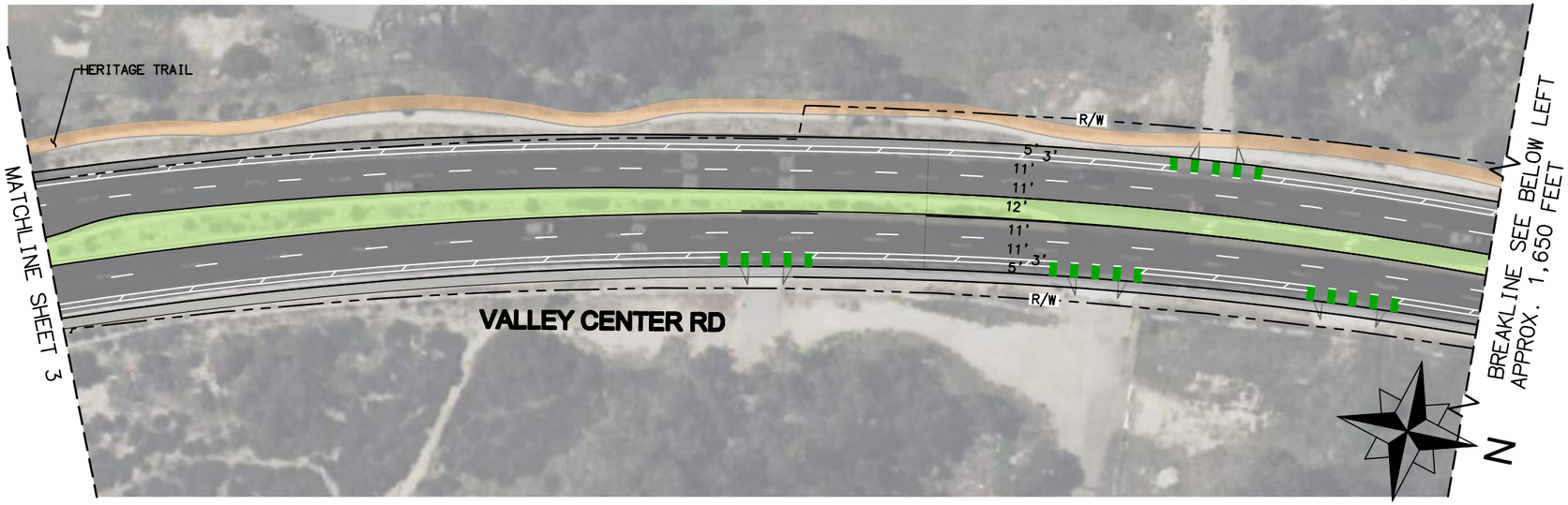

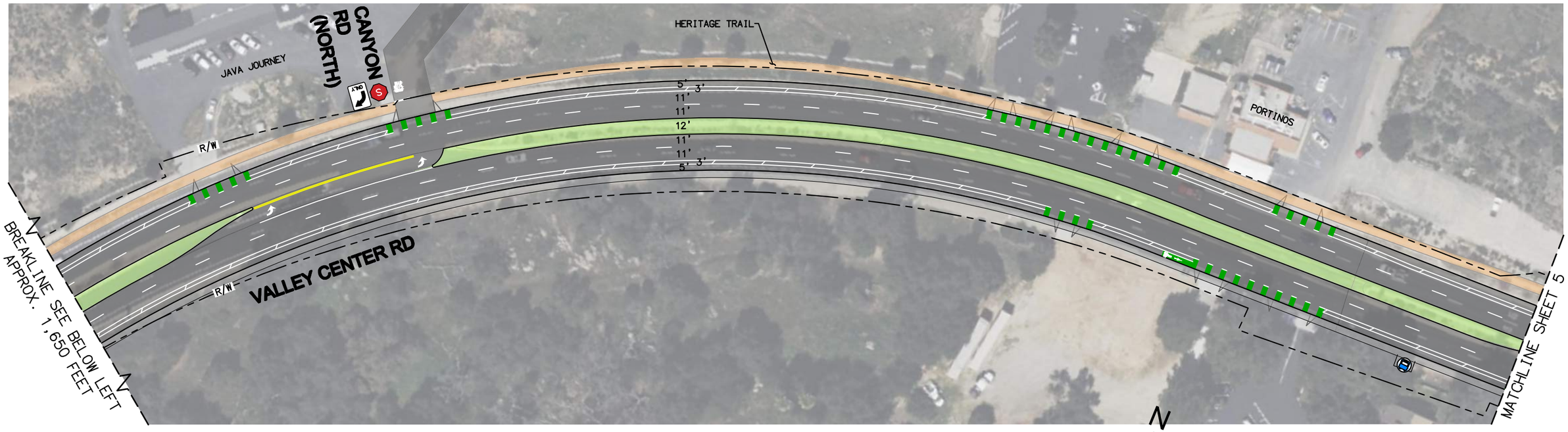

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
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- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION B

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MATCHLINE SHEET 4

MILLER RD

VALLEY CENTER RD

HERITAGE TRAIL

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

R/W

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

FUTURE INDIAN CREEK ROAD EXTENSION

VALLEY CENTER RD

HERITAGE TRAIL

CALIFORNIA BANK

R/W

5' 3' 11' 11' 12' 11' 11' 5' 3'

R/W

INDIAN CREEK RD

MATCHLINE SHEET 6

N

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION B

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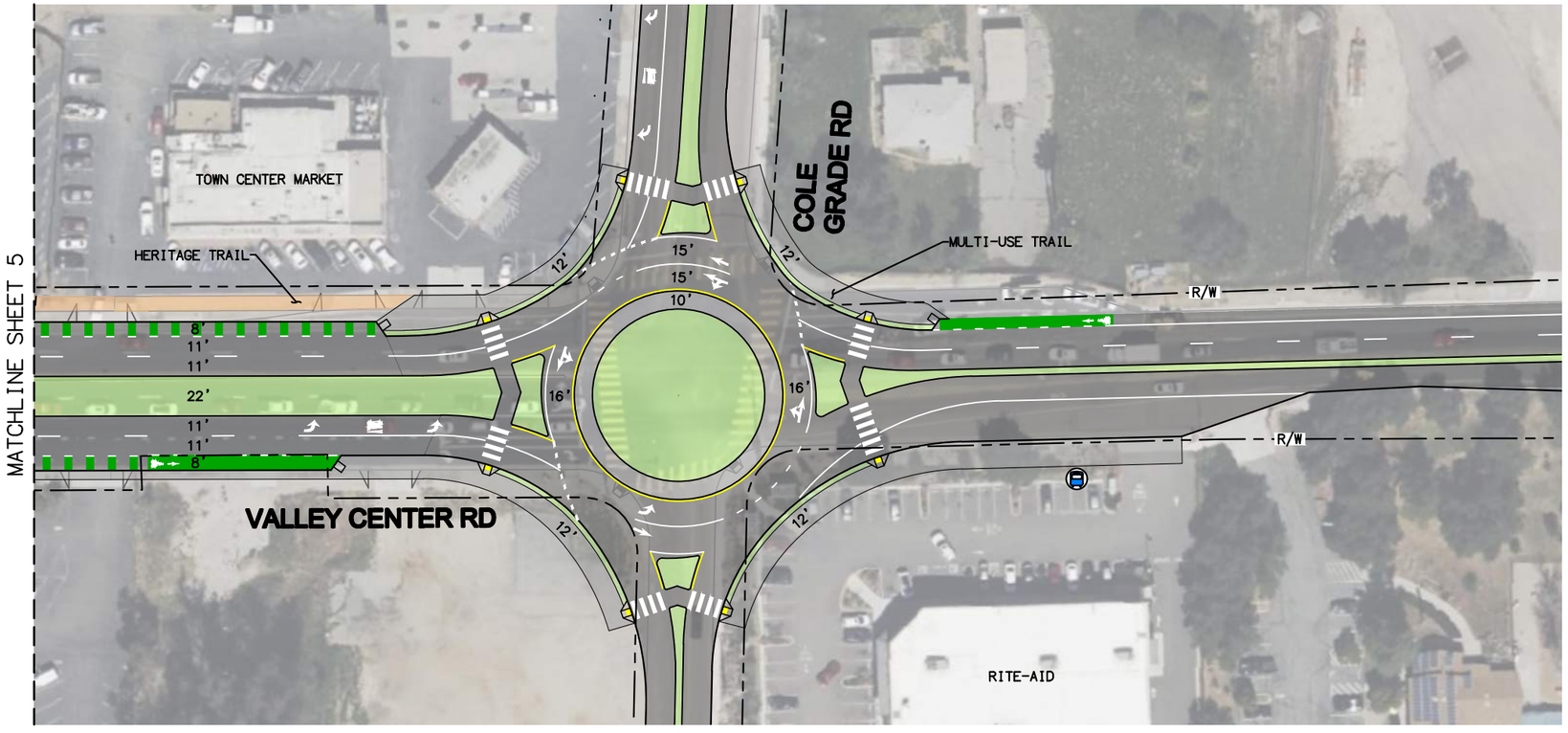

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
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- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION B

SHEET 6 OF 6

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Michael Baker
INTERNATIONAL

Exhibit 3 – Collision Data

CRASH ANALYSIS

Crash data was provided by the County for an eight-and-a-half-year period from July 2013 through December 2021. During this time period a total of 300 crashes were reported between Woods Valley Road at the southwest end of the corridor to the northeast end of the corridor in vicinity of Cole Grade Road.

A common method for evaluating the relative safety along the corridor is the crash rate analysis. The crash rate is calculated as follows:

Crash Rate (r) = 1,000,000 * C / (365 * N * V * L)

Where: C = Total number of crashes along the segment
N = Number of years of data
V = Number of vehicles per day (both directions)
L = Length of the roadway segment (in miles)

The crash rate for the segment of Valley Center Road from Woods Valley Road to Cole Grade Road is 1.48 crashes per million vehicle miles (MVM). According to Caltrans 2019 Collision Data on California State Highways, the average annual crash rate (3 year rate: 2017 to 2019) for four-lane divided roadways in rural areas is reported to be 1.03 crashes per MVM and 1.25 crashes per MVM in urban areas. Therefore, the crash rate along Valley Center Road is higher than both the rural area average rate and the urban area average rate for a four-lane divided road.

Figure 1 illustrates the distribution of crashes by crash type and collision factor along the corridor. The following summarizes the findings of the crash analysis.

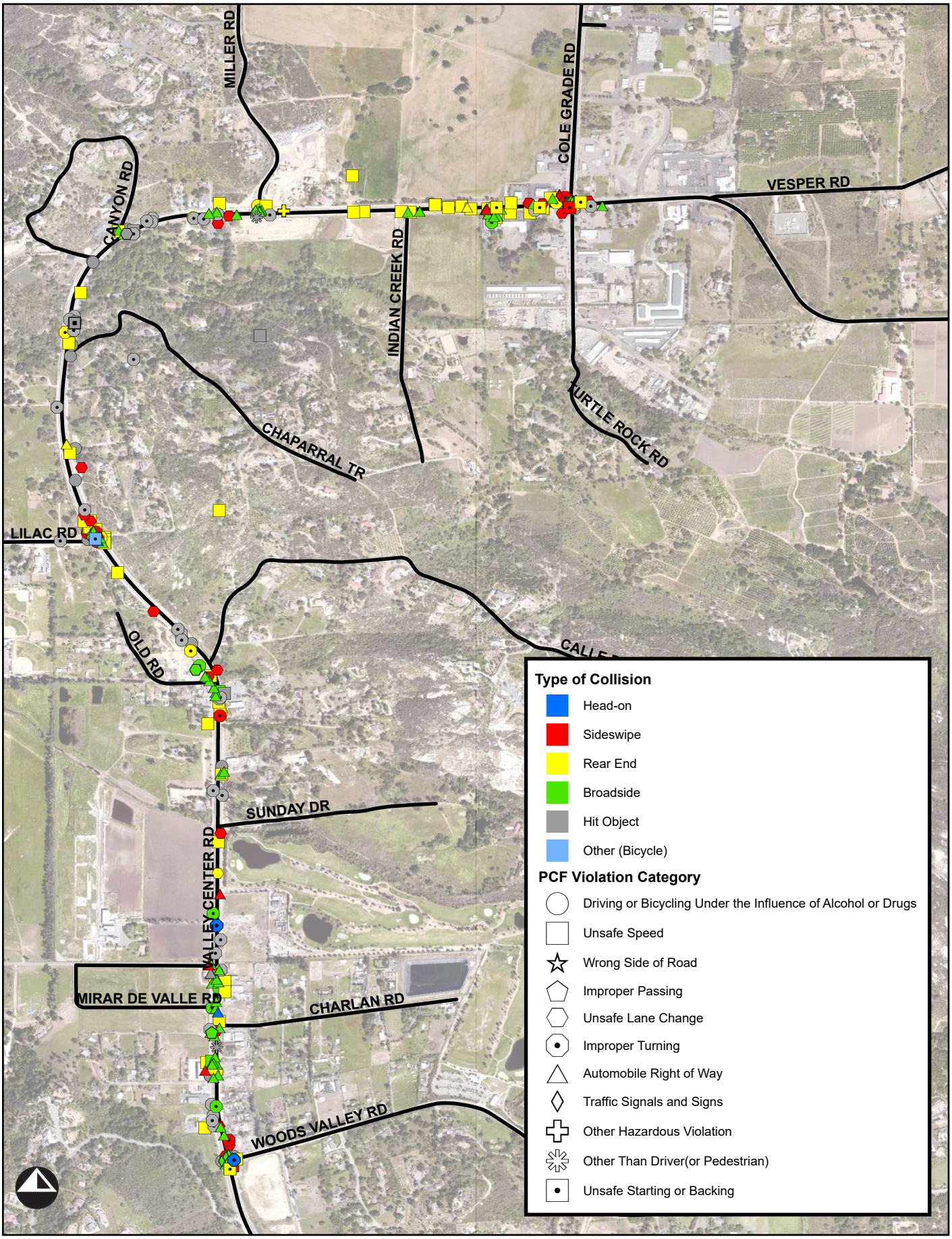
Crash by Location and Severity

The crash data on Valley Center Road was assessed to determine the location of each incident and assigned to the nearest intersection (within approximately 250-feet). Of the 300 crashes, the majority occurred at or near the three signalized intersections of Cole Grade Road, Lilac Road and Woods Valley Road. Of the unsignalized intersections along the corridor, Miller Road and Mirar de Valle Road had the highest number of crashes with 35 crashes and 21 crashes respectively. **Table 1** summarizes the crashes by location and severity. As shown in the table, three (3) fatal crashes occurred along the corridor at Mirar de Valle Road, Lilac Road, and Miller Road. A total of 16 crashes involved severe injuries and 34 involved other visible injuries. The majority of the crashes along the corridor, 184 out of 300 crashes reported, were property damage only.

Table 1: Collision Severity by Location

Crash Locations	Number of Crashes (2013-2021)	Crash Severity				
		Fatal	Severe	Other Visible Injury	Complaint of Pain	Property Damage Only
Woods Valley Road	45	0	1	3	11	30
Rinehart Lane	5	0	0	0	3	2
Charlan Road	10	0	1	1	1	7
Mirar de Valle Road	21	1	1	1	2	16
Sunday Drive	7	0	0	1	1	5
Old Road	21	0	1	6	2	12
Calle De Vista	6	0	0	0	1	5
Lilac Road	64	1	5	5	14	39
Chaparral Terrace	8	0	0	1	0	7
Canyon Road	6	0	1	1	2	2
Miller Road	35	1	1	6	8	19
Indian Creek Road	6	0	0	2	2	2
Cole Grade Road	66	0	1	3	24	38
Total	**300**	**3**	**12**	**30**	**71**	**184**

Source: County of San Diego, Crossroads Database (6/2013-6/2018), SWITRS Database (7/2018-12/2021)



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Crash Locations (2013-2021)

Figure 1

Crash by Collision Type

Of the 300 crashes reported, most were broadside (97 crashes), rear end (85 crashes) or hit object (62 crashes). As shown in **Figure 2**, these three collision types account for 81% of all crashes along the corridor. A breakdown of collision type by intersection is provided in **Table 2**.

Figure 2: Collision Type

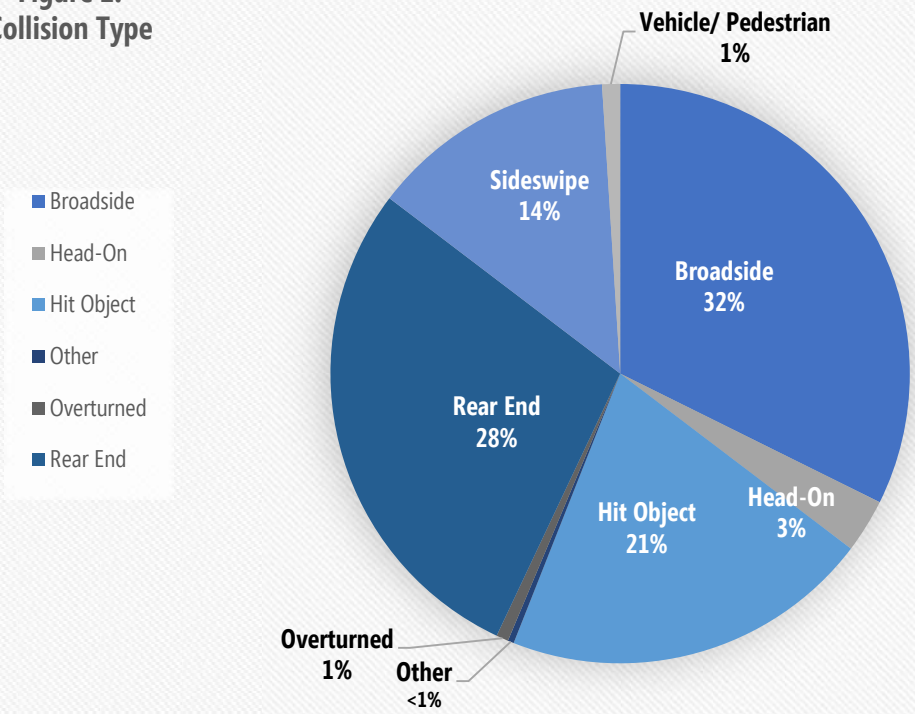


Table 2: Collision Type by Location

Crash Locations	Number of Crashes (2013-2021)	Collision Type							
		Head On	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle / Pedestrian	Other
Woods Valley Road	45	2	5	11	16	11	0	0	0
Rinehart Lane	5	0	1	0	4	0	0	0	0
Charlan Road	10	0	2	2	5	1	0	0	0
Mirar de Valle Road	21	1	2	1	11	5	0	1	0
Sunday Drive	7	0	1	2	2	2	0	0	0
Old Road	21	0	2	4	12	3	0	0	0
Calle De Vista	6	0	1	2	2	1	0	0	0
Lilac Road	64	3	11	20	13	14	1	1	1
Chaparral Terrace	8	0	1	2	0	5	0	0	0
Canyon Road	6	0	0	0	2	3	1	0	0
Miller Road	35	1	2	12	9	11	0	0	0
Indian Creek Road	6	0	1	2	2	1	0	0	0
Cole Grade Road	66	2	12	27	19	5	0	1	0
Total	**300**	**9**	**41**	**85**	**97**	**62**	**2**	**3**	**1**

Source: County of San Diego, Crossroads Database (6/2013-6/2018), SWITRS Database (7/2018-12/2021)

Crash by Collision Factor

Of the 300 crashes reported, 71% of the crashes were attributed to auto right-of-way violations (79 crashes), unsafe speed (71 crashes), or improper turning (62 crashes). Driving under the influence (DUI) accounted for 30 of the 300 crashes reported along the corridor in the eight-and-a-half-year period. **Figure 3** and **Table 3** summarize the collision factor data. Speed data provided with this report indicates that most drivers exceed the posted speed limit. To reduce speed and reduce crashes associated with speed, traffic calming measures and/or geometric modifications to the road are necessary (i.e., installing a roundabout). Improper Turning and Auto ROW also correspond with the broadside collision type.

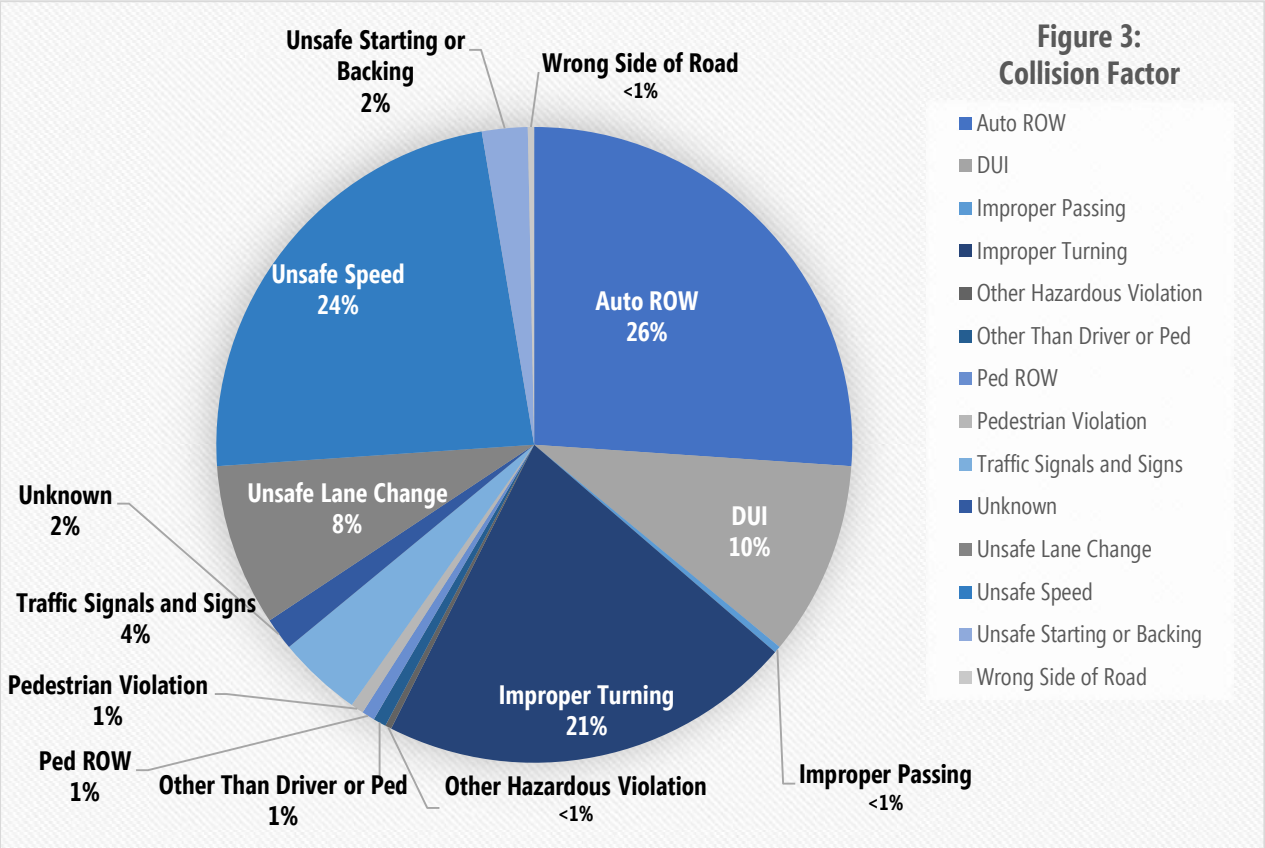


Table 3: Collision Factor by Location

Crash Locations	Number of Crashes (2013-2021)	Collision Factor													
		Unsafe Speed	Auto ROW	Improper Turning	DUI	Unsafe Lane Change	Traffic Signal & Signs	Unsafe Starting or Backing	Other	Other than Driver or Ped	Wrong Side of the Road	Improper Passing	Other Hazard Violation	Ped ROW	Ped Violation
Woods Valley Road	45	8	10	11	7	3	5	1	0	0	0	0	0	0	0
Rinehart Lane	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Charlan Road	10	2	4	1	0	1	0	0	0	1	0	1	0	0	0
Mirar de Valle Road	21	2	11	6	1	0	0	0	0	0	0	0	0	0	1
Sunday Drive	7	1	2	2	0	2	0	0	0	0	0	0	0	0	0
Old Road	21	7	8	3	2	1	0	0	0	0	0	0	0	0	0
Calle De Vista	6	1	1	4	0	0	0	0	0	0	0	0	0	0	0
Lilac Road	64	16	10	13	11	6	2	1	4	0	0	0	0	1	0
Chaparral Terrace	8	2	0	2	2	1	0	1	0	0	0	0	0	0	0
Canyon Road	6	0	2	3	1	0	0	0	0	0	0	0	0	0	0
Miller Road	35	10	8	7	4	3	0	0	0	1	1	0	1	0	0
Indian Creek Road	6	2	3	1	0	0	0	0	0	0	0	0	0	0	0
Cole Grade Road	66	20	15	9	2	8	6	4	1	0	0	0	0	1	0
Total	**300**	**71**	**79**	**62**	**30**	**25**	**13**	**7**	**5**	**2**	**1**	**1**	**1**	**2**	**1**

Source: County of San Diego, Crossroads Database (6/2013-6/2018), SWITRS Database (7/2018-12/2021)

Pedestrian & Bicycle Involved Collisions

Of the 300 collisions reported, one collision involved a bicycle. The bicycle involved collision occurred at the intersection of Valley Center Road / Lilac Road. The collision resulted in injury and is attributed to a vehicle code violation.

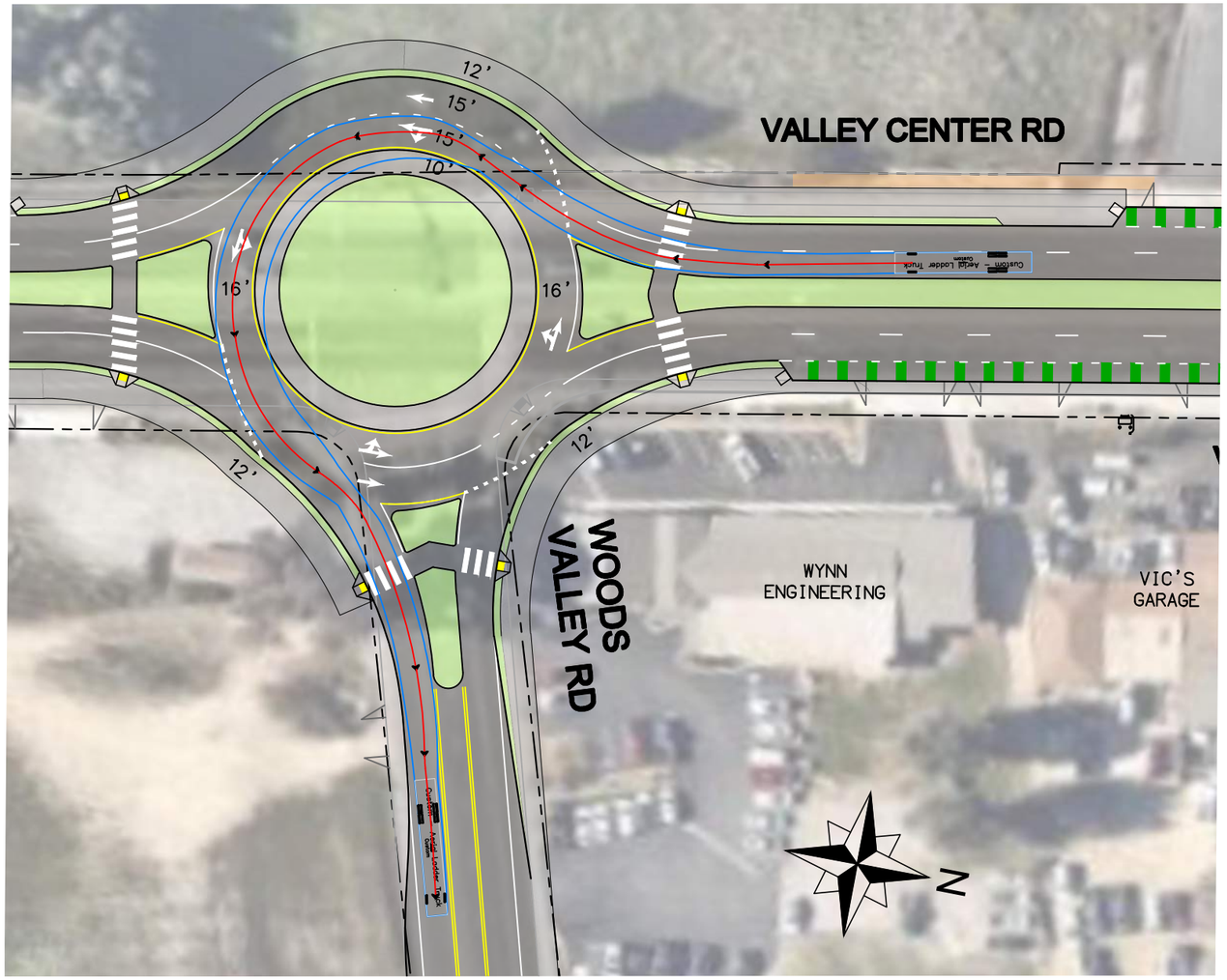
Three (3) pedestrian involved collisions were reported during the eight-and-a-half-year period. The pedestrian collisions at the intersections Cole Grade Road and Lilac Road resulted in complaints of pain and are attributed to pedestrian right-of-way violations. The pedestrian collision at Mirar de Valle Road resulted in a fatality and was also attributed to a pedestrian code violation.

Time of Day Summary of Collisions

Collision reports include a summary of the time of day, based on daylight, when the collision occurred. Based on the eight-and-a-half-year data provided, the majority of the crashes reported occurred during daylight hours. A summary of crashes by time of day is provided below:

- Daylight – 185 crashes
- Dusk / Dawn – 7 crashes
- Dark - Street Lights – 54 crashes
- Dark - No Street Lights – 53 crashes
- Dark - Lights not Functioning – 1 crash

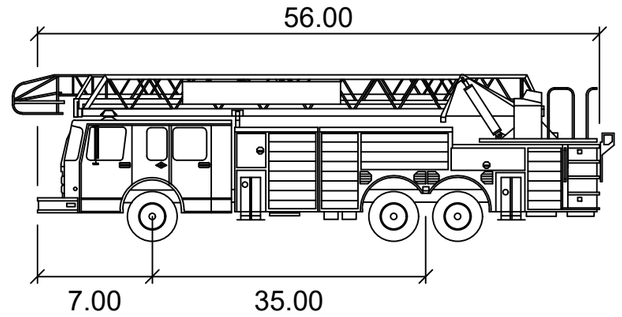
Therefore, non-daylight conditions account for approximately 38% of the crashes along Valley Center Road.



60 30 0

SCALE: 1"=60'

VALLEY CENTER RD – WOODS VALLEY RD TURN TEMPLATE



Custom - Aerial Ladder Truck

	feet
Width	: 8.25
Track	: 8.25
Lock to Lock Time	: 6.0
Steering Angle	: 33.3

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

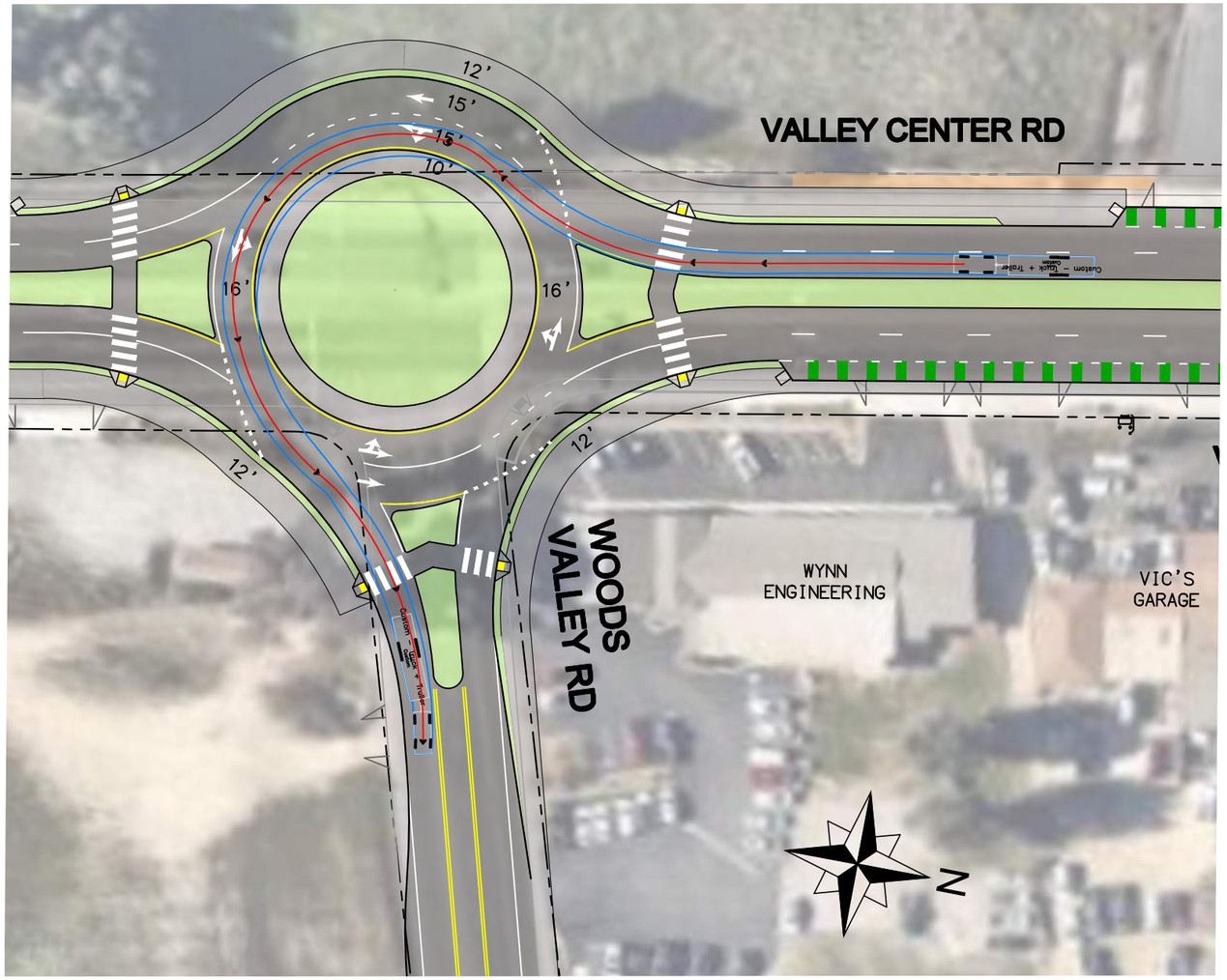
- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Michael Baker INTERNATIONAL

Exhibit 4:

Roundabout Turn Template: Aerial Ladder Truck

(Dimensions match the largest VCFPD vehicle)



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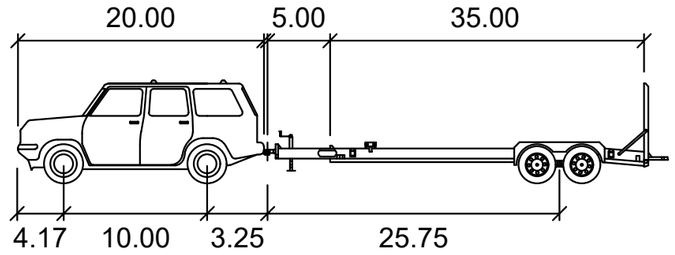
SCALE: 1"=60'

VALLEY CENTER RD – WOODS VALLEY RD TURN TEMPLATE



CUSTOM - TRUCK+TRAILER

	feet
Car Width	: 7.00
Trailer Width	: 8.00
Car Track	: 7.00
Trailer Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 19.8
Articulating Angle	: 50.0

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Exhibit 5:

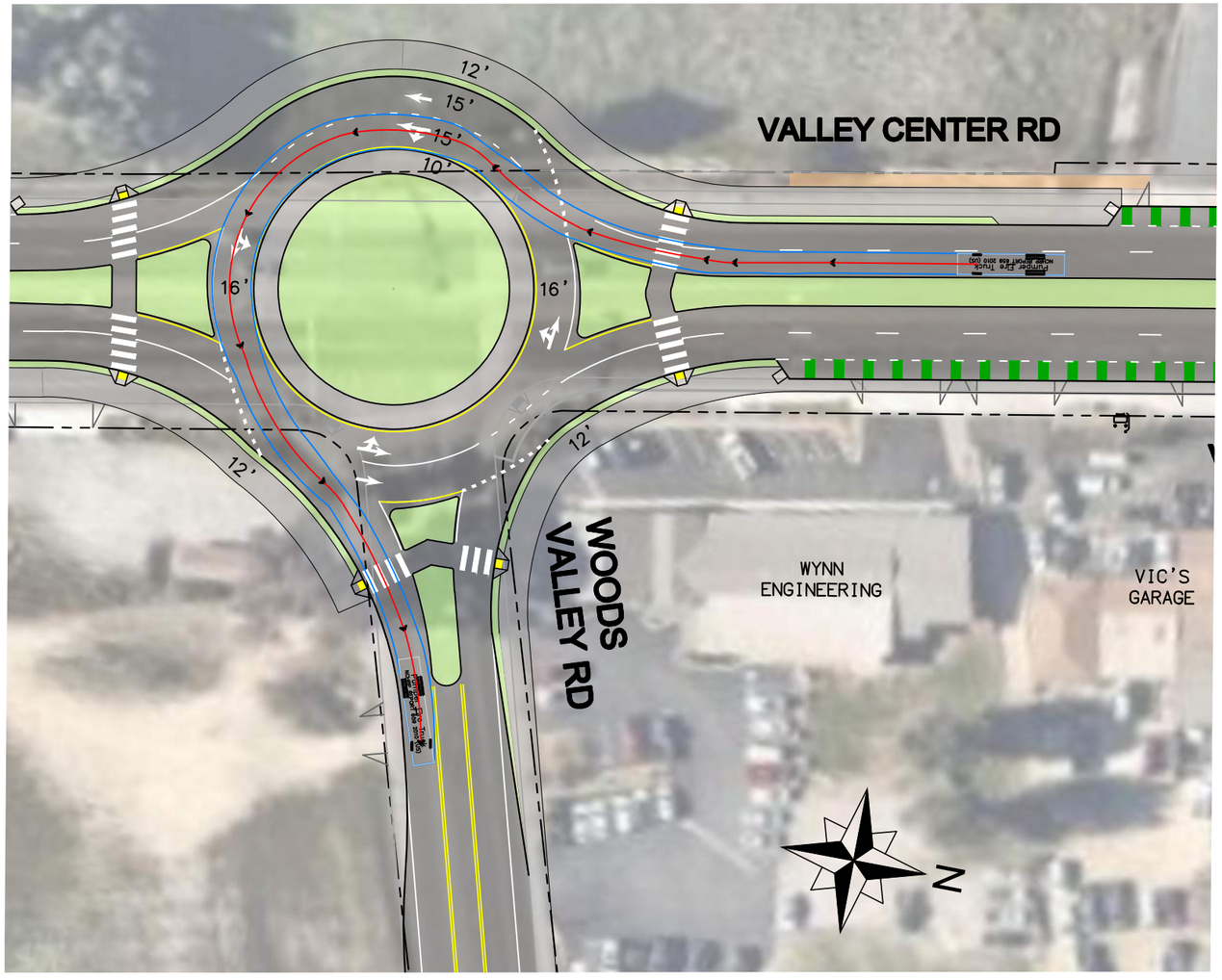
Roundabout Turn Template: CalFire Truck with Trailer for Bulldozer

(Dimensions match specifications provided by the County Fire Protection District)

Michael Baker INTERNATIONAL

H:\PDATA\170071_VALLEY CENTER CORRIDOR\TRAFFIC\EXHIBITS\CADD\DLV\170071-OVERALL-FINAL-AUTOTURN-6.DWG FRANKOWSKI, KAT 7/21/2023 10:00 AM

VALLEY CENTER RD – WOODS VALLEY RD TURN TEMPLATE



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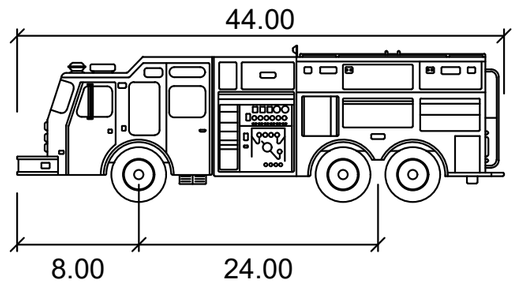
SCALE: 1"=60'



Pumper Fire Truck

		feet
Width	:	8.50
Track	:	8.50
Lock to Lock Time	:	6.0
Steering Angle	:	37.8

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Exhibit 6:
Roundabout Turn Template: Pumper Fire Truck

Michael Baker INTERNATIONAL

\\CARLCA1FS1\HROOT\PDATA\170071_VALLEY CENTER CORRIDOR\TRAFFIC\EXHIBITS\CADD\DLV\170071-OVERALL-FINAL-AUTOTURN-4.DWG GRAY, JORDAN 8/1/2023 10:35 AM

Exhibit 7

Modeled Intersection Performance Comparison of Existing Traffic Control, CCP Option A, and CCP Option B - Based on Existing Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With CCP Option A			With CCP Option B		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road		7.5 - A	9.0 - A		4.0 - A	6.7 - B		4.0 - A	6.7 - B
2-	Valley Center Road / Mirar De Valle Road	STOP	29.7 - D	**45.2 - E**		11.4 - B	13.2 - B		11.4 - B	13.2 - B
3-	Valley Center Road / Park Circle Way [3]		3.4 - A	3.7 - A		3.4 A	3.7 A		3.4 A	3.7 A
4-	Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**		4.2 - A	4.7 - A		4.2 - A	4.7 - A
5-	Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D		5.4 - A	5.6 - A		5.4 - A	5.6 - A
6-	Valley Center Road / Lilac Road		17.5 - B	13.5 - B		18.2 - B	14.0 - B		18.2 - B	14.0 - B
7-	Valley Center Road / Miller Road	STOP	27.3 - D	15.2 - C		7.8 - A	10.0 - A		27.4 - C	38.7 - D
8-	Valley Center Road / Indian Creek Road	STOP	16.9 - C	26.1 - D		6.4 - A	6.6 - B		6.4 - A	6.6 - B
9-	Valley Center Road / Cole Grade Road		31.3 - C	33.5 - C		27.1 - C	34.5 - C		9.6 - A	13.0 - B

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP)

Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout

STOP Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

Exhibit 8
Modeled Intersection Performance Comparison of Existing Traffic Control, CCP Option A, and CCP Option B
- Based on Future Year 2035 Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With CCP Option A			With CCP Option B		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.8 - A	10.0 - A	Roundabout	4.3 - A	7.6 - A	Roundabout	4.3 - A	7.6 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	**42.5 - E**	**70.8 - F**	Signal (private)	15.1 - B	15.2 - B	Signal (private)	15.1 - B	15.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	12.8 - B	18.4 - B	Signal	12.8 - B	6.7 - A	Signal	12.8 - B	6.7 - A
4-	Valley Center Road / Sunday Drive	STOP	32.7 - D	**72.9 - F**	Signal	5.6 - A	5.1 - A	Signal	5.6 - A	5.1 - A
5-	Valley Center Road / Old Road	STOP	**1338.7 - F**	**214.2 - F**	Signal	8.6 - A	6.3 - A	Signal	8.6 - A	6.3 - A
6-	Valley Center Road / Lilac Road	Signal	26.7 - C	20.5 - C	Signal	26.7 - C	19.4 - B	Signal	26.7 - C	19.4 - B
7-	Valley Center Road / Miller Road	STOP	**45.3 - E**	17.4 - C	Roundabout	9.0 - A	11.6 - B	Signal	28.4 - C	50.5 - D
8-	Valley Center Road / Indian Creek Road	STOP	19.8 - C	32.0 - D	Signal (private)	6.5 - A	8.5 - A	Signal (private)	6.5 - A	8.5 - A
9-	Valley Center Road / Cole Grade Road	Signal	42.2 - C	47.7 - D	Signal	40.2 - D	47.3 - D	Roundabout	12.7 - B	16.5 - C

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

 Traffic Signal (existing or proposed with CCP)

 Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

 Roundabout

 Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

Exhibit 9

Valley Center Road VCFPD Travel Time Comparison

Scenario		Northbound / Eastbound	Southbound
		Lilac Road to Cole Grade Road	Lilac Road to Woods Valley Road
Based on Existing Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:31	2:49
Option A	Travel Time	4:55	3:03
	Difference	+0:24	+0:14
Option B	Travel Time	5:07	3:03
	Difference	+0:36	+0:14
No Roundabouts	Travel Time	5:31	3:06
	Difference	+1:00	+0:17
Based on Future Year 2035 Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:55	2:51
Option A	Travel Time	5:23	3:07
	Difference	+0:28	+0:16
Option B	Travel Time	5:40	3:07
	Difference	+0:45	+0:16
No Roundabouts	Travel Time	6:17	3:11
	Difference	+1:22	+0:20
Difference between Existing and Future Year 2035			
Baseline (Calibrated)		+0:24	+0:02
Option A		+0:28	+0:04
Option B		+0:33	+0:04
No Roundabouts		+0:46	+0:05

All times are shown in minutes : seconds

Notes:

- Baseline (calibrated) scenario utilizes actual speeds provided by AVL (automatic vehicle location) data. For segments that were greater than the posted speed limit (45 MPH), a ceiling cap of 45 MPH was applied. For speeds lower than 45 MPH, actual speeds were used.
- Option A & B assumes the same segment speeds as the Baseline condition and only considers the change in delay associated with the intersection control modifications.
- South of Lilac Road, Option A and Option B have the same intersection controls and geometry. Therefore the estimated travel time in the southbound direction are assumed to be identical.
- All Travel Time estimates utilize PM Peak Hour intersection delays as this scenario is shown to be the worse case study scenario.
- All Travel Time estimates utilize the approach delay for the direction of travel (i.e. northbound / eastbound or southbound approaches to the intersection).

EXHIBIT 10 AVL of E161 to Cool Valley Rd

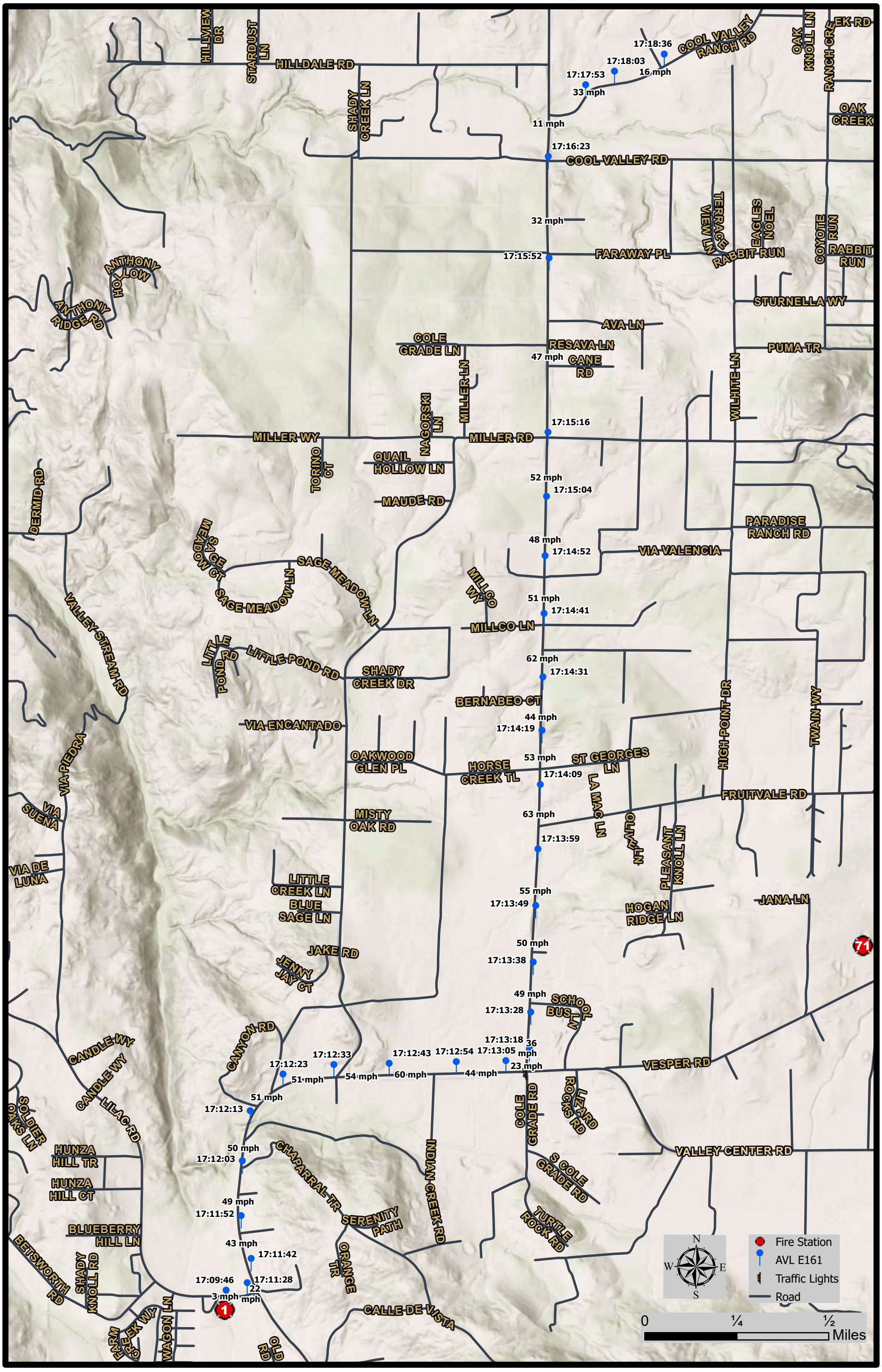
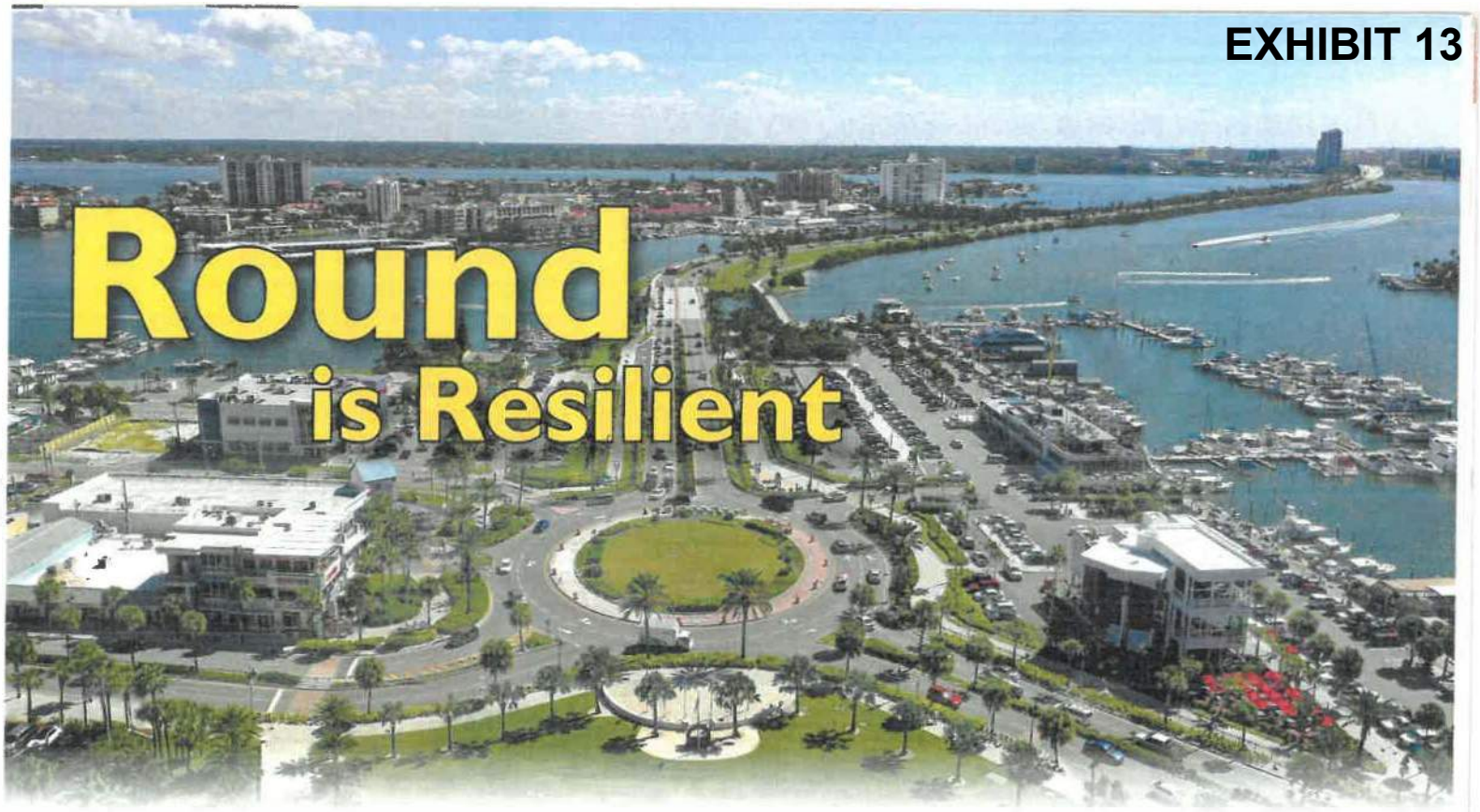


EXHIBIT 11 AVL of E161 to Woods Valley Rd

EXHIBIT 12

EXHIBIT 13



Round is Resilient

Paul Bertels knew he faced the biggest challenge of his career. Hurricane Charlie had already destroyed parts of Punta Gorda and was headed directly for Clearwater Beach, a barrier island on the west coast of Florida. As the City of Clearwater Traffic Operations Manager, he, somehow, had to pull off a mandatory evacuation of the beach. Hurricane Charlie was the most intense storm to hit Florida since Hurricane Andrew wreaked havoc on South Florida in 1992 and the strongest storm to hit the west coast of Florida in a century.

Bertels knew he could contraflow the westbound lanes of the 4-lane divided highway, Memorial Causeway, that connects Clearwater Beach to the mainland. That would give him enough causeway capacity to safely evacuate the beach population. But the intersection connecting the causeway to the beach roadway network was the Clearwater Beach Entryway Roundabout, a trailblazing project that four years earlier had become the first high-profile modern roundabout in the United States. With a normal daily traffic of about 33,000 vehicles, the beach roundabout operation is tested every Spring Break weekend, when the traffic volume almost doubles to nearly 60,000. The roundabout aces that test every year by controlling Spring Break traffic arriving from the mainland with the first roundabout metering signal in the United States, but how could the roundabout handle mandatory evacuation traffic departing the Beach?

The problem Paul Bertels had to solve was how to double the capacity of the roundabout for the evacuation. Because the roundabout is located mid-island, normally traffic from both North and South Clearwater Beach departs the island by flowing counter-clockwise through the south half of the roundabout and directly into the two eastbound lanes of the causeway and on to the mainland. No one had ever attempted to evacuate an island through half a

continued on next page

As the City of Clearwater Traffic Operations Manager, Ken Sides, somehow, had to pull off a mandatory evacuation of the beach.

By Ken Sides, PE, PTOE, CNU-a

Round is Resilient continued from page 23

roundabout. Working closely with the police beach commander Mike Williams, Bertels devised a plan to contraflow the north half of the roundabout, so that all North Beach traffic contraflowed clockwise through the north half of the roundabout and directly into the two contraflowed westbound lanes of Memorial Causeway. Remarkably, very few resources were needed to contraflow the roundabout: just one parked police vehicle to block circulating traffic from entering the contraflowing section and two patrol officers on foot to direct North Beach traffic entering the roundabout to contraflow clockwise, instead of flowing normally counter-clockwise.

Networks aren't networks without functioning nodes, and that includes the roadway transportation network. But severe storms, hurricanes and power outages can severely curtail the operation of street intersections and make them dangerous to cross, adding to woes during and after disasters.

Modern roundabouts are the most resilient intersections ever invented. In normal operation, they provide excellent operational efficiency and outstanding safety compared to conventional intersections. Modern roundabouts operate exactly the same both in normal times and after disasters because they require no sensors, signals, controllers or electricity to operate the same as they always do. Even if the roundabout YIELD signs have been blown away by high winds, the geometry of modern roundabouts causes all drivers to slow down to 25 MPH or less—highly desirable behavior during times of stress.

For roundabouts, there is no lengthy and very costly post-disaster recovery period of dangerous, minimally functioning intersections while repair crews scramble to repair downed power lines, restore power, and replace missing signal heads and damaged controllers. There is no hindrance to emergency vehicles, no severe crashes, and no need to divert critically-needed police forces to manually direct intersection traffic.

Many small and medium-sized signalized intersections are good candidates for conversion to modern roundabouts for safety and operational benefits alone; taking them off the signal network relieves the annual signal budget during normal times and can pay big dividends in time of disaster. Instead of rebuilding signalized intersections post-disaster at considerable expense, some could instead be converted to modern roundabouts.

An early study by the Insurance Institute for Highway Safety found that modern roundabouts reduce fatalities by more than 90% --thereby closing in on the goal of Vision Zero for intersections. Based on 17 years of crash data, a 2018 study by Pennsylvania DOT found modern roundabouts have reduced both fatalities and severe injuries by 100% to zero. Minor injuries were reduced 95%, and possible/unknown injuries by 92%. Total crashes went down 47%. The Florida DOT pegs the comprehensive cost to society of a fatal crash at $10,660,000 and severe injury crashes at $599,040.

A 2017 Minnesota DOT study found

modern roundabouts have reduced the fatality crash rate by 86% and the severe injuries rate by 83%. The crash rate for all roundabouts is ½ the crash rate of high-volume/low-speed signalized intersections and 1/3 the crash rate of high-volume/high-speed signalized intersections. The typical 15-25 MPH roundabout speeds and two-thirds fewer pedestrian/vehicle conflict points are a substantial safety benefit for pedestrians, youngsters, oldsters, bicyclists, skaters and transit riders, as well.

Converting signalized intersections to modern roundabouts typically improves peak hour operations a very welcome 30%, and roundabouts flow even better for the roughly 80% of traffic that is off-peak. Late-night vehicles typically encounter no delay at all. The elimination of idling vehicle-hours queued up at red lights typically results in a 30% reduction in the associated fuel consumption, toxic pollution, and greenhouse gas emissions—the last a major contributor to increasing storm severity due to the greater energy input of warming ocean water into storm formation.

In the aftermath of Hurricane Florence, Traffic Management Officer Eric Lippert was directing traffic at an inoperative signalized intersection in Wilmington, NC, when he realized the intersection could better handle the low post-storm traffic volume by itself and without him—if it were converted to a temporary roundabout by means of few traffic cones. His "tactical urbanism" idea worked surprisingly well in rudimentary implementation, so several other Wilmington intersections were also promptly and easily converted to temporary "cone" roundabouts. Wilmington City Traffic Engineer Don Bennett, PE, refined the design and observed that, "Unequivocally, a single lane roundabout works better than four, 5-lane approaches with STOP control. There are capacity issues, but it works much better and everyone complies." During critical times, each intersection was tying up 12-16 officers for 24-hour operations; the "coneabouts" got that down to just three officers plus a patrol car parked in the center. The officers reset downed cones and the vehicle's flashing blue light alerts motorists in advance.

Converting signalized intersections to modern roundabounts typically improves peak hour operations a very welcome 30%...

Modern roundabouts offer engineers a way to dramatically reduce intersection fatalities and severe injuries while saving society billions of dollars annually. To date,

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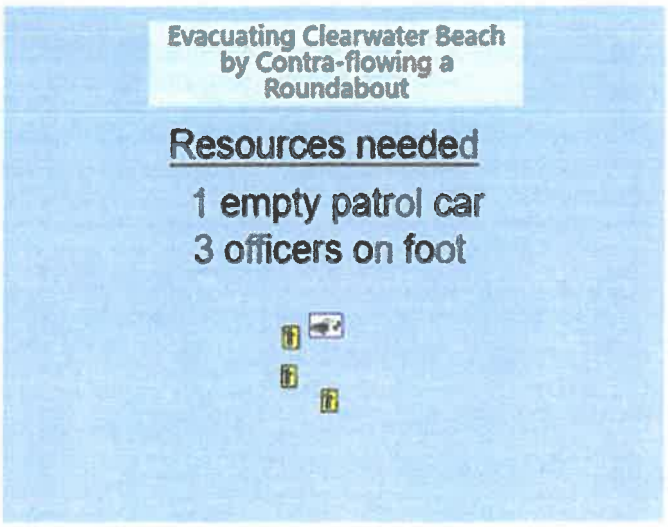

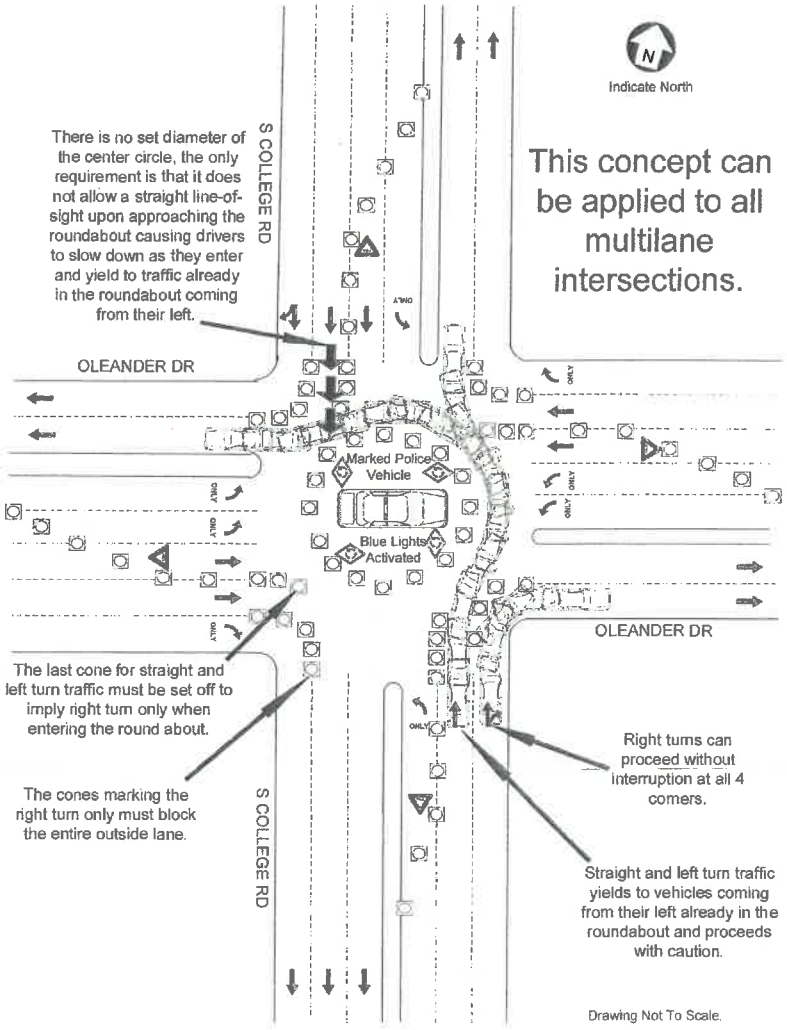

the United States has built approximately 5,000 modern roundabouts, but to achieve roundabout parity by population with countries such as France or Australia, the U.S. would need to construct some 145,000 roundabouts. The City of Carmel, Indiana, has led the way by eliminating almost all traffic signals and constructing 121 modern roundabouts—more than one for every 1,000 residents. The equivalent for Tallahassee would be a minimum of 190 roundabouts.

References

[1] *Crash Reductions Following Installation of Roundabouts in the United States*, Insurance Institute for Highway Safety, Bhagwant N. Persaud, Richard A. Retting, Per E. Garder, Dominique Lord, March 2000

[2] The Pennsylvania Department of Transportation, 9/27/2018, https://www.penndot.gov/pages/all-news-details.aspx?newsid=536

[3] FDOT KABCO Crash Costs, Table 122.6.2, FDOT Design Manual, Florida Department of Transportation, 1/1/2018

[4] *A Study of the Traffic Safety at Roundabouts in Minnesota,* Office of Traffic, Safety, and Technology Minnesota Department of Transportation, Derek Leuer, P.E., October 30, 2017, http://www.dot.state.mn.us/trafficeng/safety/docs/roundaboutstudy.pdf

About the Author:

Ken Sides, PE, PTOE, CNU-a, is a Senior Transportation Engineer for Sam Schwartz Transportation Consultants in Tampa, Florida. He is a quadruple hurricane evacuee, having fled ahead of Hurricanes Andrew, Charley, Irma, and Florence. He has been instrumental in several dozen modern roundabouts constructed in Clearwater, Florida, mostly as project manager. Many of the roundabouts are elements of complete street road diet corridor projects. His first roundabout was the pioneering Clearwater Beach Entryway Roundabout in 1998. His roundabout projects have won nine engineering, planning and construction awards.

Mr. Sides is a long-serving member of both the Transportation Research Board (TRB) Roundabout Committee and the Institute of Transportation Engineers (ITE) Roundabout Committee. TRB is an arm of the National Academy of Sciences. He is a certified Professional Transportation Operations Engineer (PTOE), an accredited member of the Congress of New Urbanism (CNU-a), and a certified bicycle safety instructor. His peers have named him Engineer of the Year four times.

Valley Center Road Corridor Concept Plan

Appendix C:
2024 Citygate Report Supplement

CITYGATE
FIRE & EMS

SUPPLEMENT TO THE SEPTEMBER 2023 REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS: ADDRESSING THE DRAFT FINAL CORRIDOR CONCEPT PLAN

FINAL REPORT SUPPLEMENT

SAN DIEGO COUNTY

JUNE 24, 2024

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FIRE & EMS

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CITYGATE
ASSOCIATES
600 Coolidge Drive, Suite 150 ■ Folsom, CA 95630 ■ PH 916-458-5100 ■ FAX 916-983-2090

June 24, 2024

RE: SUPPLEMENT TO THE SEPTEMBER 2023 REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS – ADDRESSING THE DRAFT FINAL CORRIDOR CONCEPT PLAN

This supplement to Citygate Associates, LLC's (Citygate's) 2023 report reviews the Draft Final Valley Center Road Corridor Concept Plan (CCP), which is slightly different than the options covered in our analysis that was published on September 26, 2003. Citygate's ongoing scope of work is to understand the potential impacts of the CCP options on fire and EMS response times and public evacuation.

Citygate's updated research work on the Spring 2024 Draft Final CCP included:

- Understanding the perspectives of community members as presented in the public meetings.
- Review of the updated traffic flow and intersection design work by Michael Baker International (MBI) for the Draft Final CCP.
- Comparison and contrast of the use of the Draft Final CCP intersection controls on emergency response times and disaster evacuation routes, including traffic signals and roundabouts.
- Comparison of historical fire unit travel time records (as used in Citygate's 2023 report) to the Draft Final CCP design traffic control models.

COMPONENTS OF THE DRAFT FINAL CCP

Following several outreach meetings for consideration of the three CCP options addressed in Citygate's 2023 report, the Valley Center Community Planning Group (CPG) voted on February 12, 2024, to recommend new CCP Option A with one revision: to remove the Woods Valley Road intersection roundabout included in that option. All other components of Option A would apply to the Draft Final CCP per this CPG recommendation, including the proposed roundabout at the Miller Road intersection. This CPG recommendation is now the Draft Final CCP and is addressed in this supplement to Citygate's 2023 Report, which addressed previous CCP Options A, B, and C. Plan sheets for this Draft Final CCP can be found in Exhibit S-1.

The key components of the Draft Final CCP are:

- A two-lane roundabout at the Miller Road intersection.
- Newly proposed traffic signals at the Sunday Drive and Old Road intersections.
  - Implementation actions for newly proposed signals at the Old Road and Sunday Drive intersections would be contingent on funding availability and adherence to the latest guidance in the California Manual on Uniform Traffic Control Devices (CA MUTCD) for justifying signal installation.
  - In the full corridor one-page plan sheet attached as Exhibit S-1, these newly proposed signals and existing signals are depicted with white circles surrounding the signal symbol. The signals with yellow circles are conditions of private development projects and are not considered part of the improvements planned with the Valley Center Road CCP.
- A controlled pedestrian crossing (also referred to as a pedestrian signal) at Rinehart Lane.
  - The type of controlled pedestrian crossing would be determined during the engineering phase of implementation.
- Curb extensions (also referred to as bulb outs) at all existing or proposed signalized intersections.
- A Class IV separated bikeway on both sides of the road throughout the corridor.
  - The type of physical separation would be determined at the engineering phase of implementation.
- Extending the raised median throughout the corridor, with median openings limited to signal or roundabout-controlled intersections.
- No left turn restrictions at stop sign-controlled side streets.
- A 25-foot-long mountable median in the South Village for public safety personnel use only.
- Reduction in travel lane widths (outside the roundabout) from 12’ to 11’.
- Extending the 5’-wide sidewalk on the east and south sides of the corridor to fill in existing gaps.
- Maintaining the 8’-wide Heritage Trail pathway on the west and north sides of the corridor, with minor modifications at the proposed roundabout to accommodate the roundabout multi-use path, as well as at the proposed curb extensions.

- Converting crosswalks to continental crosswalks at intersections that do not already have continental crosswalks.

- The plan sheets in Exhibit S-1 show a few locations for consideration as potential bus stop relocations. These potential relocations are in consideration of best practices under ideal implementation circumstances (e.g., a County-initiated implementation project). The bus stop relocations are not required for Valley Center Road CCP consistency but may be considered during implementation coordination with the North County Transit District (NCTD), the operator of a bus route along the corridor.

UPDATED CITYGATE TECHNICAL REVIEW

Citygate reviewed the Draft Final CCP traffic flow modeling statistics provided by MBI in Exhibits S-5 and S-6. This review included the changed mathematics due to the exchange of a roundabout for a controlled intersection traffic signal at Valley Center Road and Woods Valley Road and any other design changes that might affect the response times of emergency units, given the sensitivity of the traffic models.

In Citygate's experience, the exchange of one roundabout for a signal-controlled intersection is not a major enough design change to significantly change the summary findings in our initial 2023 review of the corridor design elements as to impacts on public safety access. Citygate has revisited and then compared in depth the findings of our September 2023 report that related to evaluation of the 2023 CCP options for emergency response and evacuation consideration. For clarity, we list below all of our 2023 findings and, where needed, address changes given the 2024 Draft Final CCP.

Finding #1: In Citygate's experience, the existing emergency response travel times for fire units are typical for suburban business districts as found within the corridor. The fire unit speeds reflect the existing four-lane boulevard design with intermittent medians and controls.

No changes; was not applicable to evaluation and comparison of the Draft Final CCP.

Finding #2: The two roundabouts proposed in Option A and Option B are consistent with best practices and will impact fire unit travel times less than traffic signals while being safer for the motoring public and firefighters requesting emergency right-of-way. For both Options A and B, there are only two roundabouts proposed for the CCP—one north of Lilac Road, and one south of Lilac Road. Based on the location of Station 1 (Lilac Road), a Valley Center Fire unit would typically only encounter

one roundabout during a response. The lag factor for multiple added traffic signals will be far greater than it will be for the one roundabout.

Supplement to Finding #2 for Draft Final CCP: *The finding's impacts are unchanged other than the removal of the southern corridor roundabout.*

Finding #3: In Citygate's experience, increased traffic and added development along the corridor will result in the need for additional intersection control requirements at some point in the near term—even without a Corridor Concept Plan. Therefore, response times will be affected by congestion, an increased number and use of side streets/driveways, and controls such as traffic signals.

No changes; was not applicable to evaluation and comparison of the Draft Final CCP.

Finding #4: Increasing traffic and resultant required traffic controls will lengthen emergency unit travel time. The current CCP strategies only lengthen travel times by 0:14 to 0:36 seconds compared to longer anticipated delays with other options.

Supplement to Finding #4 for Draft Final CCP: *In comparison to the previous Options A and B, the removal of the single roundabout at Woods Valley Road and Valley Center Road in the Draft Final CCP—combined with all the southbound design elements—only increases emergency unit travel time from the 2023 Options A and B by 4 seconds, from 3:07 minutes to 3:11 minutes, using Exhibit S-6 2035 traffic volumes. It only increases by 3 seconds in the modeling based on existing traffic volumes found in the same Exhibit. This resultant impact is materially insignificant given all the variables related to emergency unit speeds in differing traffic volumes across a 24/7/365 traffic flow model. Any change in time that is less than 1:00 minute is not likely to negatively impact emergency outcomes.*

Finding #5: The least traffic safety impact to response times will be the options with roundabouts proposed as part the CCP. The small roadway design impact on fire or ambulance unit travel time must be contrasted with the overall improvements in traffic and pedestrian safety.

Supplement to Finding #5 for the Draft Final CCP: *The only change is that there is only one remaining roundabout. The modeling shows that any roundabout causes less impact to travel time than a traffic signal.*

Finding #6: The proposed roundabouts in the CCP Options A and B will not slow or hamper evacuation route use and, in fact, would provide a smoother flow and higher capacity than a four-way intersection.

Supplement to Finding #6 for the Draft Final CCP: *The only change is that there is only one remaining roundabout. The roundabout proposed in the Draft Final CCP was also part of Option A addressed in our 2023 study, and Citygate stands by this finding in consideration of the Draft Final CCP.*

CAPSTONE RECOMMENDATION

Based on the six findings included in our 2023 report and a supplemental review of the Draft Final CCP, combined with Citygate's research and professional experience in fire unit travel time planning, we find that fire and EMS unit response times will not be materially lengthened by the Draft Final CCP. Further, Citygate recommends the use of the roundabout in the Draft Final CCP, as it will slow response times the least (compared to a traffic signal) while providing for smoother evacuation routing.

CITYGATE
FIRE & EMS

SUPPLEMENT TO THE SEPTEMBER 2023 REVIEW OF EMERGENCY RESPONSE CONSIDERATIONS FOR THE VALLEY CENTER ROAD CORRIDOR CONCEPT PLAN DESIGN OPTIONS: ADDRESSING THE DRAFT FINAL CORRIDOR CONCEPT PLAN

FINAL REPORT SUPPLEMENT
ALL EXHIBITS

SAN DIEGO COUNTY

JUNE 24, 2024

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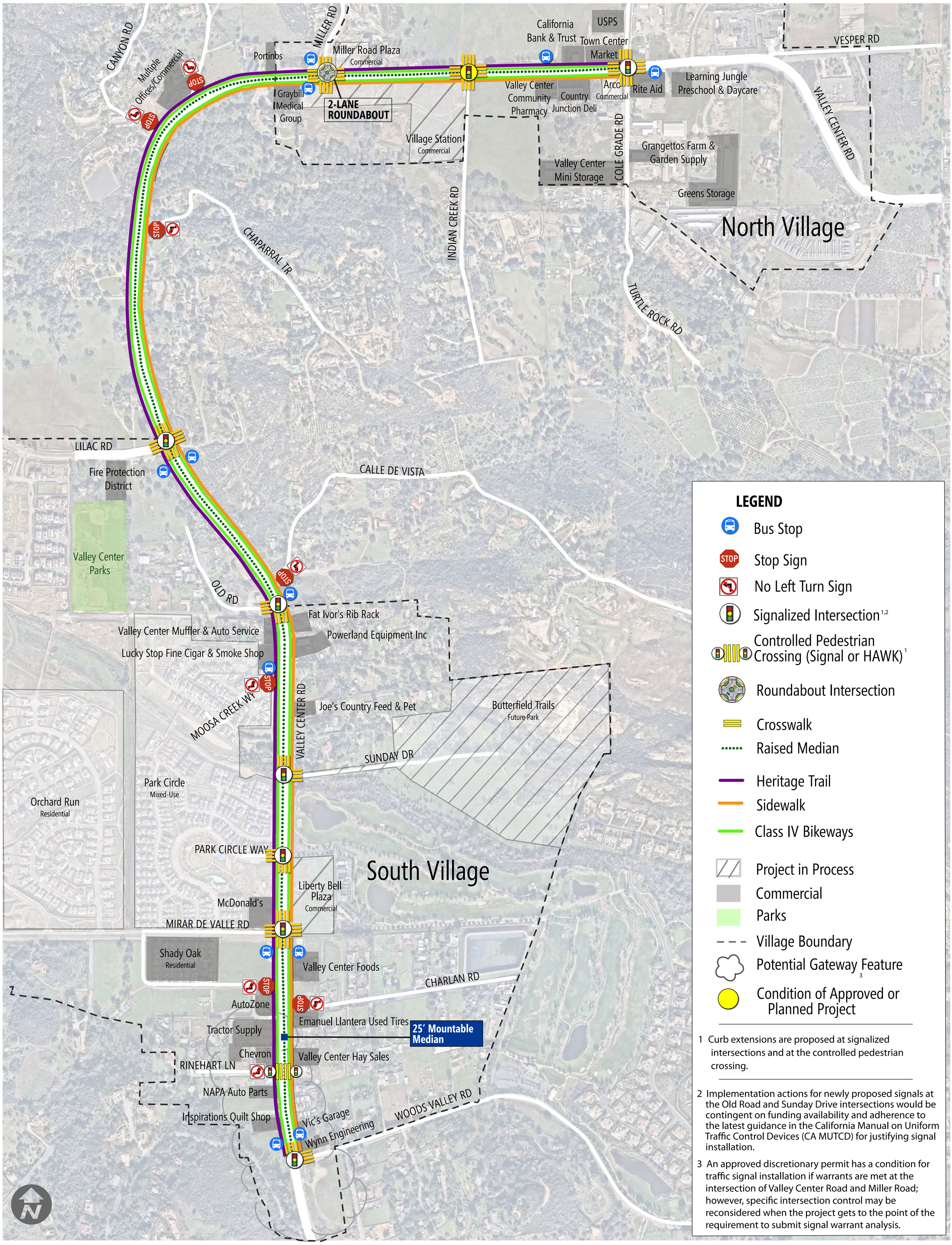
Michael Baker
INTERNATIONAL

Exhibit S-1 -
Draft Final Valley Center Road Corridor Concept Plan



LEGEND

- Bus Stop
- Stop Sign
- No Left Turn Sign
- Signalized Intersection[1,2]
- Controlled Pedestrian Crossing (Signal or HAWK)[1]
- Roundabout Intersection
- Crosswalk
- Raised Median
- Heritage Trail
- Sidewalk
- Class IV Bikeways
- Project in Process
- Commercial
- Parks
- Village Boundary
- Potential Gateway Feature[3]
- Condition of Approved or Planned Project

1 Curb extensions are proposed at signalized intersections and at the controlled pedestrian crossing.

2 Implementation actions for newly proposed signals at the Old Road and Sunday Drive intersections would be contingent on funding availability and adherence to the latest guidance in the California Manual on Uniform Traffic Control Devices (CA MUTCD) for justifying signal installation.

3 An approved discretionary permit has a condition for traffic signal installation if warrants are met at the intersection of Valley Center Road and Miller Road; however, specific intersection control may be reconsidered when the project gets to the point of the requirement to submit signal warrant analysis.

COUNTY OF SAN DIEGO

Valley Center Road Corridor Concept Plan

May 2024
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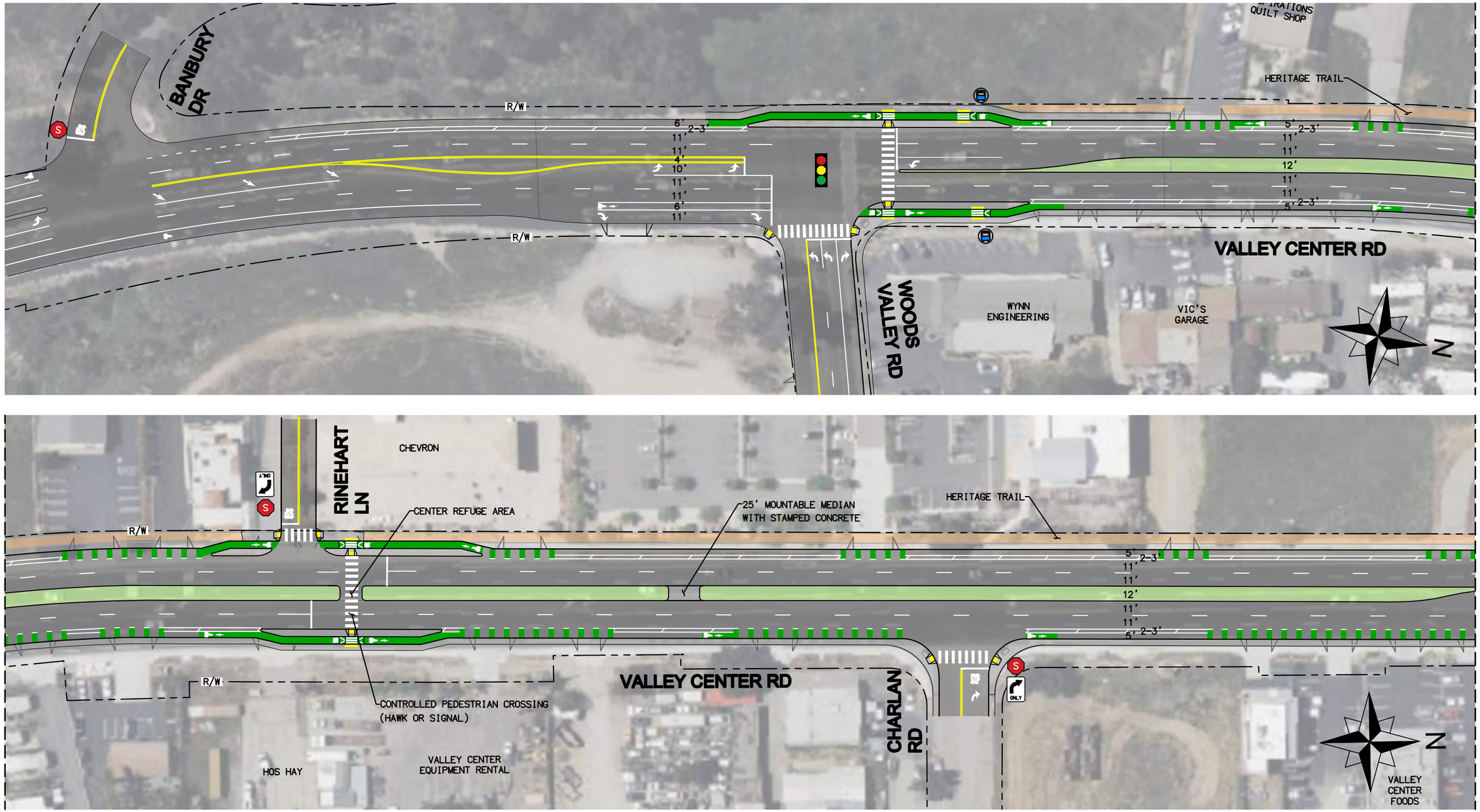

LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION - TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 1 OF 6

MATCHLINE SHEET 1

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

MATCHLINE SHEET 3

MIRAR DE VALLE

PARK CIRCLE WAY

MOOSA CREEK WAY

SUNDAY DR

HERITAGE TRAIL

R/W

5' 2-3'
11'
11'
12'
11'
11'
5' 2-3'

VALLEY CENTER RD

FROM

TO

OPTIONAL (NOT REQUIRED FOR VCRCCP CONSISTENCY): POTENTIAL BUS STOP RELOCATION FOR CONSIDERATION.

JOE'S COUNTY FEED & PET

LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION - TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 2 OF 6

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MATCHLINE SHEET 2

MATCHLINE BELOW LEFT

LUCKY STOP FINE CIGAR & SMOKE

VALLEY CENTER MUFFLER & AUTO SERVICE

OLD RD

HERITAGE TRAIL

R/W

5' 2-3' 11' 11' 12' 11' 11' 5' 2-3'

VALLEY CENTER RD

FAT IVORS RIB RACK

CALLE DE VISTA

ONLY

N

MATCHLINE ABOVE RIGHT

HERITAGE TRAIL

R/W

5' 2-3' 11' 11' 12' 11' 11' 5' 2-3'

5' 2-3' 11' 11' 22' 11' 11' 5' 2-3'

2-3' 5' 11' 11' 10' 10' 11' 11' 5' 2-3'

VALLEY CENTER RD

LILAC RD

N

MATCHLINE SHEET 4

FROM

TO

OPTIONAL (NOT REQUIRED FOR VCRCCP CONSISTENCY): POTENTIAL BUS STOP RELOCATION FOR CONSIDERATION.

LEGEND

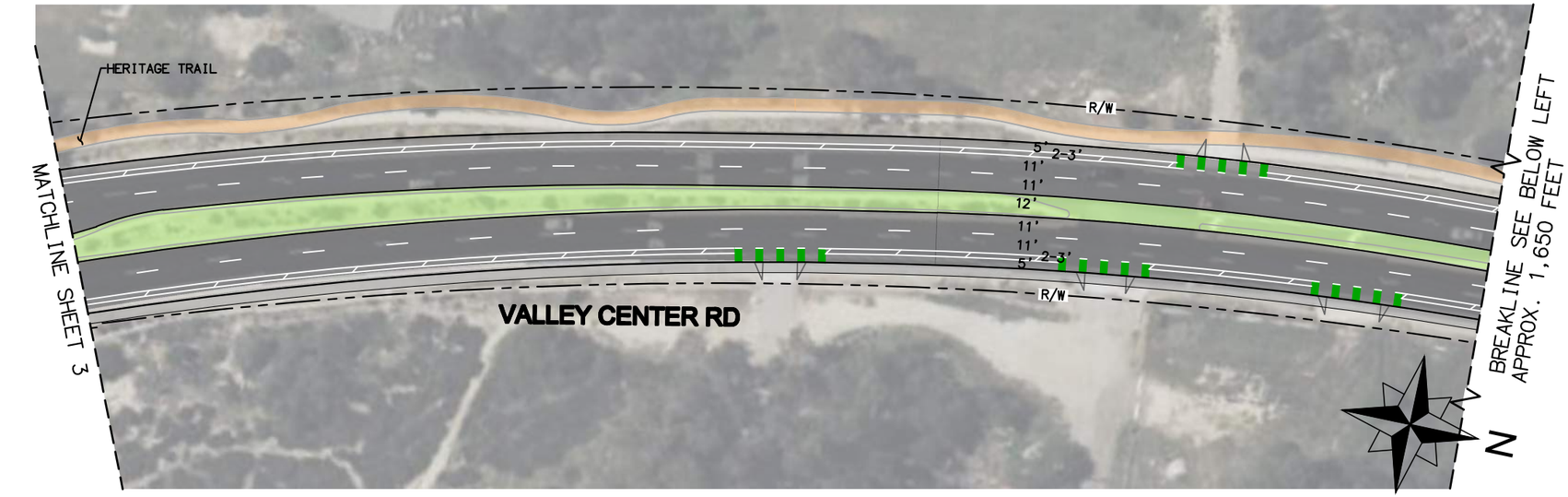
- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION - TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

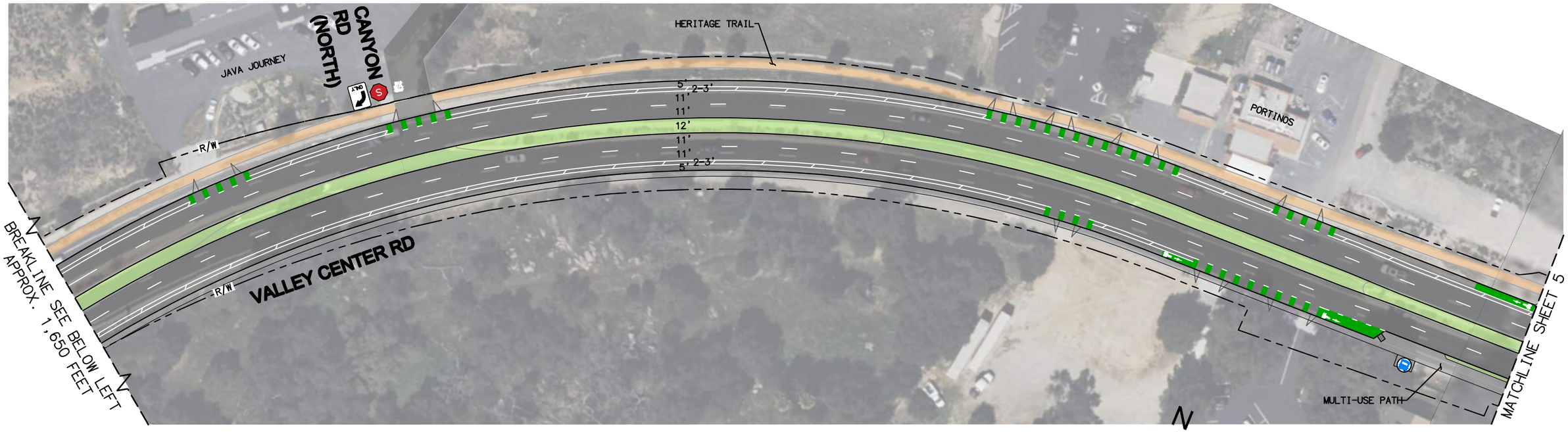
80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 3 OF 6





LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION – TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

N

80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 4 OF 6

MATCHLINE SHEET 4

MATCHLINE BELOW LEFT

MATCHLINE ABOVE RIGHT

MATCHLINE SHEET 6

MILLER RD

VALLEY CENTER RD

R/W

HERITAGE TRAIL

MULTI-USE PATH

12'
15'
15'
10'
12'
16'
16'
12'
12'

5' 2-3'
11'
11'
12'
11'
11'
5' 2-3'

FUTURE INDIAN CREEK ROAD EXTENSION

FUTURE ANTICIPATED R/W

CALIFORNIA BANK

INDIAN CREEK RD

LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION - TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

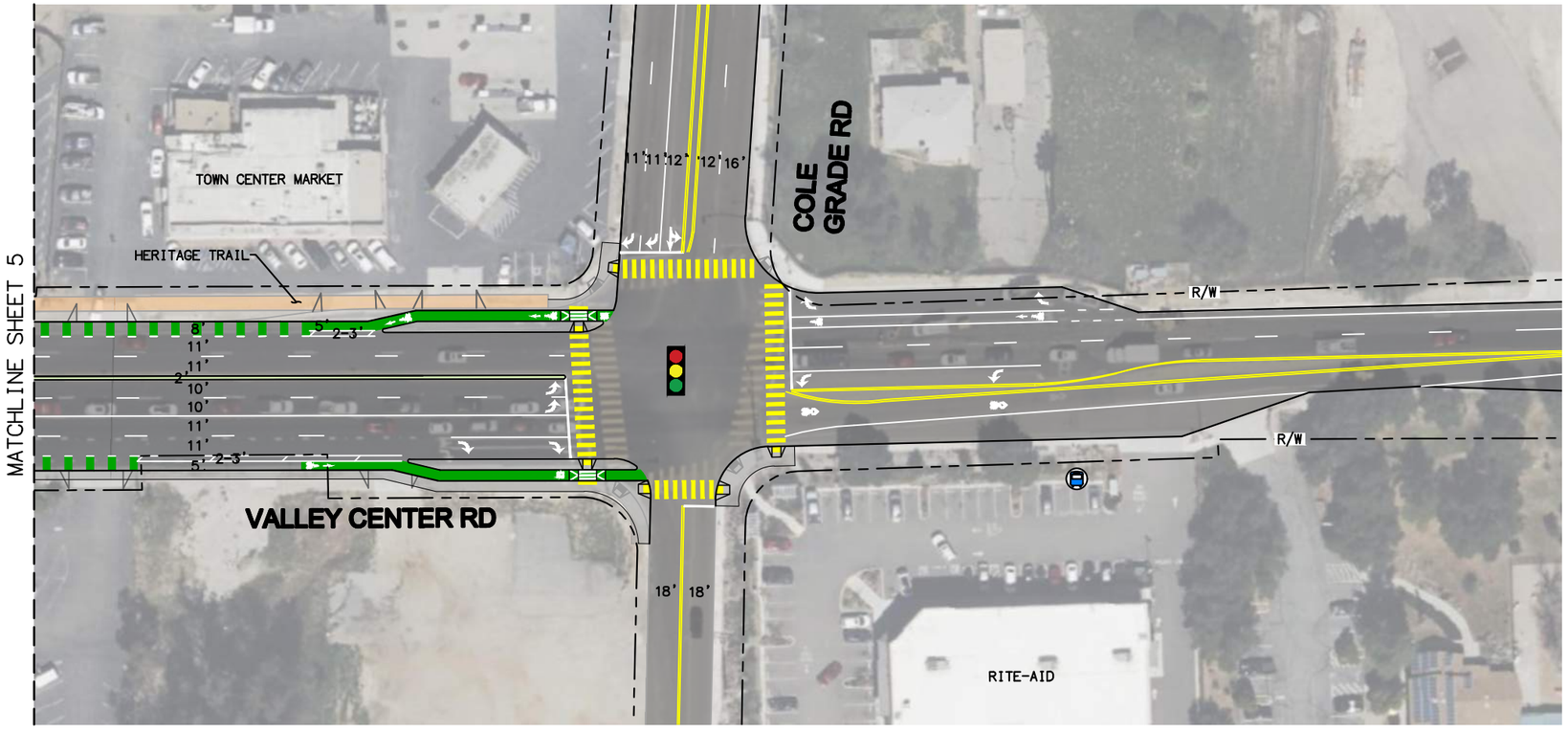
80 40 0

SCALE: 1"=80'

N

Valley Center Road Corridor Concept Plan

SHEET 5 OF 6



LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER (WITH PHYSICAL SEPARATION - TYPE TO BE DETERMINED WITH ENGINEERING DESIGN)
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

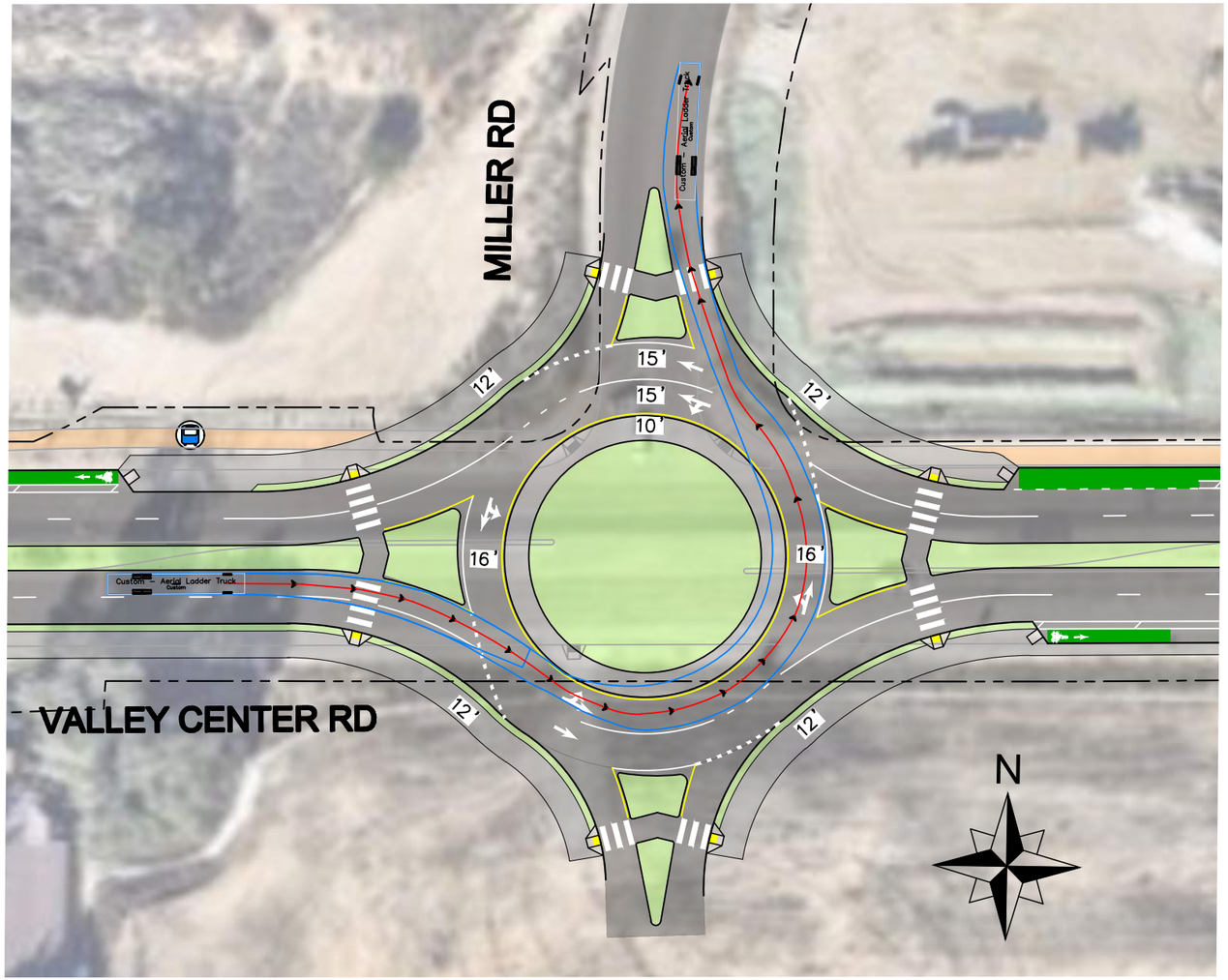
N

80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

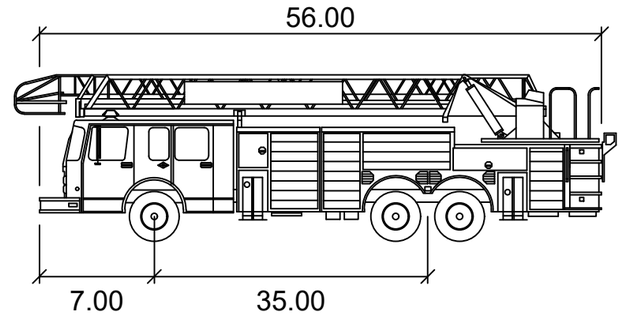
SHEET 6 OF 6



60 30 0

SCALE: 1"=60'

VALLEY CENTER RD – MILLER RD
TURN TEMPLATE



Custom - Aerial Ladder Truck

		feet
Width	:	8.25
Track	:	8.25
Lock to Lock Time	:	6.0
Steering Angle	:	33.3

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Exhibit S-2:
Roundabout Turn Template: Aerial Ladder Truck
(Dimensions match the largest VCFPD vehicle)

Michael Baker INTERNATIONAL

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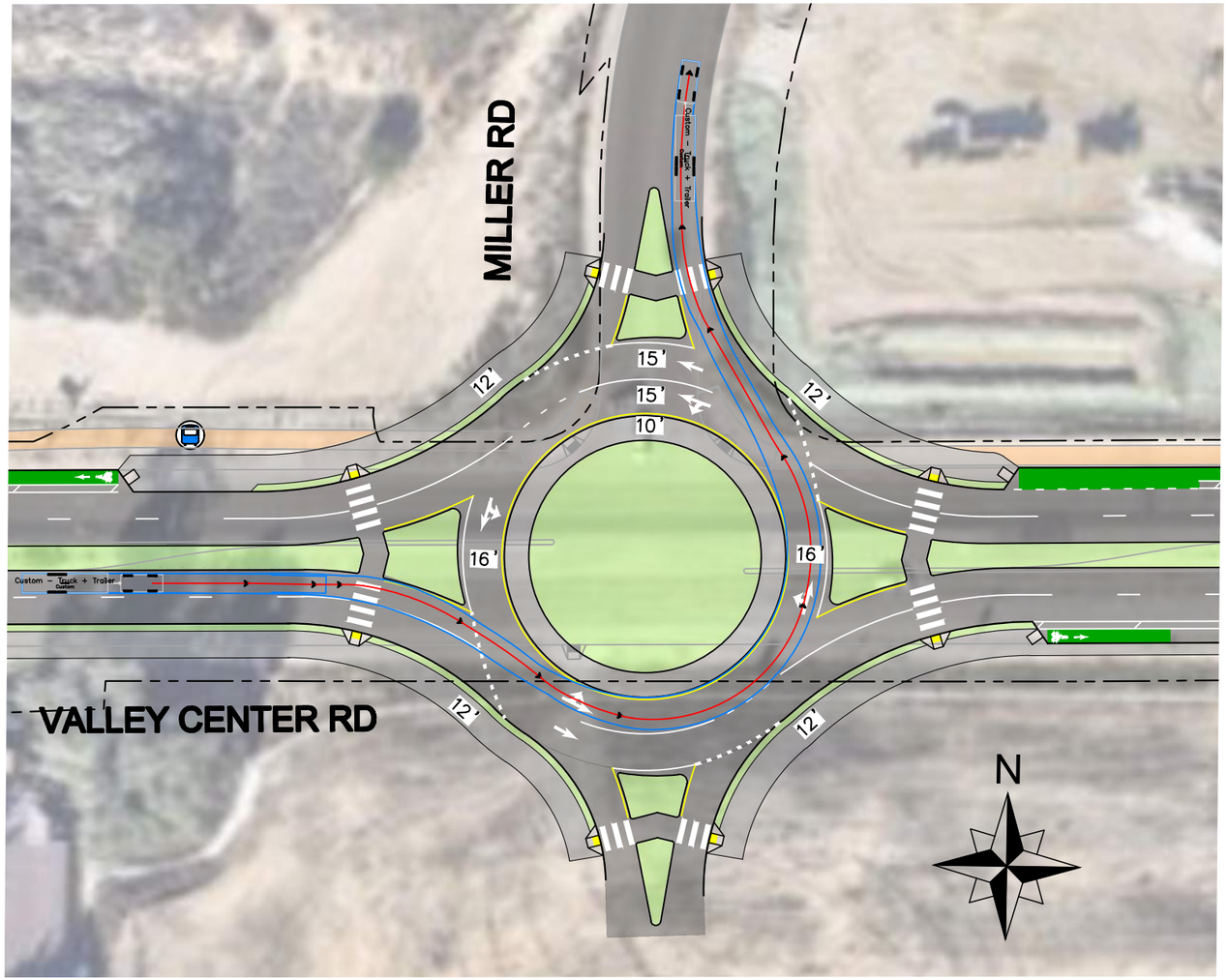
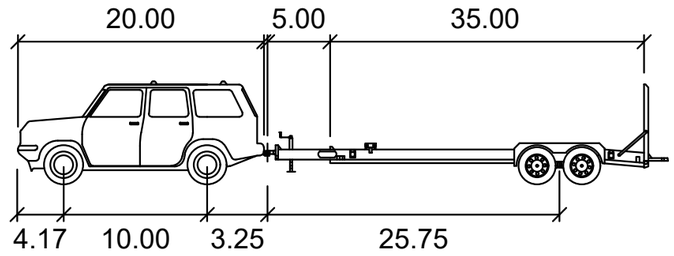


60 30 0

SCALE: 1"=60'

VALLEY CENTER RD – MILLER RD
TURN TEMPLATE



CUSTOM - TRUCK+TRAILER

	feet
Car Width	: 7.00
Trailer Width	: 8.00
Car Track	: 7.00
Trailer Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 19.8
Articulating Angle	: 50.0

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

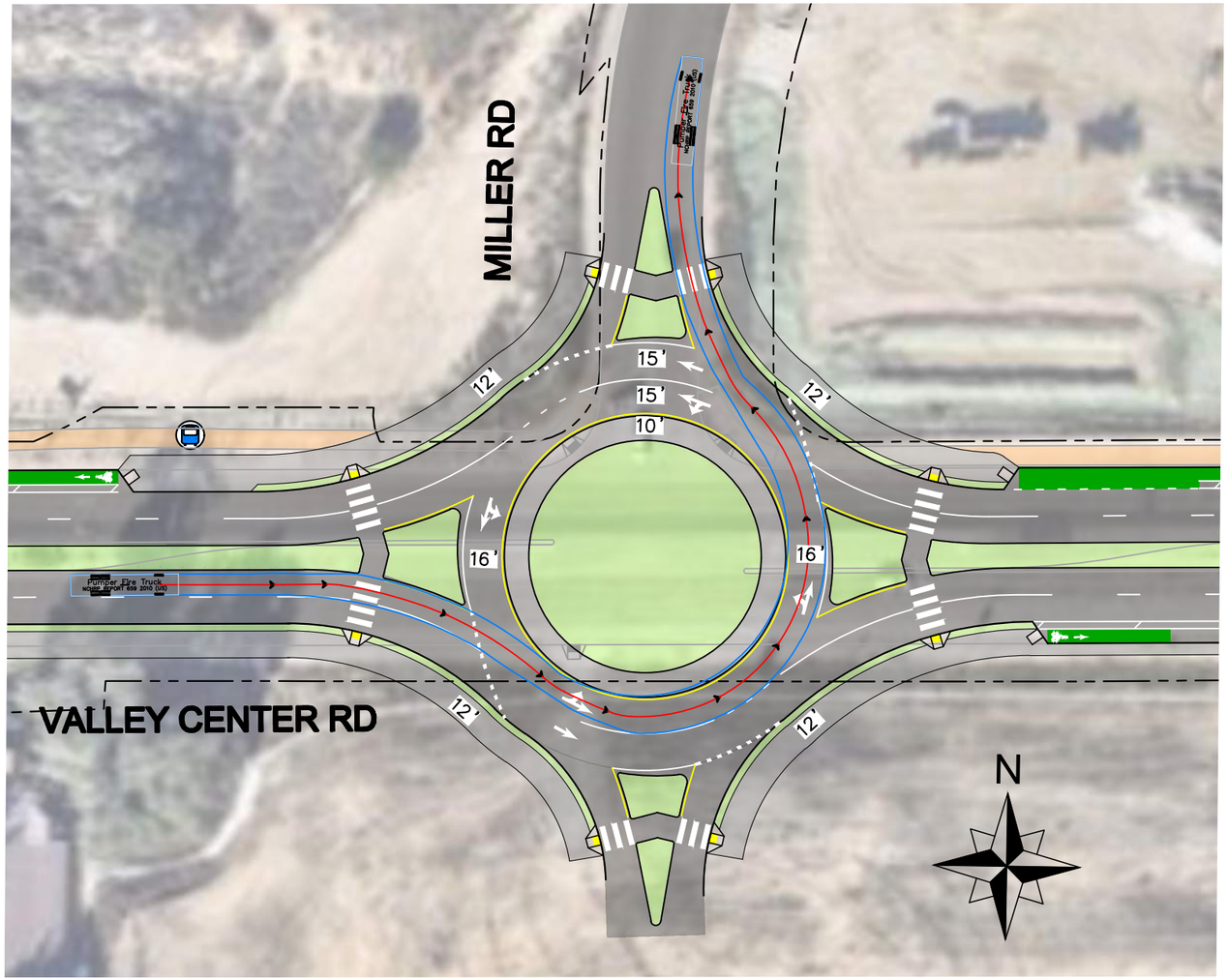
- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Michael Baker INTERNATIONAL

Exhibit S-3:

Roundabout Turn Template: CalFire Truck with Trailer for Bulldozer

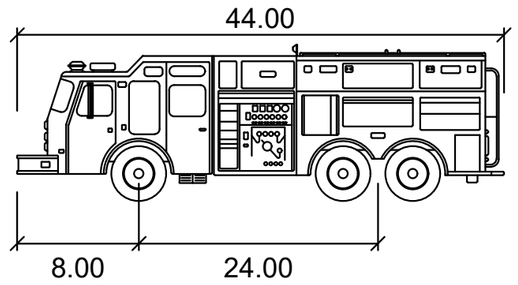
(Dimensions match specifications provided by the County Fire Protection District)



60 30 0

SCALE: 1"=60'

VALLEY CENTER RD - MILLER RD
TURN TEMPLATE



Pumper Fire Truck

		feet
Width	:	8.50
Track	:	8.50
Lock to Lock Time	:	6.0
Steering Angle	:	37.8

CENTER LINE OF THE VEHICLE

WHEEL TRACKING

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
- ROAD STRIPE
- BUFFER WITH DELINEATORS
- RIGHT-OF-WAY
- CROSSWALK
- TRAFFIC SIGNAL
- STOP SIGN
- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

Exhibit S-4:
Roundabout Turn Template: Pumper Fire Truck

Michael Baker INTERNATIONAL

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Exhibit S-5

Valley Center Road VCFPD Travel Time Comparison - Final Corridor Concept Plan

Scenario		Northbound / Eastbound	Southbound
		Lilac Road to Cole Grade Road	Lilac Road to Woods Valley Road
Based on Existing Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:31	2:49
Draft Final CCP	Travel Time	4:55	3:06
	Difference	+0:24	+0:17
Based on Future Year 2035 Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:55	2:51
Draft Final CCP	Travel Time	5:23	3:11
	Difference	+0:28	+0:20
Difference between Existing and Future Year 2035			
Baseline (Calibrated)		+0:24	+0:02
Draft Final CCP		+0:28	+0:05

All times are shown in minutes : seconds

Notes:

- Baseline (calibrated) scenario utilizes actual speeds provided by AVL (automatic vehicle location) data. For segments that were greater than the posted speed limit (45 MPH), a ceiling cap of 45 MPH was applied. For speeds lower than 45 MPH, actual speeds were used.
- Travel Time estimates for the Draft Final CCP assume the same segment speeds as the Baseline condition and only consider the change in delay associated with the intersection control modifications.
- All Travel Time estimates utilize PM Peak Hour intersection delays as this scenario is shown to be the worse case study scenario.
- All Travel Time estimates utilize the approach delay for the direction of travel (i.e., northbound / eastbound or southbound approaches to the intersection).

Exhibit S-6

Valley Center Road VCFPD Travel Time Comparison

- Previous Options A, B, C, and Final Corridor Concept Plan

Scenario		Northbound / Eastbound	Southbound
		Lilac Road to Cole Grade Road	Lilac Road to Woods Valley Road
Based on Existing Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:31	2:49
Option A	Travel Time	4:55	3:03
	Difference	+0:24	+0:14
Option B	Travel Time	5:07	3:03
	Difference	+0:36	+0:14
Option C (No Roundabouts)	Travel Time	5:31	3:06
	Difference	+1:00	+0:17
Draft Final CCP	Travel Time	4:55	3:06
	Difference	+0:24	+0:17
Based on Future Year 2035 Traffic Volumes			
Baseline (Calibrated)	Travel Time	4:55	2:51
Option A	Travel Time	5:23	3:07
	Difference	+0:28	+0:16
Option B	Travel Time	5:40	3:07
	Difference	+0:45	+0:16
Option C (No Roundabouts)	Travel Time	6:17	3:11
	Difference	+1:22	+0:20
Draft Final CCP	Travel Time	5:23	3:11
	Difference	+0:28	+0:20
Difference between Existing and Future Year 2035			
Baseline (Calibrated)		+0:24	+0:02
Option A		+0:28	+0:04
Option B		+0:33	+0:04
No Roundabouts		+0:46	+0:05
Draft Final CCP		+0:28	+0:05

All times are shown in minutes : seconds

Notes:

- Baseline (calibrated) scenario utilizes actual speeds provided by AVL (automatic vehicle location) data. For segments that were greater than the posted speed limit (45 MPH), a ceiling cap of 45 MPH was applied. For speeds lower than 45 MPH, actual speeds were used.
- Travel Time estimates for Options A, B, and C, and the Draft Final CCP assume the same segment speeds as the Baseline condition and only consider the change in delay associated with the intersection control modifications.
- South of Lilac Road, Option A and Option B have the same intersection controls and geometry. Therefore the estimated travel time in the southbound direction are assumed to be identical.
- All Travel Time estimates utilize PM Peak Hour intersection delays as this scenario is shown to be the worse case study scenario.
- All Travel Time estimates utilize the approach delay for the direction of travel (i.e., northbound / eastbound or southbound approaches to the intersection).

Exhibit S-7
Modeled Intersection Performance Comparison of Existing Traffic Control and Final Valley Center Road Corridor Concept Plan - Based on Existing Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With Draft Final CCP		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.5 - A	9.0 - A	Signal	7.5 - A	9.0 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	29.7 - D	**45.2 - E**	Signal	11.4 - B	13.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	3.4 - A	3.7 - A	Signal	3.4 A	3.7 A
4-	Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**	Signal	4.2 - A	4.7 - A
5-	Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D	Signal	5.4 - A	5.6 - A
6-	Valley Center Road / Lilac Road	Signal	17.5 - B	13.5 - B	Signal	18.2 - B	14.0 - B
7-	Valley Center Road / Miller Road	STOP	27.3 - D	15.2 - C	Roundabout	7.8 - A	10.0 - A
8-	Valley Center Road / Indian Creek Road	STOP	16.9 - C	26.1 - D	Signal	6.4 - A	6.6 - B
9-	Valley Center Road / Cole Grade Road	Signal	31.3 - C	33.5 - C	Signal	27.1 - C	34.5 - C

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP)

Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout

Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

Exhibit S-8
Modeled Intersection Performance Comparison of Existing Traffic Control and Final Valley Center Road Corridor Concept Plan - Based on Future Year 2035 Traffic

	Study Intersection	With Existing Geometry and Traffic Control [1]			With Draft Final CCP		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.8 - A	10.0 - A	Signal	7.8 - A	10.0 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	**42.5 - E**	**70.8 - F**	Signal	15.1 - B	15.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	12.8 - B	18.4 - B	Signal	12.8 - B	6.7 - A
4-	Valley Center Road / Sunday Drive	STOP	32.7 - D	**72.9 - F**	Signal	5.6 - A	5.1 - A
5-	Valley Center Road / Old Road	STOP	**1338.7 - F**	**214.2 - F**	Signal	8.6 - A	6.3 - A
6-	Valley Center Road / Lilac Road	Signal	26.7 - C	20.5 - C	Signal	26.7 - C	19.4 - B
7-	Valley Center Road / Miller Road	STOP	**45.3 - E**	17.4 - C	Roundabout	9.0 - A	11.6 - B
8-	Valley Center Road / Indian Creek Road	STOP	19.8 - C	32.0 - D	Signal	6.5 - A	8.5 - A
9-	Valley Center Road / Cole Grade Road	Signal	42.2 - C	47.7 - D	Signal	40.2 - D	47.3 - D

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP)

Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout

Minor Street Stop Control, worst approach delay and LOS reported. Traffic along Valley Center Road does not stop.

Valley Center Road Corridor Concept Plan

Appendix D: Summary of 2023 VCRCCP Options for Outreach

Valley Center Road Corridor Concept Plan
Summary of Input Received on 2022 Draft Corridor Concept Plan (CCP)
and Summary of New CCP Options A, B and C

This document summarizes new CCP Options A and B, and how they were developed. While the intersection performance modeling and the Citygate report (emergency response considerations) are based on review of these options in comparison to a "no roundabouts" option (Option C), these are not the only options on the table going forward. The project team will consider all recommendations that come out of the next outreach, prior to a determination on a Draft Final CCP that will go through CEQA review and then hearings.

Summary of Public Input on the 2022 Draft CCP

The Draft CCP that was out for public review in 2022 drew a lot of input. Emailed input was generally 50-50 in terms of support for the plan and opposition to it (or concerns with certain components); however, some of the opposition were more vocal at the most recent public meetings, with concerns about roundabouts.

Here are some summary points of common themes in comments of support and opposition:

Support:

- Will help reduce speeding and accidents, which are increasing problems
- Speeding and reckless drivers make it scary to slow down to turn into businesses or turn out of businesses
- The most serious accidents (injuries, damage – T-bone and head on collisions) can be avoided with roundabouts
- Will reduce stopping/starting with signals and associated air quality/GHG issues; too many signals would be needed along short stretch
- Improved safety for bicyclists and pedestrians (Class IV bike lanes, sidewalk extensions, bulb outs/curb extensions at signalized intersections)
- References to illegal maneuvers in the center turn lane (like passing) and prevalence of conflicting turn movements that can be addressed with the proposed median extensions
- The plan would contribute to more of a Village atmosphere along the corridor (calmed traffic, more pedestrian oriented, aesthetic values), as envisioned in the General Plan, VC Community Plan and VC Design Guidelines

Opposition

- Concerns with effects on emergency response times and evacuation (roundabouts)
- Concerns with large vehicles being able to navigate roundabouts
- Drivers not used to roundabouts, some get confused, and a lot of out-of-town visitors passing through use the corridor
- Perceptions that roundabouts will cause more delay
- Concerns with closing off portions of the median, limiting left turn access to certain businesses
- A few commenters don’t think bicycle facility safety improvements are needed, since they don’t see a lot of bicyclists
- Concerns with the number of roundabouts proposed

Here is a list of components applicable to both options and components unique to Option A and Option B, with the addition of a few rationale points:

Applicable to both:

- Two roundabouts instead of four (locations vary between Options A and B, see below)
    - Trying to find some middle ground between supporters and opposition.
    - Chief Napier input on more minimal emergency response impacts, as VCFPD emergency responders would typically only go through one roundabout on most calls, if there is just one roundabout in South Village and one in North Village
- Newly proposed signals at the intersections of Sunday Drive and Old Road
    - The plan calls for meeting traffic signal warrants prior to installing newly proposed signals.
    - Throughout the process, we heard a lot of concerns about dangerous turns onto the corridor from Old Road, due to its location at the end of the curve and sight distance in relation to speeds.
- Carrying forward proposed signals that are conditions of private development (not newly proposed with the CCP) at Mirar De Valle and Indian Creek Road
- Class IV bike lanes throughout the corridor – Final CCP will call out flexibility for final engineering process, re: the type of physical separation.
    - These are called for along the corridor in the County's current General Plan Mobility Element Network, so the County doesn't have discretion on changing this aspect without adding a General Plan Amendment to the project.
- Curb extensions/bulb-outs at all signalized intersections
    - For traffic calming and improved safety and visibility for pedestrians and bicyclists
    - Class IV bike lanes/striping would transition behind pedestrian area at curb extensions, as shown in the plans.
- Pedestrian signal at Rinehart
    - With the addition of this controlled crossing, the plan would limit the distance between controlled pedestrian crossings to approximately ¼ mile or less within the Village boundaries, as a best practice for pedestrian oriented.
        - Note: the corridor geographic scope runs through the South Village, curve area, and North Village; the curve area is not part of either Village (you can see Village boundaries on the one-page plan map).
- No left turn restriction at stop-controlled side streets: Canyon Road (north and south legs), Chaparral Terrace, Calle de Vista, Moosa Creek Way, Charlan Road, and Rinehart Lane
    - Many comments early in the process on dangerous/scary left turns from these side streets
- Raised median extension with openings limited to controlled intersections (roundabouts and signals) – one exception in Option B (see below)
    - Addressing safety concerns
- Extension of the sidewalk (many gaps now) along the east and south sides of the corridor and maintain the Heritage Trail (decomposed granite pathway) on the west and north sides
    - Both of these are consistent with the current VC Community RightofWay Development Standards, which address the right of way outside travel lanes.
- Reduction in segment lane widths (outside roundabouts) from 12' to 11'

Applicable to Option A:

- Roundabouts at Woods Valley Road and Miller Road
    - Miller is the most feasible for development of a roundabout in the near term, as the developer on the south side (covering southeast and southwest corners) has agreed to provide an Irrevocable Offer to Dedicated Right of Way (IOD) for roundabout right of way if needed, the northwest corner is vacant, and there would be no structures in the limited area needed on the northeast corner.
    - The Woods Valley roundabout would slow down drivers before they get into the Villages from the south (from Escondido and other job centers, commercial centers, and more densely populated areas)
- Lilac and Cole Grade would remain signals.
- This option has a couple components preferred by California Highway Patrol (CHP) during coordination meetings.
    - CHP had concerns with a median opening for left turns from VC Rd to Canyon Rd at the curve (included in Option B), due to the speeds and sight distance in this area, *so this option has the median closed there.*
        - There were some stakeholder concerns about continued speeding along the curve if there was no side friction from turn pocket(s), so we combined this median closed along curve with the option that has a roundabout just before the curve in the North Village (Miller Road intersection)
    - CHP would also prefer to have an area where officers can radar drivers and have an emergency turnaround outside of regular median openings, for pursuits – this is the reason for *providing a 25' long mountable median in South Village in this option*, for public safety personnel only.

Applicable to Option B:

- Roundabouts at Woods Valley Road and Cole Grade Road
    - As shown in the intersection performance tables, at the busiest Cole Grade intersection, the roundabout shows the most dramatic improvement (less delay) over a signal, in comparison to other intersections that modeled roundabout vs. signal.
    - This provides a "bookend" approach to roundabouts – having a roundabout when entering the area of the Villages from either side of the corridor,
- Lilac would remain a signal and Miller would be proposed for a signal.
- Left turn median turn pocket at Canyon Road, for northbound Valley Center Road (would still have no left turn restriction from Canyon, entering VC Road)
    - Provides access to commercial and residential uses utilizing this road along the curve, where the opportunities for U-turns at controlled intersections are not as close as within the Village boundaries.
    - "Side friction" of median opening (referenced above) to limit speeding along the curve.

Option C - the "No Roundabouts" Option:

- Option C (the "No Roundabouts" Option) would entail all components of Option B, except with signals where Option B shows roundabouts (the intersections of Woods Valley Road and Cole Grade Road).
- In the intersection performance tables (attached) stakeholders can compare modeled average delay associated with signals vs. roundabouts at the Woods Valley and Cole Grade intersections.

Table 1

Modeled Intersection Performance Comparison of Existing Traffic Control, CCP Option A, and CCP Option B - Based on Existing Traffic

	Study Intersection	With Existing Geometry and Traffic Control [1]			With CCP Option A			With CCP Option B		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Signal	7.5 - A	9.0 - A	Roundabout	4.0 - A	6.7 - B	Roundabout	4.0 - A	6.7 - B
2-	Valley Center Road / Mirar De Valle Road	STOP	29.7 - D	**45.2 - E**	Signal (private)	11.4 - B	13.2 - B	Signal (private)	11.4 - B	13.2 - B
3-	Valley Center Road / Park Circle Way [3]	Signal	3.4 - A	3.7 - A	Signal	3.4 A	3.7 A	Signal	3.4 A	3.7 A
4-	Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**	Signal	4.2 - A	4.7 - A	Signal	4.2 - A	4.7 - A
5-	Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D	Signal	5.4 - A	5.6 - A	Signal	5.4 - A	5.6 - A
6-	Valley Center Road / Lilac Road	Signal	17.5 - B	13.5 - B	Signal	18.2 - B	14.0 - B	Signal	18.2 - B	14.0 - B
7-	Valley Center Road / Miller Road	STOP	27.3 - D	15.2 - C	Roundabout	7.8 - A	10.0 - A	Signal	27.4 - C	38.7 - D
8-	Valley Center Road / Indian Creek Road	STOP	16.9 - C	26.1 - D	Signal (private)	6.4 - A	6.6 - B	Signal (private)	6.4 - A	6.6 - B
9-	Valley Center Road / Cole Grade Road	Signal	31.3 - C	33.5 - C	Signal	27.1 - C	34.5 - C	Roundabout	9.6 - A	13.0 - B

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP) Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout STOP Minor Street Stop Control, worst approach delay and LOS reported

Table 2
Modeled Intersection Performance Comparison of Existing Traffic Control, CCP Option A, and CCP Option B
- Based on Future Year 2035 Traffic

Study Intersection		With Existing Geometry and Traffic Control [1]			With CCP Option A			With CCP Option B		
		Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS	Traffic Control	AM Delay[2] - LOS	PM Delay[2] - LOS
1-	Valley Center Road / Woods Valley Road	Traffic Signal	7.8 - A	10.0 - A	Roundabout	4.3 - A	7.6 - A	Roundabout	4.3 - A	7.6 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	**42.5 - E**	**70.8 - F**	Traffic Signal (condition of private development)	15.1 - B	15.2 - B	Traffic Signal (condition of private development)	15.1 - B	15.2 - B
3-	Valley Center Road / Park Circle Way [3]	Traffic Signal	12.8 - B	18.4 - B	Traffic Signal	12.8 - B	6.7 - A	Traffic Signal	12.8 - B	6.7 - A
4-	Valley Center Road / Sunday Drive	STOP	32.7 - D	**72.9 - F**	Traffic Signal	5.6 - A	5.1 - A	Traffic Signal	5.6 - A	5.1 - A
5-	Valley Center Road / Old Road	STOP	**1338.7 - F**	**214.2 - F**	Traffic Signal	8.6 - A	6.3 - A	Traffic Signal	8.6 - A	6.3 - A
6-	Valley Center Road / Lilac Road	Traffic Signal	26.7 - C	20.5 - C	Traffic Signal	26.7 - C	19.4 - B	Traffic Signal	26.7 - C	19.4 - B
7-	Valley Center Road / Miller Road	STOP	**45.3 - E**	17.4 - C	Roundabout	9.0 - A	11.6 - B	Traffic Signal	28.4 - C	50.5 - D
8-	Valley Center Road / Indian Creek Road	STOP	19.8 - C	32.0 - D	Traffic Signal (condition of private development)	6.5 - A	8.5 - A	Traffic Signal (condition of private development)	6.5 - A	8.5 - A
9-	Valley Center Road / Cole Grade Road	Traffic Signal	42.2 - C	47.7 - D	Traffic Signal	40.2 - D	47.3 - D	Roundabout	12.7 - B	16.5 - C

Note: Deficient intersection operation indicated in **bold**.

[1] Existing conditions data was collected for the corridor prior to the buildout of Park Circle and Liberty Bell Plaza developments.

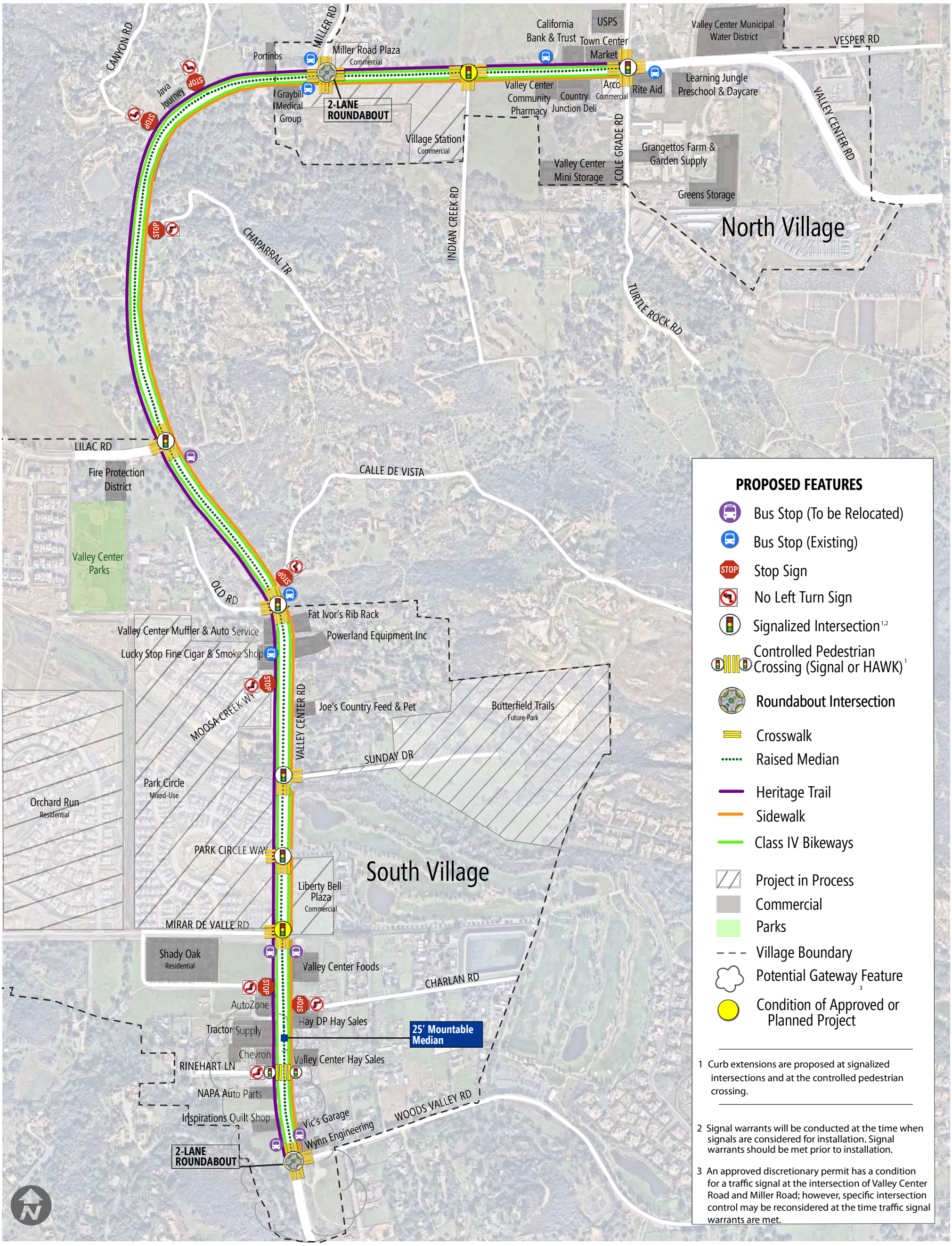
[2] Average seconds of delay per vehicle. *The lower the number, the better the anticipated intersection performance.*

[3] The Park Circle Way intersection did not exist at the time of the 2019 analysis of existing conditions.

Traffic Signal (existing or proposed with CCP) Traffic Signal (condition of private development)

Signal warrants will be conducted at the time signals are considered for installation. Signal warrants should be met prior to installation.

Roundabout Minor Street Stop Control, worst approach delay and LOS reported



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Draft Corridor Concept Plan-Option A

Figure 6A

July 2023
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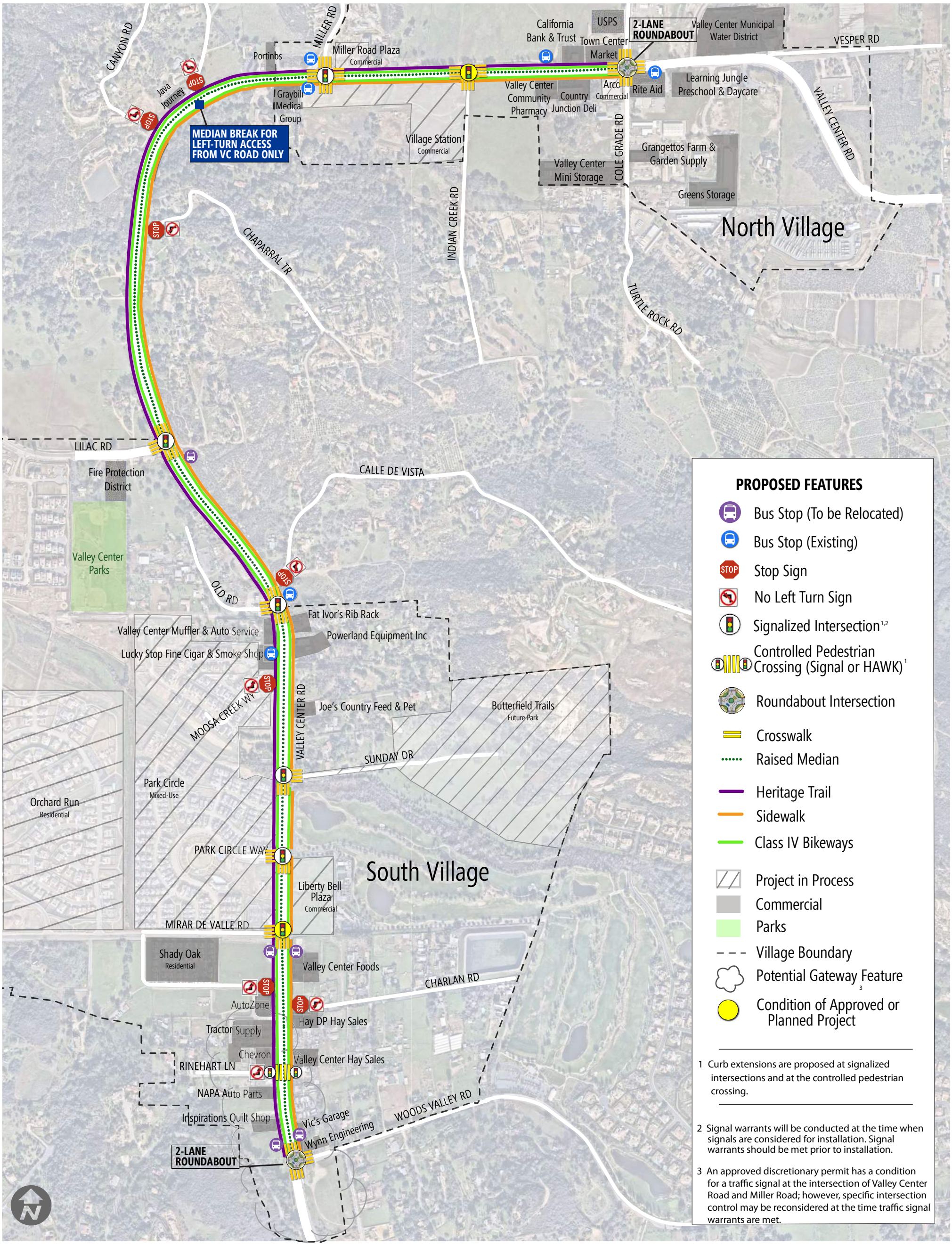

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Draft Corridor Concept Plan-Option B

Figure 6B

July 2023
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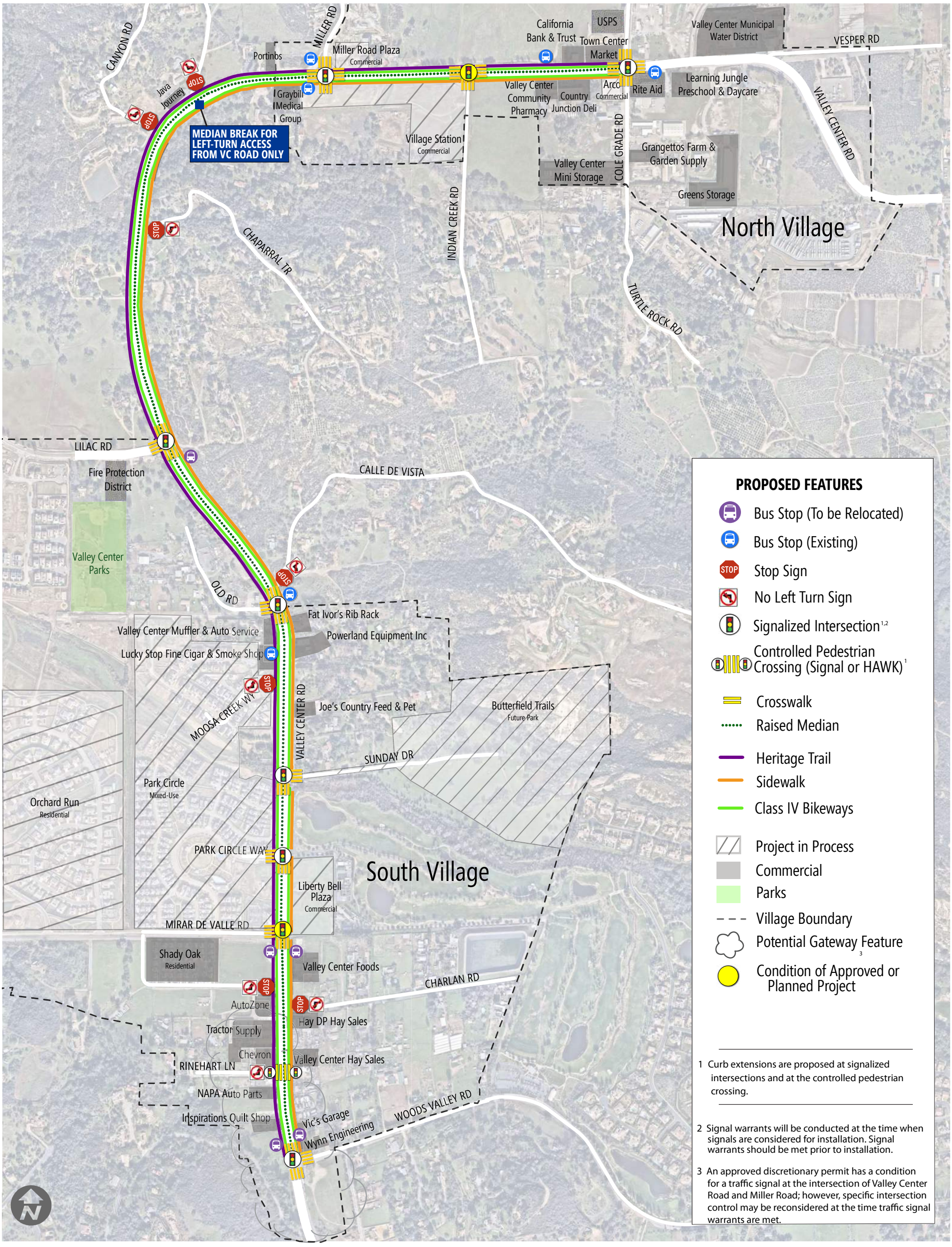

Draft Corridor Concept Plan-Option C
(also referred to as the No Roundabouts option)

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Figure 6C

Valley Center Road Corridor Concept Plan

Appendix E: Operational Analysis Worksheets

Existing Volumes with Existing Geometry & Traffic Control – Intersection Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	166	98	465	57	44	1018
Future Volume (veh/h)	166	98	465	57	44	1018
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	184	109	479	59	47	1083
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	467	214	919	624	77	1687
Arrive On Green	0.14	0.14	0.26	0.26	0.04	0.48
Sat Flow, veh/h	3401	1560	3589	1560	1753	3589
Grp Volume(v), veh/h	184	109	479	59	47	1083
Grp Sat Flow(s),veh/h/ln	1700	1560	1749	1560	1753	1749
Q Serve(g_s), s	1.4	1.8	3.3	0.7	0.7	6.5
Cycle Q Clear(g_c), s	1.4	1.8	3.3	0.7	0.7	6.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	467	214	919	624	77	1687
V/C Ratio(X)	0.39	0.51	0.52	0.09	0.61	0.64
Avail Cap(c_a), veh/h	3196	1466	2722	1429	415	4165
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	11.1	8.8	5.2	13.1	5.4
Incr Delay (d2), s/veh	0.2	0.7	0.2	0.0	2.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.6	0.6	0.1	0.2	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.2	11.8	8.9	5.2	16.0	5.6
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	293		538			1130
Approach Delay, s/veh	11.4		8.5			6.0
Approach LOS	B		A			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				18.7		9.1	6.1	12.6
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				33.2		26.2	6.6	21.7
Max Q Clear Time (g_c+I1), s				8.5		3.8	2.7	5.3
Green Ext Time (p_c), s				5.0		0.5	0.0	1.8

Intersection Summary			
HCM 6th Ctrl Delay		7.5	
HCM 6th LOS		A	

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	53	17	570	1033	24
Future Vol, veh/h	25	53	17	570	1033	24
Conflicting Peds, #/hr	0	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	88	88	88	88
Heavy Vehicles, %	2	2	4	4	4	4
Mvmt Flow	37	79	19	648	1174	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1551	602	1202	0	-	0
Stage 1	1189	-	-	-	-	-
Stage 2	362	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.18	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.24	-	-	-
Pot Cap-1 Maneuver	104	443	565	-	-	-
Stage 1	251	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	100	443	564	-	-	-
Mov Cap-2 Maneuver	100	-	-	-	-	-
Stage 1	242	-	-	-	-	-
Stage 2	674	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.7	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	564	-	100	443	-	-
HCM Lane V/C Ratio	0.034	-	0.373	0.179	-	-
HCM Control Delay (s)	11.6	-	61	14.9	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.5	0.6	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	1	0	624	1	1	1	1034
Future Vol, veh/h	1	0	624	1	1	1	1034
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	2
Peak Hour Factor	25	25	90	90	92	98	98
Heavy Vehicles, %	2	2	4	4	4	4	4
Mvmt Flow	4	0	693	1	1	1	1055

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	1226	347	0	0	694	694	0
Stage 1	694	-	-	-	-	-	-
Stage 2	532	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	6.48	4.18	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.54	2.24	-
Pot Cap-1 Maneuver	171	649	-	-	514	884	-
Stage 1	457	-	-	-	-	-	-
Stage 2	553	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	170	649	-	-	645	645	-
Mov Cap-2 Maneuver	170	-	-	-	-	-	-
Stage 1	456	-	-	-	-	-	-
Stage 2	553	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	170	645	-
HCM Lane V/C Ratio	-	-	0.024	0.003	-
HCM Control Delay (s)	-	-	26.7	10.6	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	274	0	233	2	0	0	1	146	512	0	0	814
Future Volume (veh/h)	274	0	233	2	0	0	1	146	512	0	0	814
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00		1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No
Adj Sat Flow, veh/h/ln	1841	1841	1914	1870	1870	1870		1841	1841	1914	1841	1841
Adj Flow Rate, veh/h	364	0	163	8	0	0		164	575	0	0	885
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25		0.89	0.89	0.89	0.92	0.92
Percent Heavy Veh, %	4	4	4	2	2	2		4	4	4	4	4
Cap, veh/h	584	0	266	22	0	0		255	2031	0	3	1072
Arrive On Green	0.17	0.00	0.17	0.01	0.00	0.00		0.07	0.58	0.00	0.00	0.43
Sat Flow, veh/h	3506	0	1596	1781	0	0		3401	3589	0	1753	2493
Grp Volume(v), veh/h	364	0	163	8	0	0		164	575	0	0	620
Grp Sat Flow(s),veh/h/ln	1753	0	1596	1781	0	0		1700	1749	0	1753	1749
Q Serve(g_s), s	6.2	0.0	6.1	0.3	0.0	0.0		3.0	5.3	0.0	0.0	20.2
Cycle Q Clear(g_c), s	6.2	0.0	6.1	0.3	0.0	0.0		3.0	5.3	0.0	0.0	20.2
Prop In Lane	1.00		1.00	1.00		0.00		1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	584	0	266	22	0	0		255	2031	0	3	752
V/C Ratio(X)	0.62	0.00	0.61	0.36	0.00	0.00		0.64	0.28	0.00	0.00	0.82
Avail Cap(c_a), veh/h	1664	0	757	856	0	0		438	2842	0	152	1348
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00		1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	25.0	0.0	24.9	31.6	0.0	0.0		29.0	6.8	0.0	0.0	16.2
Incr Delay (d2), s/veh	0.4	0.0	0.9	7.2	0.0	0.0		1.0	0.0	0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	2.1	0.2	0.0	0.0		1.2	1.4	0.0	0.0	6.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.4	0.0	25.8	38.8	0.0	0.0		30.0	6.8	0.0	0.0	17.1
LnGrp LOS	C	A	C	D	A	A		C	A	A	A	B
Approach Vol, veh/h		527			8				739			1214
Approach Delay, s/veh		25.5			38.8				12.0			17.2
Approach LOS		C			D				B			B

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		16.7	9.7	33.0		5.0	0.0	42.7				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.6	8.3	49.7		31.0	5.6	52.4				
Max Q Clear Time (g_c+I1), s		8.2	5.0	22.4		2.3	0.0	7.3				
Green Ext Time (p_c), s		0.9	0.1	5.2		0.0	0.0	2.4				

Intersection Summary												
HCM 6th Ctrl Delay			17.5									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	303
Future Volume (veh/h)	303
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.99
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1914
Adj Flow Rate, veh/h	329
Peak Hour Factor	0.92
Percent Heavy Veh, %	4
Cap, veh/h	397
Arrive On Green	0.43
Sat Flow, veh/h	923
Grp Volume(v), veh/h	594
Grp Sat Flow(s),veh/h/ln	1668
Q Serve(g_s), s	20.4
Cycle Q Clear(g_c), s	20.4
Prop In Lane	0.55
Lane Grp Cap(c), veh/h	717
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	1285
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	16.3
Incr Delay (d2), s/veh	1.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	6.3
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	17.3
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	18	790	0	1026	14	18	89
Future Vol, veh/h	18	790	0	1026	14	18	89
Conflicting Peds, #/hr	7	0	0	0	7	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	100	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	0	-	0	-
Grade, %	-	2	-	0	-	0	-
Peak Hour Factor	89	89	95	95	95	86	86
Heavy Vehicles, %	4	4	4	4	4	2	2
Mvmt Flow	20	888	0	1080	15	21	103

Major/Minor	Major1		Major2			Minor2	
Conflicting Flow All	1102	0	888	-	0	1579	555
Stage 1	-	-	-	-	-	1095	-
Stage 2	-	-	-	-	-	484	-
Critical Hdwy	4.18	-	6.48	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.24	-	2.54	-	-	3.52	3.32
Pot Cap-1 Maneuver	618	-	386	-	-	100	475
Stage 1	-	-	-	-	-	282	-
Stage 2	-	-	-	-	-	585	-
Platoon blocked, %		-		-	-		
Mov Cap-1 Maneuver	613	-	386	-	-	95	471
Mov Cap-2 Maneuver	-	-	-	-	-	95	-
Stage 1	-	-	-	-	-	270	-
Stage 2	-	-	-	-	-	580	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	27.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	613	-	386	-	-	283
HCM Lane V/C Ratio	0.033	-	-	-	-	0.44
HCM Control Delay (s)	11.1	-	0	-	-	27.3
HCM Lane LOS	B	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	0	-	-	2.1

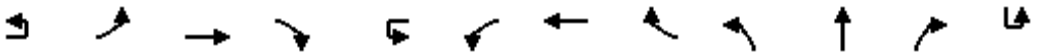
Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	794	2	2	1032	4	2
Future Vol, veh/h	794	2	2	1032	4	2
Conflicting Peds, #/hr	0	1	1	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	96	96	75	75
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	882	2	2	1075	5	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	885	0	1427	443
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	543	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	748	-	126	562
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	546	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	747	-	125	561
Mov Cap-2 Maneuver	-	-	-	-	253	-
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	545	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	310	-	-	747	-
HCM Lane V/C Ratio	0.026	-	-	0.003	-
HCM Control Delay (s)	16.9	-	-	9.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	25	371	387	31	1	14	390	154	26	11	9	10
Future Volume (veh/h)	25	371	387	31	1	14	390	154	26	11	9	10
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)		1.00		0.99		1.00		0.99	1.00		1.00	
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach			No				No			No		
Adj Sat Flow, veh/h/ln		1841	1841	1841		1841	1841	1914	1841	1841	1841	
Adj Flow Rate, veh/h		391	407	33		16	443	175	30	12	10	
Peak Hour Factor		0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	
Percent Heavy Veh, %		4	4	4		4	4	4	4	4	4	
Cap, veh/h		398	612	516		27	564	221	60	24	20	
Arrive On Green		0.12	0.33	0.33		0.02	0.23	0.23	0.06	0.06	0.06	
Sat Flow, veh/h		3401	1841	1551		1753	2445	956	999	399	333	
Grp Volume(v), veh/h		391	407	33		16	316	302	52	0	0	
Grp Sat Flow(s),veh/h/ln		1700	1841	1551		1753	1749	1652	1731	0	0	
Q Serve(g_s), s		7.9	13.1	1.0		0.6	11.7	11.9	2.0	0.0	0.0	
Cycle Q Clear(g_c), s		7.9	13.1	1.0		0.6	11.7	11.9	2.0	0.0	0.0	
Prop In Lane		1.00		1.00		1.00		0.58	0.58		0.19	
Lane Grp Cap(c), veh/h		398	612	516		27	404	381	105	0	0	
V/C Ratio(X)		0.98	0.66	0.06		0.60	0.78	0.79	0.50	0.00	0.00	
Avail Cap(c_a), veh/h		398	826	696		142	722	682	725	0	0	
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	
Uniform Delay (d), s/veh		30.5	19.8	15.8		33.9	25.0	25.1	31.5	0.0	0.0	
Incr Delay (d2), s/veh		40.5	0.5	0.0		7.6	1.3	1.4	2.7	0.0	0.0	
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln		5.2	4.9	0.3		0.3	4.5	4.3	0.9	0.0	0.0	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		71.0	20.3	15.8		41.5	26.3	26.5	34.2	0.0	0.0	
LnGrp LOS		E	C	B		D	C	C	C	A	A	
Approach Vol, veh/h			831				634			52		
Approach Delay, s/veh			44.0				26.8			34.2		
Approach LOS			D				C			C		

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	28.3		26.2	13.0	21.3		8.8
Change Period (Y+Rc), s	4.9	5.3		5.3	4.9	5.3		4.6
Max Green Setting (Gmax), s	5.6	31.1		34.2	8.1	28.6		29.0
Max Q Clear Time (g_c+I1), s	2.6	15.1		17.2	9.9	13.9		4.0
Green Ext Time (p_c), s	0.0	1.3		3.0	0.0	1.9		0.2

Intersection Summary		
HCM 6th Ctrl Delay		31.3
HCM 6th LOS		C

Notes

User approved ignoring U-Turning movement.

Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	199	28	613
Future Volume (veh/h)	199	28	613
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Work Zone On Approach		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841
Adj Flow Rate, veh/h	212	30	652
Peak Hour Factor	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4
Cap, veh/h	466	66	821
Arrive On Green	0.30	0.30	0.30
Sat Flow, veh/h	1545	219	2723
Grp Volume(v), veh/h	242	0	652
Grp Sat Flow(s),veh/h/ln	1763	0	1361
Q Serve(g_s), s	7.7	0.0	15.2
Cycle Q Clear(g_c), s	7.7	0.0	15.2
Prop In Lane	0.88		1.00
Lane Grp Cap(c), veh/h	532	0	821
V/C Ratio(X)	0.46	0.00	0.79
Avail Cap(c_a), veh/h	871	0	1344
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	22.2
Incr Delay (d2), s/veh	0.5	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	4.8
Unsig. Movement Delay, s/veh			
LnGrp Delay(d),s/veh	20.0	0.0	23.6
LnGrp LOS	C	A	C
Approach Vol, veh/h		894	
Approach Delay, s/veh		22.6	
Approach LOS		C	
Timer - Assigned Phs			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	6	2	624	1050	2
Future Vol, veh/h	6	6	2	624	1050	2
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	-	60	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	2	2	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	7	2	678	1141	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1485	572	1143	0	-	0
Stage 1	1142	-	-	-	-	-
Stage 2	343	-	-	-	-	-
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	115	463	607	-	-	-
Stage 1	266	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	115	463	607	-	-	-
Mov Cap-2 Maneuver	115	-	-	-	-	-
Stage 1	265	-	-	-	-	-
Stage 2	690	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.1	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	607	-	184	-	-
HCM Lane V/C Ratio	0.004	-	0.071	-	-
HCM Control Delay (s)	11	-	26.1	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	76	103	1043	165	118	780
Future Volume (veh/h)	76	103	1043	165	118	780
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	84	114	1075	170	126	830
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	6	6	6	6	6	6
Cap, veh/h	379	174	1456	823	160	2178
Arrive On Green	0.11	0.11	0.42	0.42	0.09	0.63
Sat Flow, veh/h	3346	1535	3532	1535	1725	3532
Grp Volume(v), veh/h	84	114	1075	170	126	830
Grp Sat Flow(s),veh/h/ln	1673	1535	1721	1535	1725	1721
Q Serve(g_s), s	1.0	3.0	11.0	2.4	3.0	4.9
Cycle Q Clear(g_c), s	1.0	3.0	11.0	2.4	3.0	4.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	379	174	1456	823	160	2178
V/C Ratio(X)	0.22	0.66	0.74	0.21	0.79	0.38
Avail Cap(c_a), veh/h	2057	944	2445	1265	376	3598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	17.7	10.1	5.0	18.6	3.7
Incr Delay (d2), s/veh	0.1	1.6	0.3	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.6	2.5	0.6	1.1	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.0	19.3	10.4	5.1	21.8	3.8
LnGrp LOS	B	B	B	A	C	A
Approach Vol, veh/h	198		1245			956
Approach Delay, s/veh	18.3		9.7			6.1
Approach LOS	B		A			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				31.8		10.0	8.8	23.0
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				43.7		25.7	9.1	29.7
Max Q Clear Time (g_c+I1), s				6.9		5.0	5.0	13.0
Green Ext Time (p_c), s				3.7		0.3	0.1	4.7

Intersection Summary								
HCM 6th Ctrl Delay			9.0					
HCM 6th LOS			A					

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	14	17	1	51	1103	904	17
Future Vol, veh/h	14	17	1	51	1103	904	17
Conflicting Peds, #/hr	0	0	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	100	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	67	67	92	88	88	88	88
Heavy Vehicles, %	2	2	6	6	6	6	6
Mvmt Flow	21	25	1	58	1253	1027	19

Major/Minor	Minor2		Major1			Major2	
Conflicting Flow All	1787	528	1047	1051	0	-	0
Stage 1	1042	-	-	-	-	-	-
Stage 2	745	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.52	4.22	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.56	2.26	-	-	-
Pot Cap-1 Maneuver	73	495	299	635	-	-	-
Stage 1	301	-	-	-	-	-	-
Stage 2	430	-	-	-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	65	493	618	618	-	-	-
Mov Cap-2 Maneuver	65	-	-	-	-	-	-
Stage 1	271	-	-	-	-	-	-
Stage 2	428	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	45.2	0.5	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	618	-	65	493	-	-
HCM Lane V/C Ratio	0.096	-	0.321	0.051	-	-
HCM Control Delay (s)	11.4	-	84.7	12.7	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	0.2	-	-

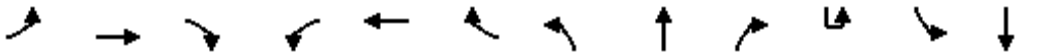
Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	0	1115	1	1	930
Future Vol, veh/h	1	0	1115	1	1	930
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	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	2
Peak Hour Factor	25	25	90	90	98	98
Heavy Vehicles, %	2	2	6	6	6	6
Mvmt Flow	4	0	1239	1	1	949

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1717	620	0	0	1240	0
Stage 1	1240	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.22	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.26	-
Pot Cap-1 Maneuver	81	431	-	-	536	-
Stage 1	236	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	81	431	-	-	536	-
Mov Cap-2 Maneuver	81	-	-	-	-	-
Stage 1	236	-	-	-	-	-
Stage 2	590	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	51.7	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	81	536	-
HCM Lane V/C Ratio	-	-	0.049	0.002	-
HCM Control Delay (s)	-	-	51.7	11.7	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	310	0	182	0	0	0	209	895	0	3	0	761
Future Volume (veh/h)	310	0	182	0	0	0	209	895	0	3	0	761
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1811	1811	1884	1870	1870	1870	1811	1811	1884		1811	1811
Adj Flow Rate, veh/h	386	0	128	0	0	0	235	1006	0		0	827
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89		0.92	0.92
Percent Heavy Veh, %	6	6	6	2	2	2	6	6	6		6	6
Cap, veh/h	599	0	274	0	3	0	350	2138	0		3	1030
Arrive On Green	0.17	0.00	0.17	0.00	0.00	0.00	0.10	0.62	0.00		0.00	0.43
Sat Flow, veh/h	3450	0	1580	0	1870	0	3346	3532	0		1725	2406
Grp Volume(v), veh/h	386	0	128	0	0	0	235	1006	0		0	591
Grp Sat Flow(s),veh/h/ln	1725	0	1580	0	1870	0	1673	1721	0		1725	1721
Q Serve(g_s), s	5.7	0.0	4.0	0.0	0.0	0.0	3.7	8.6	0.0		0.0	16.5
Cycle Q Clear(g_c), s	5.7	0.0	4.0	0.0	0.0	0.0	3.7	8.6	0.0		0.0	16.5
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	599	0	274	0	3	0	350	2138	0		3	736
V/C Ratio(X)	0.64	0.00	0.47	0.00	0.00	0.00	0.67	0.47	0.00		0.00	0.80
Avail Cap(c_a), veh/h	1929	0	883	0	1053	0	674	3261	0		175	1459
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		0.00	1.00
Uniform Delay (d), s/veh	21.2	0.0	20.5	0.0	0.0	0.0	23.8	5.6	0.0		0.0	13.7
Incr Delay (d2), s/veh	0.4	0.0	0.5	0.0	0.0	0.0	0.8	0.1	0.0		0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.3	0.0	0.0	0.0	1.3	1.6	0.0		0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.6	0.0	20.9	0.0	0.0	0.0	24.6	5.6	0.0		0.0	14.5
LnGrp LOS	C	A	C	A	A	A	C	A	A		A	B
Approach Vol, veh/h		514			0			1241				1155
Approach Delay, s/veh		21.5			0.0			9.2				14.6
Approach LOS		C						A				B

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		15.6	10.7	28.9		0.0	0.0	39.5				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.8	11.1	46.7		31.0	5.6	52.2				
Max Q Clear Time (g_c+I1), s		7.7	5.7	18.6		0.0	0.0	10.6				
Green Ext Time (p_c), s		0.8	0.2	4.9		0.0	0.0	4.8				

Intersection Summary												
HCM 6th Ctrl Delay			13.5									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	302
Future Volume (veh/h)	302
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1884
Adj Flow Rate, veh/h	328
Peak Hour Factor	0.92
Percent Heavy Veh, %	6
Cap, veh/h	407
Arrive On Green	0.43
Sat Flow, veh/h	952
Grp Volume(v), veh/h	564
Grp Sat Flow(s),veh/h/ln	1638
Q Serve(g_s), s	16.6
Cycle Q Clear(g_c), s	16.6
Prop In Lane	0.58
Lane Grp Cap(c), veh/h	701
V/C Ratio(X)	0.81
Avail Cap(c_a), veh/h	1389
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	13.8
Incr Delay (d2), s/veh	0.8
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	4.6
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	14.6
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection	
Int Delay, s/veh	0.7

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Vol, veh/h	2	73	1128	0	1018	28	1	43
Future Vol, veh/h	2	73	1128	0	1018	28	1	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	100	-	100	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	2	-	0	-	0	-
Peak Hour Factor	92	89	89	95	95	95	86	86
Heavy Vehicles, %	6	6	6	6	6	6	2	2
Mvmt Flow	2	82	1267	0	1072	29	1	50

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1101	1101	0	1267	-	0	1889	551
Stage 1	-	-	-	-	-	-	1087	-
Stage 2	-	-	-	-	-	-	802	-
Critical Hdwy	6.52	4.22	-	6.52	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.56	2.26	-	2.56	-	-	3.52	3.32
Pot Cap-1 Maneuver	276	607	-	215	-	-	62	478
Stage 1	-	-	-	-	-	-	285	-
Stage 2	-	-	-	-	-	-	402	-
Platoon blocked, %			-		-	-		
Mov Cap-1 Maneuver	586	586	-	215	-	-	53	478
Mov Cap-2 Maneuver	-	-	-	-	-	-	53	-
Stage 1	-	-	-	-	-	-	244	-
Stage 2	-	-	-	-	-	-	402	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	586	-	215	-	-	404
HCM Lane V/C Ratio	0.144	-	-	-	-	0.127
HCM Control Delay (s)	12.2	-	0	-	-	15.2
HCM Lane LOS	B	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	1128	6	1	1	1043	2	0
Future Vol, veh/h	1128	6	1	1	1043	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	90	90	92	96	96	75	75
Heavy Vehicles, %	6	6	6	6	6	2	2
Mvmt Flow	1253	7	1	1	1086	3	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	0	1260	1260	0	1804	630
Stage 1	-	-	-	-	-	1257	-
Stage 2	-	-	-	-	-	547	-
Critical Hdwy	-	-	6.52	4.22	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.56	2.26	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	217	526	-	71	424
Stage 1	-	-	-	-	-	231	-
Stage 2	-	-	-	-	-	544	-
Platoon blocked, %	-	-			-		
Mov Cap-1 Maneuver	-	-	305	305	-	71	424
Mov Cap-2 Maneuver	-	-	-	-	-	173	-
Stage 1	-	-	-	-	-	229	-
Stage 2	-	-	-	-	-	544	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	26.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	173	-	-	305	-
HCM Lane V/C Ratio	0.015	-	-	0.007	-
HCM Control Delay (s)	26.1	-	-	16.9	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	61	647	467	37	2	23	498	111	59	23	21	16
Future Volume (veh/h)	61	647	467	37	2	23	498	111	59	23	21	16
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		1.00	1.00		1.00	
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach			No				No			No		
Adj Sat Flow, veh/h/ln		1811	1811	1811		1811	1811	1884	1811	1811	1811	
Adj Flow Rate, veh/h		681	492	39		26	566	126	67	26	24	
Peak Hour Factor		0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	
Percent Heavy Veh, %		6	6	6		6	6	6	6	6	6	
Cap, veh/h		775	813	689		37	667	148	92	36	33	
Arrive On Green		0.23	0.45	0.45		0.02	0.24	0.24	0.09	0.09	0.09	
Sat Flow, veh/h		3346	1811	1535		1725	2799	621	973	378	349	
Grp Volume(v), veh/h		681	492	39		26	347	345	117	0	0	
Grp Sat Flow(s),veh/h/ln		1673	1811	1535		1725	1721	1699	1700	0	0	
Q Serve(g_s), s		17.8	18.7	1.3		1.4	17.5	17.6	6.1	0.0	0.0	
Cycle Q Clear(g_c), s		17.8	18.7	1.3		1.4	17.5	17.6	6.1	0.0	0.0	
Prop In Lane		1.00		1.00		1.00		0.37	0.57		0.21	
Lane Grp Cap(c), veh/h		775	813	689		37	410	405	160	0	0	
V/C Ratio(X)		0.88	0.61	0.06		0.71	0.85	0.85	0.73	0.00	0.00	
Avail Cap(c_a), veh/h		1293	1221	1034		108	602	595	543	0	0	
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	
Uniform Delay (d), s/veh		33.7	18.9	14.2		44.2	33.0	33.0	40.0	0.0	0.0	
Incr Delay (d2), s/veh		2.1	0.3	0.0		9.1	5.0	5.3	4.7	0.0	0.0	
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln		7.0	7.0	0.4		0.6	7.4	7.4	2.7	0.0	0.0	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		35.7	19.2	14.2		53.3	38.0	38.4	44.7	0.0	0.0	
LnGrp LOS		D	B	B		D	D	D	D	A	A	
Approach Vol, veh/h			1212				718			117		
Approach Delay, s/veh			28.3				38.7			44.7		
Approach LOS			C				D			D		

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.8	46.1		24.8	25.9	26.9		13.2
Change Period (Y+Rc), s	4.9	5.3		5.3	4.9	5.3		4.6
Max Green Setting (Gmax), s	5.7	61.2		34.0	35.1	31.8		29.0
Max Q Clear Time (g_c+I1), s	3.4	20.7		17.6	19.8	19.6		8.1
Green Ext Time (p_c), s	0.0	1.8		1.8	1.2	2.0		0.5

Intersection Summary		
HCM 6th Ctrl Delay		33.5
HCM 6th LOS		C

Notes

User approved ignoring U-Turning movement.

Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	101	14	456
Future Volume (veh/h)	101	14	456
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00
Work Zone On Approach		No	
Adj Sat Flow, veh/h/ln	1811	1811	1811
Adj Flow Rate, veh/h	107	15	485
Peak Hour Factor	0.94	0.94	0.94
Percent Heavy Veh, %	6	6	6
Cap, veh/h	326	46	579
Arrive On Green	0.21	0.21	0.21
Sat Flow, veh/h	1522	213	2701
Grp Volume(v), veh/h	122	0	485
Grp Sat Flow(s),veh/h/ln	1735	0	1351
Q Serve(g_s), s	5.4	0.0	15.6
Cycle Q Clear(g_c), s	5.4	0.0	15.6
Prop In Lane	0.88		1.00
Lane Grp Cap(c), veh/h	372	0	579
V/C Ratio(X)	0.33	0.00	0.84
Avail Cap(c_a), veh/h	650	0	1011
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.1	0.0	34.2
Incr Delay (d2), s/veh	0.4	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	5.3
Unsig. Movement Delay, s/veh			
LnGrp Delay(d),s/veh	30.5	0.0	36.7
LnGrp LOS	C	A	D
Approach Vol, veh/h		607	
Approach Delay, s/veh		35.4	
Approach LOS		D	
Timer - Assigned Phs			

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	3	7	1115	943	7
Future Vol, veh/h	3	3	7	1115	943	7
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	-	60	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	2	2	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	3	8	1212	1025	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1651	517	1033	0	-	0
Stage 1	1029	-	-	-	-	-
Stage 2	622	-	-	-	-	-
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	89	503	668	-	-	-
Stage 1	306	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	88	503	668	-	-	-
Mov Cap-2 Maneuver	88	-	-	-	-	-
Stage 1	302	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.1	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	668	-	150	-	-
HCM Lane V/C Ratio	0.011	-	0.043	-	-
HCM Control Delay (s)	10.5	-	30.1	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Existing Volumes with VCRCCP – Intersection Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	166	98	465	57	44	1018
Future Volume (veh/h)	166	98	465	57	44	1018
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	184	109	479	59	47	1083
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	467	214	919	624	77	1687
Arrive On Green	0.14	0.14	0.26	0.26	0.04	0.48
Sat Flow, veh/h	3401	1560	3589	1560	1753	3589
Grp Volume(v), veh/h	184	109	479	59	47	1083
Grp Sat Flow(s),veh/h/ln	1700	1560	1749	1560	1753	1749
Q Serve(g_s), s	1.4	1.8	3.3	0.7	0.7	6.5
Cycle Q Clear(g_c), s	1.4	1.8	3.3	0.7	0.7	6.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	467	214	919	624	77	1687
V/C Ratio(X)	0.39	0.51	0.52	0.09	0.61	0.64
Avail Cap(c_a), veh/h	3196	1466	2722	1429	415	4165
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	11.1	8.8	5.2	13.1	5.4
Incr Delay (d2), s/veh	0.2	0.7	0.2	0.0	2.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.6	0.6	0.1	0.2	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.2	11.8	8.9	5.2	16.0	5.6
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	293		538			1130
Approach Delay, s/veh	11.4		8.5			6.0
Approach LOS	B		A			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				18.7		9.1	6.1	12.6
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				33.2		26.2	6.6	21.7
Max Q Clear Time (g_c+I1), s				8.5		3.8	2.7	5.3
Green Ext Time (p_c), s				5.0		0.5	0.0	1.8

Intersection Summary			
HCM 6th Ctrl Delay		7.5	
HCM 6th LOS		A	

HCM 6th Signalized Intersection Summary
2: Valley Center Rd. & Mirar De Valle Rd.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	5	53	25	5	25	17	570	25	25	1033	24
Future Volume (veh/h)	25	5	53	25	5	25	17	570	25	25	1033	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1945	1870	1870	1870	1811	1811	1870	1870	1811	1811
Adj Flow Rate, veh/h	37	5	79	27	5	27	19	648	27	27	1174	27
Peak Hour Factor	0.67	0.92	0.67	0.92	0.92	0.92	0.88	0.88	0.92	0.92	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	6	6	2	2	6	6
Cap, veh/h	175	15	245	57	25	133	268	1153	48	57	1659	38
Arrive On Green	0.10	0.16	0.16	0.03	0.10	0.10	0.34	0.34	0.34	0.03	0.48	0.48
Sat Flow, veh/h	1781	95	1504	1781	254	1370	450	3365	140	1781	3438	79
Grp Volume(v), veh/h	37	0	84	27	0	32	19	331	344	27	587	614
Grp Sat Flow(s),veh/h/ln	1781	0	1600	1781	0	1624	450	1721	1785	1781	1721	1796
Q Serve(g_s), s	0.8	0.0	1.9	0.6	0.0	0.8	1.4	6.6	6.6	0.6	11.2	11.2
Cycle Q Clear(g_c), s	0.8	0.0	1.9	0.6	0.0	0.8	6.8	6.6	6.6	0.6	11.2	11.2
Prop In Lane	1.00		0.94	1.00		0.84	1.00		0.08	1.00		0.04
Lane Grp Cap(c), veh/h	175	0	260	57	0	157	268	590	612	57	830	867
V/C Ratio(X)	0.21	0.00	0.32	0.47	0.00	0.20	0.07	0.56	0.56	0.47	0.71	0.71
Avail Cap(c_a), veh/h	766	0	1166	234	0	699	339	859	891	217	1254	1309
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	0.0	15.5	19.9	0.0	17.4	13.5	11.2	11.2	19.9	8.5	8.5
Incr Delay (d2), s/veh	0.6	0.0	0.7	5.9	0.0	0.6	0.1	0.8	0.8	5.9	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.7	0.3	0.0	0.3	0.1	1.8	1.9	0.3	2.4	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	0.0	16.2	25.8	0.0	18.0	13.6	12.0	12.0	25.8	9.6	9.6
LnGrp LOS	B	A	B	C	A	B	B	B	B	C	A	A
Approach Vol, veh/h		121			59			694			1228	
Approach Delay, s/veh		16.7			21.6			12.1			10.0	
Approach LOS		B			C			B			A	

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	5.8	18.8	5.8	11.3		24.7	8.6	8.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s	5.1	20.9	5.5	30.5		30.5	18.0	18.0
Max Q Clear Time (g_c+I1), s	2.6	8.8	2.6	3.9		13.2	2.8	2.8
Green Ext Time (p_c), s	0.0	3.2	0.0	0.4		7.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	25	0	0	0	10	620	0	0	1008	25
Future Volume (veh/h)	10	0	25	0	0	0	10	620	0	0	1008	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	0	1870	1870	1870
Adj Flow Rate, veh/h	11	0	27	0	0	0	11	674	0	0	1096	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	0	2	2	2
Cap, veh/h	295	0	71	0	83	0	489	2438	0	216	2431	60
Arrive On Green	0.04	0.00	0.04	0.00	0.00	0.00	0.69	0.69	0.00	0.00	0.69	0.69
Sat Flow, veh/h	1781	0	1585	0	1870	0	502	3647	0	764	3544	87
Grp Volume(v), veh/h	11	0	27	0	0	0	11	674	0	0	549	574
Grp Sat Flow(s),veh/h/ln	1781	0	1585	0	1870	0	502	1777	0	764	1777	1855
Q Serve(g_s), s	0.2	0.0	0.6	0.0	0.0	0.0	0.3	2.5	0.0	0.0	4.7	4.7
Cycle Q Clear(g_c), s	0.2	0.0	0.6	0.0	0.0	0.0	5.0	2.5	0.0	0.0	4.7	4.7
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00	1.00		0.05
Lane Grp Cap(c), veh/h	295	0	71	0	83	0	489	2438	0	216	1219	1272
V/C Ratio(X)	0.04	0.00	0.38	0.00	0.00	0.00	0.02	0.28	0.00	0.00	0.45	0.45
Avail Cap(c_a), veh/h	1181	0	859	0	1014	0	489	2438	0	216	1219	1272
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.3	0.0	15.5	0.0	0.0	0.0	3.5	2.0	0.0	0.0	2.4	2.4
Incr Delay (d2), s/veh	0.1	0.0	3.4	0.0	0.0	0.0	0.1	0.3	0.0	0.0	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	0.0	18.9	0.0	0.0	0.0	3.6	2.3	0.0	0.0	3.6	3.5
LnGrp LOS	B	A	B	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		38			0			685			1123	
Approach Delay, s/veh		17.9			0.0			2.3			3.6	
Approach LOS		B						A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	27.4	6.0	27.4	6.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	22.9	18.1	22.9	18.1
Max Q Clear Time (g_c+I1), s	7.0	2.6	6.7	0.0
Green Ext Time (p_c), s	3.9	0.1	6.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	3.4
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
4: Valley Center Rd. & Sunday Dr.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	1	624	1	2	1034
Future Volume (veh/h)	1	1	624	1	2	1034
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1945	1945	1811	1811	1788	1788
Adj Flow Rate, veh/h	4	4	693	1	2	1055
Peak Hour Factor	0.25	0.25	0.90	0.90	0.98	0.98
Percent Heavy Veh, %	2	2	6	6	6	6
Cap, veh/h	10	10	1376	2	7	2009
Arrive On Green	0.01	0.01	0.39	0.39	0.00	0.59
Sat Flow, veh/h	784	784	3616	5	1702	3486
Grp Volume(v), veh/h	9	0	338	356	2	1055
Grp Sat Flow(s),veh/h/ln	1765	0	1721	1810	1702	1698
Q Serve(g_s), s	0.1	0.0	3.4	3.4	0.0	4.2
Cycle Q Clear(g_c), s	0.1	0.0	3.4	3.4	0.0	4.2
Prop In Lane	0.44	0.44		0.00	1.00	
Lane Grp Cap(c), veh/h	21	0	672	707	7	2009
V/C Ratio(X)	0.42	0.00	0.50	0.50	0.27	0.53
Avail Cap(c_a), veh/h	1399	0	1402	1475	375	4189
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.1	0.0	5.2	5.2	11.3	2.7
Incr Delay (d2), s/veh	12.5	0.0	0.6	0.6	17.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.2	0.2	0.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.6	0.0	5.8	5.8	29.2	3.0
LnGrp LOS	C	A	A	A	C	A
Approach Vol, veh/h	9		694			1057
Approach Delay, s/veh	23.6		5.8			3.0
Approach LOS	C		A			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	4.6	13.4			17.9	4.8
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	5.0	18.5			28.0	18.0
Max Q Clear Time (g_c+I1), s	2.0	5.4			6.2	2.1
Green Ext Time (p_c), s	0.0	3.2			7.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	4.2
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	5	695	1047	5
Future Volume (veh/h)	5	5	5	695	1047	5
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.91	1.00			0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1847	1847	1847	1847
Adj Flow Rate, veh/h	5	5	5	755	1138	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	62	62	12	2242	1769	8
Arrive On Green	0.08	0.08	0.01	0.64	0.49	0.49
Sat Flow, veh/h	735	735	1759	3601	3674	16
Grp Volume(v), veh/h	11	0	5	755	557	586
Grp Sat Flow(s),veh/h/ln	1617	0	1759	1754	1754	1843
Q Serve(g_s), s	0.2	0.0	0.1	3.2	7.7	7.7
Cycle Q Clear(g_c), s	0.2	0.0	0.1	3.2	7.7	7.7
Prop In Lane	0.45	0.45	1.00			0.01
Lane Grp Cap(c), veh/h	136	0	12	2242	866	910
V/C Ratio(X)	0.08	0.00	0.42	0.34	0.64	0.64
Avail Cap(c_a), veh/h	895	0	276	3562	1263	1326
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.7	0.0	16.1	2.7	6.1	6.1
Incr Delay (d2), s/veh	0.3	0.0	21.7	0.1	0.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.0	1.0	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.0	0.0	37.7	2.8	6.9	6.9
LnGrp LOS	B	A	D	A	A	A
Approach Vol, veh/h	11			760	1143	
Approach Delay, s/veh	14.0			3.0	6.9	
Approach LOS	B			A	A	

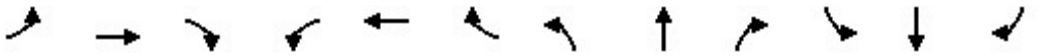
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		25.3		7.2	4.7	20.6
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		33.0		18.0	5.1	23.4
Max Q Clear Time (g_c+I1), s		5.2		2.2	2.1	9.7
Green Ext Time (p_c), s		5.1		0.0	0.0	5.8

Intersection Summary	
HCM 6th Ctrl Delay	5.4
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
6: Valley Center Rd. & Lilac Rd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	274	0	233	2	0	0	147	512	0	0	814	303
Future Volume (veh/h)	274	0	233	2	0	0	147	512	0	0	814	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1914	1870	1870	1870	1746	1746	1816	1746	1746	1816
Adj Flow Rate, veh/h	364	0	163	8	0	0	165	575	0	0	885	329
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	2	2	2	4	4	4	4	4	4
Cap, veh/h	577	0	263	22	0	0	248	1965	0	2	1046	387
Arrive On Green	0.16	0.00	0.16	0.01	0.00	0.00	0.08	0.59	0.00	0.00	0.44	0.44
Sat Flow, veh/h	3506	0	1596	1781	0	0	3227	3406	0	1663	2366	876
Grp Volume(v), veh/h	364	0	163	8	0	0	165	575	0	0	620	594
Grp Sat Flow(s),veh/h/ln	1753	0	1596	1781	0	0	1613	1659	0	1663	1659	1582
Q Serve(g_s), s	6.5	0.0	6.4	0.3	0.0	0.0	3.3	5.7	0.0	0.0	22.3	22.5
Cycle Q Clear(g_c), s	6.5	0.0	6.4	0.3	0.0	0.0	3.3	5.7	0.0	0.0	22.3	22.5
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.55
Lane Grp Cap(c), veh/h	577	0	263	22	0	0	248	1965	0	2	734	700
V/C Ratio(X)	0.63	0.00	0.62	0.36	0.00	0.00	0.66	0.29	0.00	0.00	0.84	0.85
Avail Cap(c_a), veh/h	1598	0	727	822	0	0	399	2590	0	139	1228	1171
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	0.0	26.1	32.9	0.0	0.0	30.1	6.8	0.0	0.0	16.7	16.7
Incr Delay (d2), s/veh	0.4	0.0	0.9	3.7	0.0	0.0	1.1	0.0	0.0	0.0	1.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	2.2	0.1	0.0	0.0	1.2	1.4	0.0	0.0	7.0	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	0.0	27.0	36.6	0.0	0.0	31.3	6.8	0.0	0.0	17.8	18.1
LnGrp LOS	C	A	C	D	A	A	C	A	A	A	B	B
Approach Vol, veh/h		527			8			740			1214	
Approach Delay, s/veh		26.7			36.6			12.2			17.9	
Approach LOS		C			D			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		17.0	10.1	35.0		5.0	0.0	45.1				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.6	8.3	49.7		31.0	5.6	52.4				
Max Q Clear Time (g_c+I1), s		8.5	5.3	24.5		2.3	0.0	7.7				
Green Ext Time (p_c), s		0.9	0.1	5.2		0.0	0.0	2.4				

Intersection Summary	
HCM 6th Ctrl Delay	18.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

AM
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: RoadName														
3	L2	72	3.0	78	3.0	0.193	9.1	LOS A	0.7	16.9	0.65	0.65	0.65	31.0
8	T1	1	3.0	1	3.0	0.193	9.1	LOS A	0.7	16.9	0.65	0.65	0.65	31.0
18	R2	25	3.0	27	3.0	0.193	9.1	LOS A	0.7	16.9	0.65	0.65	0.65	30.3
Approach		98	3.0	107	3.0	0.193	9.1	LOS A	0.7	16.9	0.65	0.65	0.65	30.8
East: Valley Center Road														
1	L2	64	3.0	70	3.0	0.478	7.9	LOS A	3.0	77.6	0.35	0.19	0.35	32.8
6	T1	1048	4.0	1103	4.0	0.478	7.9	LOS A	3.0	77.6	0.35	0.19	0.35	33.0
16	R2	14	4.0	15	4.0	0.478	7.9	LOS A	3.0	77.5	0.35	0.19	0.35	32.3
Approach		1126	3.9	1187	3.9	0.478	7.9	LOS A	3.0	77.6	0.35	0.19	0.35	33.0
North: Miller Road														
7	L2	18	2.0	21	2.0	0.272	12.1	LOS B	1.0	24.5	0.73	0.75	0.81	30.8
4	T1	1	3.0	1	3.0	0.272	12.1	LOS B	1.0	24.5	0.73	0.75	0.81	30.9
14	R2	89	2.0	103	2.0	0.272	12.1	LOS B	1.0	24.5	0.73	0.75	0.81	30.2
Approach		108	2.0	126	2.0	0.272	12.1	LOS B	1.0	24.5	0.73	0.75	0.81	30.3
West: Valley Center Road														
5	L2	18	4.0	20	4.0	0.430	7.2	LOS A	2.5	65.5	0.31	0.16	0.31	33.4
2	T1	887	4.0	997	4.0	0.430	7.2	LOS A	2.5	65.6	0.31	0.16	0.31	33.5
12	R2	56	3.0	61	3.0	0.430	7.2	LOS A	2.5	65.6	0.31	0.16	0.31	32.6
Approach		961	3.9	1078	3.9	0.430	7.2	LOS A	2.5	65.6	0.31	0.16	0.31	33.4
All Vehicles		2293	3.8	2497	3.8	0.478	7.8	LOS A	3.0	77.6	0.36	0.23	0.37	32.9

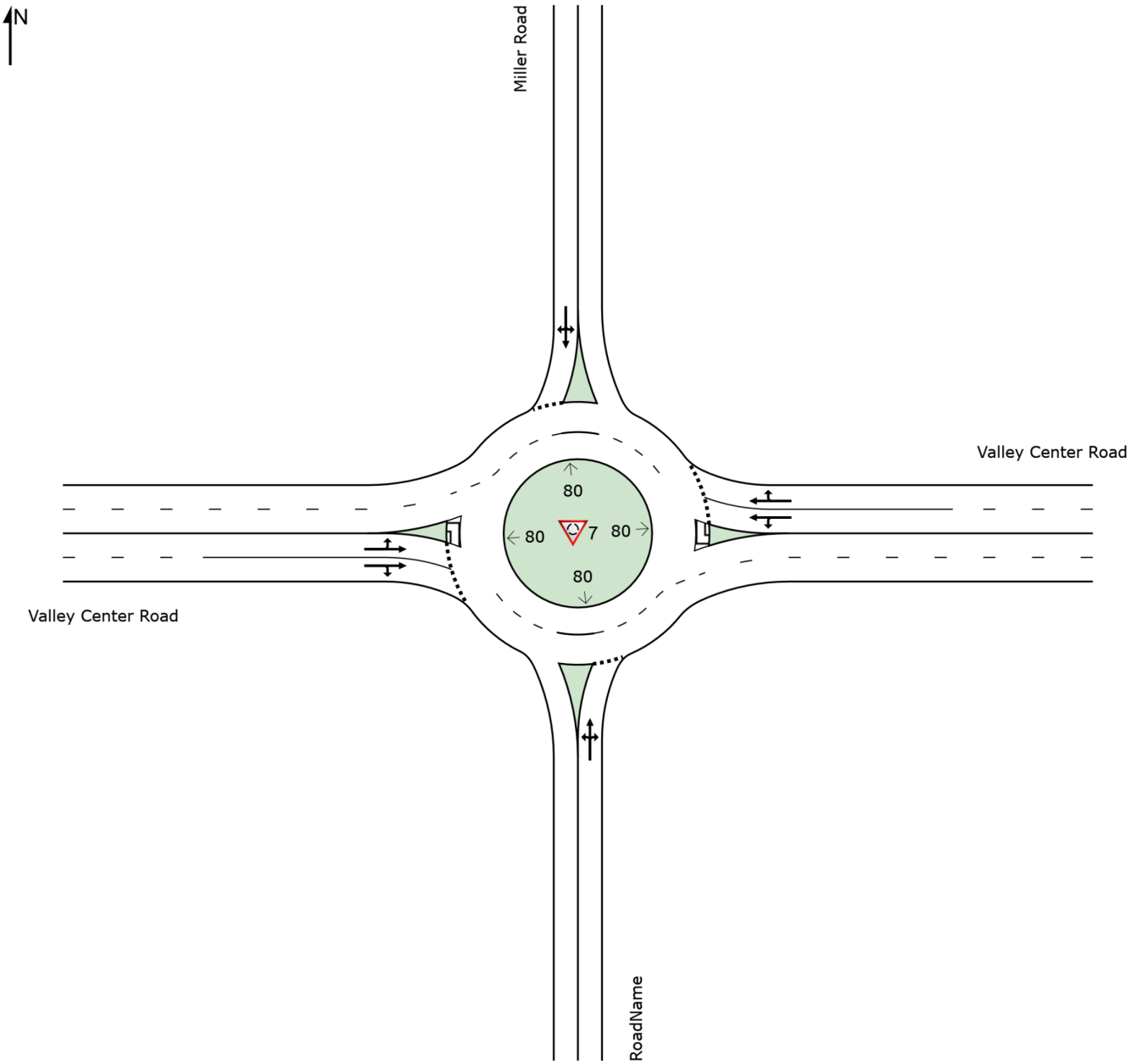
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

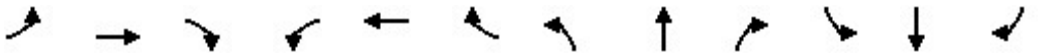
Site: 7 [Miller Road (Site Folder: Valley Center Road)]

AM
Site Category: Existing
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



HCM 6th Signalized Intersection Summary
8: Indian Creek Rd. & Valley Center Rd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	794	21	2	1032	0	4	0	2	0	0	0
Future Volume (veh/h)	19	794	21	2	1032	0	4	0	2	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.94	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1811	1811	1811	1811	1870	1945	1870	1945	1870	1870	1870
Adj Flow Rate, veh/h	21	882	23	2	1075	0	5	0	3	0	0	0
Peak Hour Factor	0.92	0.90	0.90	0.96	0.96	0.92	0.75	0.92	0.75	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	6	6	6	2	2	2	2	2	2	2
Cap, veh/h	357	1699	44	409	1707	0	431	0	345	5	6	0
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.00	0.23	0.00	0.23	0.00	0.00	0.00
Sat Flow, veh/h	525	3426	89	596	3532	0	1853	0	1483	1781	1870	0
Grp Volume(v), veh/h	21	443	462	2	1075	0	5	0	3	0	0	0
Grp Sat Flow(s),veh/h/ln	525	1721	1795	596	1721	0	1853	0	1483	1781	1870	0
Q Serve(g_s), s	1.0	5.8	5.8	0.1	7.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.6	5.8	5.8	5.9	7.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	357	853	890	409	1707	0	431	0	345	5	6	0
V/C Ratio(X)	0.06	0.52	0.52	0.00	0.63	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Avail Cap(c_a), veh/h	500	1322	1380	571	2645	0	1005	0	805	966	1015	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	9.3	5.7	5.7	7.7	6.1	0.0	9.8	0.0	9.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.0	1.1	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	6.2	6.1	7.7	6.5	0.0	9.8	0.0	9.8	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		926			1077			8			0	
Approach Delay, s/veh		6.2			6.5			9.8			0.0	
Approach LOS		A			A			A				

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.2		21.0		0.0		21.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		25.5		18.0		25.5				
Max Q Clear Time (g_c+I1), s		2.1		10.6		0.0		9.6				
Green Ext Time (p_c), s		0.0		5.2		0.0		6.9				

Intersection Summary												
HCM 6th Ctrl Delay			6.4									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
9: Cole Grade Rd. & Valley Center Rd.

03/02/2023

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	400	387	31	1	14	390	154	26	11	9	199	28
Future Volume (veh/h)	400	387	31	1	14	390	154	26	11	9	199	28
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811		1811	1811	1884	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	421	407	33		16	443	175	30	12	10	212	30
Peak Hour Factor	0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94
Percent Heavy Veh, %	6	6	6		6	6	6	6	6	6	6	6
Cap, veh/h	450	487	413		80	647	300	38	15	13	464	66
Arrive On Green	0.13	0.27	0.27		0.05	0.19	0.19	0.04	0.04	0.04	0.31	0.31
Sat Flow, veh/h	3346	1811	1535		1725	3441	1596	983	393	328	1520	215
Grp Volume(v), veh/h	421	407	33		16	443	175	52	0	0	242	0
Grp Sat Flow(s),veh/h/ln	1673	1811	1535		1725	1721	1596	1703	0	0	1735	0
Q Serve(g_s), s	7.5	12.8	1.0		0.5	7.2	6.0	1.8	0.0	0.0	6.8	0.0
Cycle Q Clear(g_c), s	7.5	12.8	1.0		0.5	7.2	6.0	1.8	0.0	0.0	6.8	0.0
Prop In Lane	1.00		1.00		1.00		1.00	0.58		0.19	0.88	
Lane Grp Cap(c), veh/h	450	487	413		80	647	300	66	0	0	529	0
V/C Ratio(X)	0.94	0.84	0.08		0.20	0.69	0.58	0.79	0.00	0.00	0.46	0.00
Avail Cap(c_a), veh/h	450	936	793		160	1635	758	820	0	0	986	0
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	25.8	20.7	16.4		27.6	22.8	22.3	28.7	0.0	0.0	16.9	0.0
Incr Delay (d2), s/veh	26.6	1.5	0.0		0.4	0.5	0.7	14.3	0.0	0.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	5.0	0.3		0.2	2.7	2.1	1.0	0.0	0.0	2.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.4	22.2	16.5		28.1	23.3	23.0	43.0	0.0	0.0	17.4	0.0
LnGrp LOS	D	C	B		C	C	C	D	A	A	B	A
Approach Vol, veh/h		861				634			52			894
Approach Delay, s/veh		36.7				23.3			43.0			19.6
Approach LOS		D				C			D			B

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.1	21.5		23.7	13.0	16.6		6.9				
Change Period (Y+Rc), s	5.3	* 5.3		5.3	4.9	5.3		4.6				
Max Green Setting (Gmax), s	5.6	* 31		34.2	8.1	28.6		29.0				
Max Q Clear Time (g_c+I1), s	2.5	14.8		15.3	9.5	9.2		3.8				
Green Ext Time (p_c), s	0.0	1.4		3.1	0.0	2.1		0.2				

Intersection Summary	
HCM 6th Ctrl Delay	27.1
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	613
Future Volume (veh/h)	613
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1811
Adj Flow Rate, veh/h	652
Peak Hour Factor	0.94
Percent Heavy Veh, %	6
Cap, veh/h	824
Arrive On Green	0.31
Sat Flow, veh/h	2701
Grp Volume(v), veh/h	652
Grp Sat Flow(s),veh/h/ln	1351
Q Serve(g_s), s	13.3
Cycle Q Clear(g_c), s	13.3
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	824
V/C Ratio(X)	0.79
Avail Cap(c_a), veh/h	1534
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	19.2
Incr Delay (d2), s/veh	1.3
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	4.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	20.5
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	76	103	1043	165	118	780
Future Volume (veh/h)	76	103	1043	165	118	780
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	84	114	1075	170	126	830
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	6	6	6	6	6	6
Cap, veh/h	379	174	1456	823	160	2178
Arrive On Green	0.11	0.11	0.42	0.42	0.09	0.63
Sat Flow, veh/h	3346	1535	3532	1535	1725	3532
Grp Volume(v), veh/h	84	114	1075	170	126	830
Grp Sat Flow(s),veh/h/ln	1673	1535	1721	1535	1725	1721
Q Serve(g_s), s	1.0	3.0	11.0	2.4	3.0	4.9
Cycle Q Clear(g_c), s	1.0	3.0	11.0	2.4	3.0	4.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	379	174	1456	823	160	2178
V/C Ratio(X)	0.22	0.66	0.74	0.21	0.79	0.38
Avail Cap(c_a), veh/h	2057	944	2445	1265	376	3598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	17.7	10.1	5.0	18.6	3.7
Incr Delay (d2), s/veh	0.1	1.6	0.3	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.6	2.5	0.6	1.1	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.0	19.3	10.4	5.1	21.8	3.8
LnGrp LOS	B	B	B	A	C	A
Approach Vol, veh/h	198		1245			956
Approach Delay, s/veh	18.3		9.7			6.1
Approach LOS	B		A			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				31.8		10.0	8.8	23.0
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				43.7		25.7	9.1	29.7
Max Q Clear Time (g_c+I1), s				6.9		5.0	5.0	13.0
Green Ext Time (p_c), s				3.7		0.3	0.1	4.7

Intersection Summary								
HCM 6th Ctrl Delay			9.0					
HCM 6th LOS			A					

HCM 6th Signalized Intersection Summary
2: Valley Center Rd. & Mirar De Valle Rd.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	14	5	17	50	5	50	1	51	1103	50	50	904	17
Future Volume (veh/h)	14	5	17	50	5	50	1	51	1103	50	50	904	17
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1945	1870	1870	1870		1811	1811	1870	1870	1811	1811
Adj Flow Rate, veh/h	21	5	25	54	5	54		58	1253	54	54	1027	19
Peak Hour Factor	0.67	0.92	0.67	0.92	0.92	0.92		0.88	0.88	0.92	0.92	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2		6	6	2	2	6	6
Cap, veh/h	129	28	138	91	11	118		357	1578	68	91	2082	39
Arrive On Green	0.07	0.10	0.10	0.05	0.08	0.08		0.47	0.47	0.47	0.05	0.60	0.60
Sat Flow, veh/h	1781	271	1355	1781	136	1470		522	3360	145	1781	3456	64
Grp Volume(v), veh/h	21	0	30	54	0	59		58	641	666	54	511	535
Grp Sat Flow(s),veh/h/ln	1781	0	1626	1781	0	1606		522	1721	1784	1781	1721	1799
Q Serve(g_s), s	0.6	0.0	0.9	1.6	0.0	1.9		3.9	17.4	17.4	1.6	9.3	9.3
Cycle Q Clear(g_c), s	0.6	0.0	0.9	1.6	0.0	1.9		5.9	17.4	17.4	1.6	9.3	9.3
Prop In Lane	1.00		0.83	1.00		0.92		1.00		0.08	1.00		0.04
Lane Grp Cap(c), veh/h	129	0	166	91	0	129		357	808	838	91	1036	1084
V/C Ratio(X)	0.16	0.00	0.18	0.59	0.00	0.46		0.16	0.79	0.79	0.59	0.49	0.49
Avail Cap(c_a), veh/h	581	0	855	226	0	524		405	967	1002	161	1036	1084
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	22.7	25.6	0.0	24.2		9.9	12.4	12.4	25.6	6.2	6.2
Incr Delay (d2), s/veh	0.6	0.0	0.5	6.1	0.0	2.5		0.2	3.9	3.8	6.1	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.8	0.0	0.8		0.4	5.5	5.7	0.8	1.9	2.0
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	24.6	0.0	23.2	31.7	0.0	26.7		10.1	16.2	16.2	31.7	6.6	6.6
LnGrp LOS	C	A	C	C	A	C		B	B	B	C	A	A
Approach Vol, veh/h		51			113				1365			1100	
Approach Delay, s/veh		23.8			29.1				15.9			7.8	
Approach LOS		C			C				B			A	

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	7.3	30.4	7.3	10.1		37.7	8.5	8.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s	5.8	31.0	7.0	29.0		31.0	18.0	18.0
Max Q Clear Time (g_c+I1), s	3.6	19.4	3.6	2.9		11.3	2.6	3.9
Green Ext Time (p_c), s	0.0	6.5	0.0	0.1		6.2	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	13.2
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	0	5	0	0	0	84	1218	0	0	1019	52
Future Volume (veh/h)	53	0	5	0	0	0	84	1218	0	0	1019	52
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	0	1870	1870	1870
Adj Flow Rate, veh/h	58	0	5	0	0	0	91	1324	0	0	1108	57
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	0	2	2	2
Cap, veh/h	269	0	96	0	114	0	457	2623	0	161	2538	131
Arrive On Green	0.06	0.00	0.06	0.00	0.00	0.00	0.74	0.74	0.00	0.00	0.74	0.74
Sat Flow, veh/h	1781	0	1585	0	1870	0	482	3647	0	414	3439	177
Grp Volume(v), veh/h	58	0	5	0	0	0	91	1324	0	0	572	593
Grp Sat Flow(s),veh/h/ln	1781	0	1585	0	1870	0	482	1777	0	414	1777	1839
Q Serve(g_s), s	1.4	0.0	0.1	0.0	0.0	0.0	4.0	7.0	0.0	0.0	5.6	5.6
Cycle Q Clear(g_c), s	1.4	0.0	0.1	0.0	0.0	0.0	9.6	7.0	0.0	0.0	5.6	5.6
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00	1.00		0.10
Lane Grp Cap(c), veh/h	269	0	96	0	114	0	457	2623	0	161	1311	1357
V/C Ratio(X)	0.22	0.00	0.05	0.00	0.00	0.00	0.20	0.50	0.00	0.00	0.44	0.44
Avail Cap(c_a), veh/h	878	0	638	0	753	0	457	2623	0	161	1311	1357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.4	0.0	19.8	0.0	0.0	0.0	4.1	2.4	0.0	0.0	2.3	2.3
Incr Delay (d2), s/veh	0.4	0.0	0.2	0.0	0.0	0.0	1.0	0.7	0.0	0.0	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.4	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.8	0.0	20.0	0.0	0.0	0.0	5.1	3.1	0.0	0.0	3.3	3.3
LnGrp LOS	C	A	C	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		63			0			1415			1165	
Approach Delay, s/veh		20.7			0.0			3.3			3.3	
Approach LOS		C						A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	37.5	7.2	37.5	7.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	33.0	18.0	33.0	18.0
Max Q Clear Time (g_c+I1), s	11.6	3.4	7.6	0.0
Green Ext Time (p_c), s	10.7	0.1	7.8	0.0

Intersection Summary	
HCM 6th Ctrl Delay	3.7
HCM 6th LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	1	1115	1	1	930
Future Volume (veh/h)	1	1	1115	1	1	930
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1945	1945	1811	1811	1788	1788
Adj Flow Rate, veh/h	4	4	1239	1	1	949
Peak Hour Factor	0.25	0.25	0.90	0.90	0.98	0.98
Percent Heavy Veh, %	2	2	6	6	6	6
Cap, veh/h	9	9	1793	1	6	2272
Arrive On Green	0.01	0.01	0.51	0.51	0.00	0.67
Sat Flow, veh/h	784	784	3619	3	1702	3486
Grp Volume(v), veh/h	9	0	604	636	1	949
Grp Sat Flow(s),veh/h/ln	1765	0	1721	1810	1702	1698
Q Serve(g_s), s	0.1	0.0	7.5	7.5	0.0	3.6
Cycle Q Clear(g_c), s	0.1	0.0	7.5	7.5	0.0	3.6
Prop In Lane	0.44	0.44		0.00	1.00	
Lane Grp Cap(c), veh/h	21	0	874	920	6	2272
V/C Ratio(X)	0.42	0.00	0.69	0.69	0.17	0.42
Avail Cap(c_a), veh/h	1126	0	1128	1187	302	3370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.8	0.0	5.3	5.3	14.0	2.1
Incr Delay (d2), s/veh	12.7	0.0	1.2	1.2	12.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.6	0.6	0.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.6	0.0	6.5	6.4	26.5	2.3
LnGrp LOS	C	A	A	A	C	A
Approach Vol, veh/h	9		1240			950
Approach Delay, s/veh	26.6		6.5			2.3
Approach LOS	C		A			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	4.5	18.8			23.4	4.8
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	5.0	18.5			28.0	18.0
Max Q Clear Time (g_c+I1), s	2.0	9.5			5.6	2.1
Green Ext Time (p_c), s	0.0	4.8			6.4	0.0

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	12	1225	1072	12
Future Volume (veh/h)	8	8	12	1225	1072	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.91	1.00			0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1847	1847	1847	1847
Adj Flow Rate, veh/h	9	9	13	1332	1165	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	70	70	30	2253	1748	20
Arrive On Green	0.09	0.09	0.02	0.64	0.49	0.49
Sat Flow, veh/h	760	760	1759	3601	3644	40
Grp Volume(v), veh/h	19	0	13	1332	575	603
Grp Sat Flow(s),veh/h/ln	1605	0	1759	1754	1754	1837
Q Serve(g_s), s	0.4	0.0	0.2	7.4	8.4	8.4
Cycle Q Clear(g_c), s	0.4	0.0	0.2	7.4	8.4	8.4
Prop In Lane	0.47	0.47	1.00			0.02
Lane Grp Cap(c), veh/h	148	0	30	2253	863	904
V/C Ratio(X)	0.13	0.00	0.43	0.59	0.67	0.67
Avail Cap(c_a), veh/h	853	0	260	3419	1218	1275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	0.0	16.5	3.5	6.5	6.5
Incr Delay (d2), s/veh	0.4	0.0	9.6	0.2	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.2	0.1	1.2	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.5	0.0	26.1	3.7	7.4	7.4
LnGrp LOS	B	A	C	A	A	A
Approach Vol, veh/h	19			1345	1178	
Approach Delay, s/veh	14.5			4.0	7.4	
Approach LOS	B			A	A	

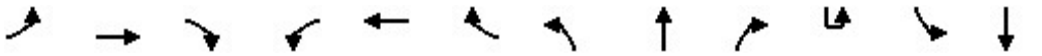
Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	26.2		7.6	5.1	21.2
Change Period (Y+Rc), s	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s	33.0		18.0	5.0	23.5
Max Q Clear Time (g_c+I1), s	9.4		2.4	2.2	10.4
Green Ext Time (p_c), s	10.0		0.0	0.0	5.8

Intersection Summary	
HCM 6th Ctrl Delay	5.6
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
6: Valley Center Rd. & Lilac Rd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	310	0	182	0	0	0	209	895	0	3	0	761
Future Volume (veh/h)	310	0	182	0	0	0	209	895	0	3	0	761
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1811	1811	1884	1870	1870	1870	1717	1717	1786		1717	1717
Adj Flow Rate, veh/h	386	0	128	0	0	0	235	1006	0		0	827
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89		0.92	0.92
Percent Heavy Veh, %	6	6	6	2	2	2	6	6	6		6	6
Cap, veh/h	591	0	271	0	3	0	339	2062	0		3	1004
Arrive On Green	0.17	0.00	0.17	0.00	0.00	0.00	0.11	0.63	0.00		0.00	0.44
Sat Flow, veh/h	3450	0	1579	0	1870	0	3172	3348	0		1635	2281
Grp Volume(v), veh/h	386	0	128	0	0	0	235	1006	0		0	591
Grp Sat Flow(s),veh/h/ln	1725	0	1579	0	1870	0	1586	1631	0		1635	1631
Q Serve(g_s), s	6.0	0.0	4.2	0.0	0.0	0.0	4.1	9.4	0.0		0.0	18.3
Cycle Q Clear(g_c), s	6.0	0.0	4.2	0.0	0.0	0.0	4.1	9.4	0.0		0.0	18.3
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	591	0	271	0	3	0	339	2062	0		3	718
V/C Ratio(X)	0.65	0.00	0.47	0.00	0.00	0.00	0.69	0.49	0.00		0.00	0.82
Avail Cap(c_a), veh/h	1847	0	846	0	1008	0	612	2960	0		159	1324
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		0.00	1.00
Uniform Delay (d), s/veh	22.2	0.0	21.5	0.0	0.0	0.0	24.8	5.6	0.0		0.0	14.1
Incr Delay (d2), s/veh	0.5	0.0	0.5	0.0	0.0	0.0	1.0	0.1	0.0		0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	1.4	0.0	0.0	0.0	1.4	1.7	0.0		0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.7	0.0	22.0	0.0	0.0	0.0	25.7	5.7	0.0		0.0	15.1
LnGrp LOS	C	A	C	A	A	A	C	A	A		A	B
Approach Vol, veh/h		514			0			1241				1155
Approach Delay, s/veh		22.5			0.0			9.5				15.1
Approach LOS		C						A				B

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		15.9	11.1	30.6		0.0	0.0	41.7				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.8	11.1	46.7		31.0	5.6	52.2				
Max Q Clear Time (g_c+I1), s		8.0	6.1	20.4		0.0	0.0	11.4				
Green Ext Time (p_c), s		0.8	0.2	4.9		0.0	0.0	4.8				

Intersection Summary	
HCM 6th Ctrl Delay	14.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

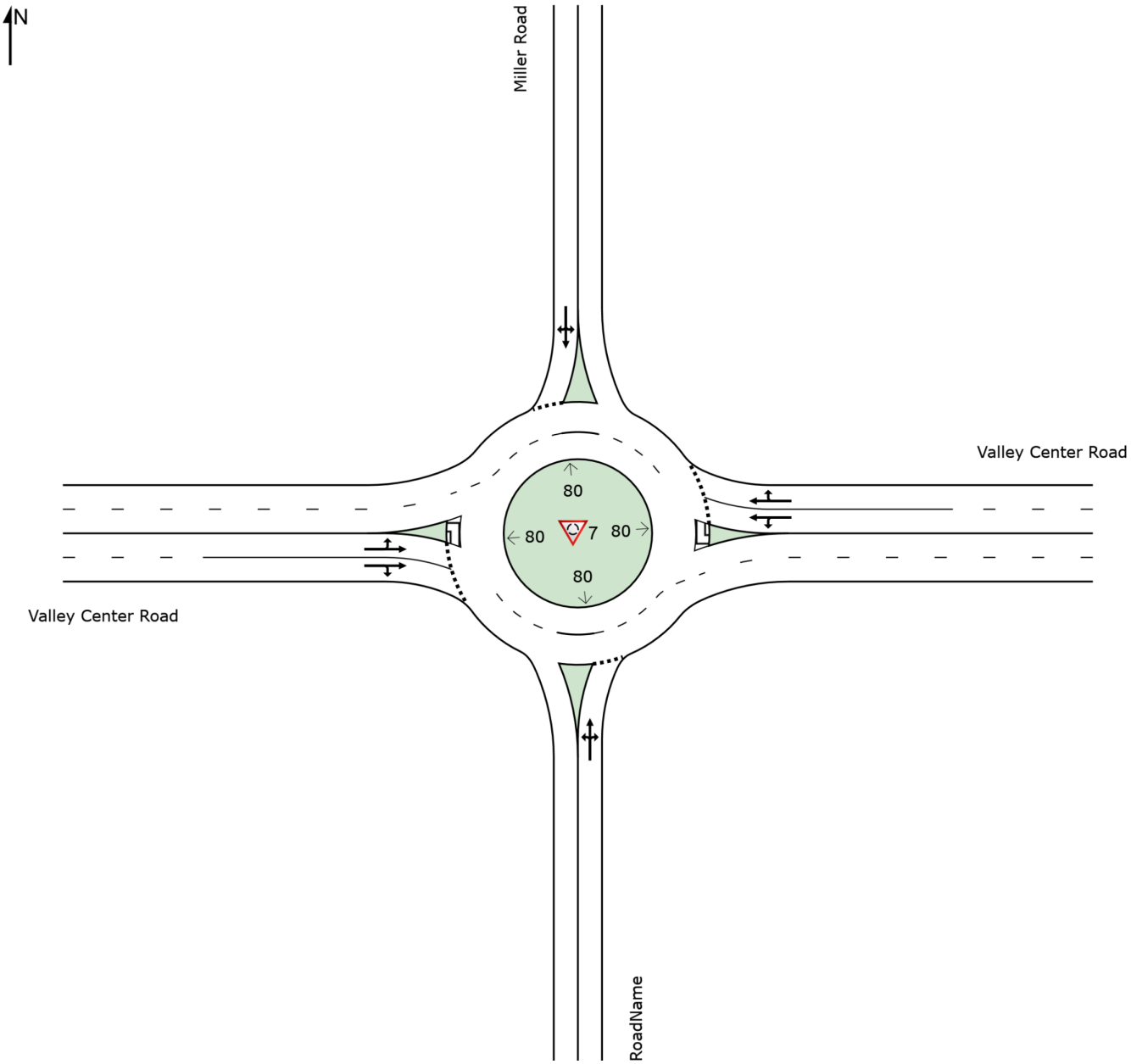
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	302
Future Volume (veh/h)	302
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	328
Peak Hour Factor	0.92
Percent Heavy Veh, %	6
Cap, veh/h	397
Arrive On Green	0.44
Sat Flow, veh/h	903
Grp Volume(v), veh/h	564
Grp Sat Flow(s),veh/h/ln	1553
Q Serve(g_s), s	18.4
Cycle Q Clear(g_c), s	18.4
Prop In Lane	0.58
Lane Grp Cap(c), veh/h	683
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	1261
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	14.2
Incr Delay (d2), s/veh	1.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	5.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	15.2
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

SITE LAYOUT

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

PM
Site Category: Existing
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

PM
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: RoadName														
3	L2	92	3.0	100	3.0	0.362	16.8	LOS C	1.3	34.3	0.81	0.87	1.07	28.0
8	T1	1	3.0	1	3.0	0.362	16.8	LOS C	1.3	34.3	0.81	0.87	1.07	28.0
18	R2	31	3.0	34	3.0	0.362	16.8	LOS C	1.3	34.3	0.81	0.87	1.07	27.5
Approach		124	3.0	135	3.0	0.362	16.8	LOS C	1.3	34.3	0.81	0.87	1.07	27.9
East: Valley Center Road														
1	L2	64	3.0	70	3.0	0.523	9.1	LOS A	3.3	84.9	0.49	0.34	0.49	32.3
6	T1	1048	4.0	1103	4.0	0.523	9.1	LOS A	3.3	84.9	0.49	0.34	0.49	32.4
16	R2	28	4.0	29	4.0	0.523	9.1	LOS A	3.3	84.8	0.49	0.34	0.49	31.7
Approach		1140	3.9	1202	3.9	0.523	9.1	LOS A	3.3	84.9	0.49	0.34	0.49	32.4
North: Miller Road														
7	L2	1	2.0	1	2.0	0.115	9.6	LOS A	0.4	9.5	0.70	0.70	0.70	32.3
4	T1	1	3.0	1	3.0	0.115	9.6	LOS A	0.4	9.5	0.70	0.70	0.70	32.3
14	R2	43	2.0	50	2.0	0.115	9.6	LOS A	0.4	9.5	0.70	0.70	0.70	31.5
Approach		45	2.0	52	2.0	0.115	9.6	LOS A	0.4	9.5	0.70	0.70	0.70	31.5
West: Valley Center Road														
5	L2	72	4.0	81	4.0	0.603	10.0	LOS B	4.8	124.8	0.37	0.18	0.37	31.9
2	T1	1244	4.0	1398	4.0	0.603	10.0	LOS B	4.8	125.0	0.37	0.18	0.37	32.0
12	R2	56	3.0	61	3.0	0.603	10.0	LOS B	4.8	125.0	0.37	0.18	0.37	31.3
Approach		1372	4.0	1540	4.0	0.603	10.0	LOS B	4.8	125.0	0.37	0.18	0.37	32.0
All Vehicles		2681	3.9	2929	3.9	0.603	10.0	LOS A	4.8	125.0	0.44	0.29	0.45	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (veh/h)	1147	23	1	43	1043	63	18
Future Volume (veh/h)	1147	23	1	43	1043	63	18
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00	0.93
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach	No				No	No	
Adj Sat Flow, veh/h/ln	1811	1811		1811	1811	1945	1945
Adj Flow Rate, veh/h	1274	26		45	1086	84	24
Peak Hour Factor	0.90	0.90		0.96	0.96	0.75	0.75
Percent Heavy Veh, %	6	6		6	6	2	2
Cap, veh/h	1962	40		310	1958	280	80
Arrive On Green	0.57	0.57		0.57	0.57	0.21	0.21
Sat Flow, veh/h	3539	70		410	3532	1364	390
Grp Volume(v), veh/h	635	665		45	1086	109	0
Grp Sat Flow(s),veh/h/ln	1721	1798		410	1721	1771	0
Q Serve(g_s), s	10.1	10.1		3.4	7.9	2.1	0.0
Cycle Q Clear(g_c), s	10.1	10.1		13.4	7.9	2.1	0.0
Prop In Lane		0.04		1.00		0.77	0.22
Lane Grp Cap(c), veh/h	979	1023		310	1958	364	0
V/C Ratio(X)	0.65	0.65		0.15	0.55	0.30	0.00
Avail Cap(c_a), veh/h	1315	1375		390	2630	910	0
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00		1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	5.9	5.9		10.5	5.4	13.4	0.0
Incr Delay (d2), s/veh	0.7	0.7		0.2	0.2	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.0		0.2	1.4	0.8	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	6.6	6.6		10.7	5.7	13.9	0.0
LnGrp LOS	A	A		B	A	B	A
Approach Vol, veh/h	1300				1131	109	
Approach Delay, s/veh	6.6				5.9	13.9	
Approach LOS	A				A	B	

Timer - Assigned Phs		2		4			8
Phs Duration (G+Y+Rc), s		12.7		27.2			27.2
Change Period (Y+Rc), s		4.5		4.5			4.5
Max Green Setting (Gmax), s		20.5		30.5			30.5
Max Q Clear Time (g_c+I1), s		4.1		12.1			15.4
Green Ext Time (p_c), s		0.2		8.5			7.3

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 6th Signalized Intersection Summary
9: Cole Grade Rd. & Valley Center Rd.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	700	467	37	2	23	498	111	59	23	21	101	14
Future Volume (veh/h)	700	467	37	2	23	498	111	59	23	21	101	14
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96		1.00		0.97	1.00		0.92	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811		1811	1811	1884	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	737	492	39		26	566	126	67	26	24	107	15
Peak Hour Factor	0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94
Percent Heavy Veh, %	6	6	6		6	6	6	6	6	6	6	6
Cap, veh/h	830	553	451		248	708	319	87	34	31	342	48
Arrive On Green	0.25	0.31	0.31		0.14	0.21	0.21	0.09	0.09	0.09	0.22	0.22
Sat Flow, veh/h	3346	1811	1476		1725	3441	1551	954	370	342	1522	213
Grp Volume(v), veh/h	737	492	39		26	566	126	117	0	0	122	0
Grp Sat Flow(s),veh/h/ln	1673	1811	1476		1725	1721	1551	1666	0	0	1735	0
Q Serve(g_s), s	18.5	22.6	1.6		1.1	13.7	6.1	6.0	0.0	0.0	5.1	0.0
Cycle Q Clear(g_c), s	18.5	22.6	1.6		1.1	13.7	6.1	6.0	0.0	0.0	5.1	0.0
Prop In Lane	1.00		1.00		1.00		1.00	0.57		0.21	0.88	
Lane Grp Cap(c), veh/h	830	553	451		248	708	319	153	0	0	390	0
V/C Ratio(X)	0.89	0.89	0.09		0.10	0.80	0.39	0.77	0.00	0.00	0.31	0.00
Avail Cap(c_a), veh/h	1077	1064	867		248	1135	512	554	0	0	676	0
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	31.7	28.9	21.6		32.5	33.0	30.0	38.7	0.0	0.0	28.2	0.0
Incr Delay (d2), s/veh	6.4	2.0	0.0		0.1	0.8	0.3	5.9	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	9.6	0.6		0.5	5.6	2.2	2.7	0.0	0.0	2.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	30.9	21.7		32.6	33.8	30.3	44.6	0.0	0.0	28.6	0.0
LnGrp LOS	D	C	C		C	C	C	D	A	A	C	A
Approach Vol, veh/h		1268				718			117			607
Approach Delay, s/veh		34.8				33.1			44.6			33.5
Approach LOS		C				C			D			C

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.9	32.0		24.9	26.5	23.3		12.6				
Change Period (Y+Rc), s	5.3	* 5.3		5.3	4.9	5.3		4.6				
Max Green Setting (Gmax), s	5.6	* 51		34.0	28.1	28.8		29.0				
Max Q Clear Time (g_c+I1), s	3.1	24.6		17.7	20.5	15.7		8.0				
Green Ext Time (p_c), s	0.0	2.0		1.9	1.1	2.3		0.5				

Intersection Summary		
HCM 6th Ctrl Delay		34.5
HCM 6th LOS		C

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	456
Future Volume (veh/h)	456
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.96
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1811
Adj Flow Rate, veh/h	485
Peak Hour Factor	0.94
Percent Heavy Veh, %	6
Cap, veh/h	579
Arrive On Green	0.22
Sat Flow, veh/h	2580
Grp Volume(v), veh/h	485
Grp Sat Flow(s),veh/h/ln	1290
Q Serve(g_s), s	15.7
Cycle Q Clear(g_c), s	15.7
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	579
V/C Ratio(X)	0.84
Avail Cap(c_a), veh/h	1005
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	32.3
Incr Delay (d2), s/veh	2.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	5.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	34.8
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Future Year 2035 Volumes with Existing Geometry & Traffic Control – Intersection Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	182	109	517	57	44	1117
Future Volume (veh/h)	182	109	517	57	44	1117
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1841	1841	1746	1746	1841	1841
Adj Flow Rate, veh/h	202	121	533	59	47	1188
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	493	226	995	658	76	1766
Arrive On Green	0.14	0.14	0.30	0.30	0.04	0.50
Sat Flow, veh/h	3401	1560	3406	1480	1753	3589
Grp Volume(v), veh/h	202	121	533	59	47	1188
Grp Sat Flow(s),veh/h/ln	1700	1560	1659	1480	1753	1749
Q Serve(g_s), s	1.6	2.2	4.1	0.7	0.8	7.7
Cycle Q Clear(g_c), s	1.6	2.2	4.1	0.7	0.8	7.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	493	226	995	658	76	1766
V/C Ratio(X)	0.41	0.54	0.54	0.09	0.62	0.67
Avail Cap(c_a), veh/h	2944	1351	2379	1276	382	3837
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.8	12.0	8.8	4.9	14.2	5.6
Incr Delay (d2), s/veh	0.2	0.7	0.2	0.0	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.9	0.8	0.1	0.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.0	12.7	9.0	4.9	17.3	5.8
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	323		592			1235
Approach Delay, s/veh	12.3		8.6			6.2
Approach LOS	B		A			A

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		20.6		9.7	6.2	14.4
Change Period (Y+Rc), s		5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s		33.2		26.2	6.6	21.7
Max Q Clear Time (g_c+I1), s		9.7		4.2	2.8	6.1
Green Ext Time (p_c), s		5.6		0.5	0.0	2.0

Intersection Summary	
HCM 6th Ctrl Delay	7.8
HCM 6th LOS	A

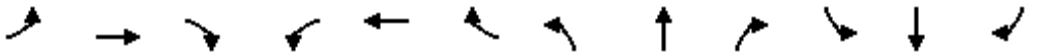
Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	59	17	637	1149	24
Future Vol, veh/h	28	59	17	637	1149	24
Conflicting Peds, #/hr	0	0	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	88	88	88	88
Heavy Vehicles, %	2	2	4	4	4	4
Mvmt Flow	42	88	19	724	1306	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1721	668	1334	0	-	0
Stage 1	1321	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.18	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.24	-	-	-
Pot Cap-1 Maneuver	80	401	503	-	-	-
Stage 1	214	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	401	503	-	-	-
Mov Cap-2 Maneuver	77	-	-	-	-	-
Stage 1	206	-	-	-	-	-
Stage 2	645	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	42.5	0.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	503	-	77	401	-	-
HCM Lane V/C Ratio	0.038	-	0.543	0.22	-	-
HCM Control Delay (s)	12.4	-	97.2	16.5	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.1	-	2.3	0.8	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	88	1	0	1	52	820	1	1	1297	55
Future Volume (veh/h)	57	0	88	1	0	1	52	820	1	1	1297	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	62	0	96	1	0	1	57	891	1	1	1410	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	161	0	143	2	0	2	86	2337	3	3	2065	88
Arrive On Green	0.09	0.00	0.09	0.00	0.00	0.00	0.05	0.64	0.64	0.00	0.59	0.59
Sat Flow, veh/h	1781	0	1585	839	0	839	1781	3642	4	1781	3473	148
Grp Volume(v), veh/h	62	0	96	2	0	0	57	435	457	1	720	750
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1677	0	0	1781	1777	1870	1781	1777	1844
Q Serve(g_s), s	2.2	0.0	4.0	0.1	0.0	0.0	2.1	7.9	7.9	0.0	18.9	19.0
Cycle Q Clear(g_c), s	2.2	0.0	4.0	0.1	0.0	0.0	2.1	7.9	7.9	0.0	18.9	19.0
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	161	0	143	5	0	0	86	1140	1200	3	1057	1097
V/C Ratio(X)	0.38	0.00	0.67	0.44	0.00	0.00	0.66	0.38	0.38	0.38	0.68	0.68
Avail Cap(c_a), veh/h	472	0	420	442	0	0	138	1140	1200	133	1057	1097
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.3	0.0	30.1	34.0	0.0	0.0	31.9	5.8	5.8	34.1	9.4	9.5
Incr Delay (d2), s/veh	1.5	0.0	5.3	54.4	0.0	0.0	8.4	1.0	0.9	73.3	3.6	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.7	0.1	0.0	0.0	1.1	2.2	2.3	0.1	6.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.8	0.0	35.3	88.4	0.0	0.0	40.3	6.8	6.7	107.3	13.0	12.9
LnGrp LOS	C	A	D	F	A	A	D	A	A	F	B	B
Approach Vol, veh/h		158			2			949			1471	
Approach Delay, s/veh		33.5			88.4			8.8			13.0	
Approach LOS		C			F			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	48.3		10.7	7.8	45.1		4.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.1	40.8		18.1	5.3	40.6		18.0				
Max Q Clear Time (g_c+I1), s	2.0	9.9		6.0	4.1	21.0		2.1				
Green Ext Time (p_c), s	0.0	5.6		0.5	0.0	9.6		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		12.8	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	1	0	708	1	1	1	1163
Future Vol, veh/h	1	0	708	1	1	1	1163
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	2
Peak Hour Factor	25	25	90	90	92	98	98
Heavy Vehicles, %	2	2	4	4	4	4	4
Mvmt Flow	4	0	787	1	1	1	1187

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	1386	394	0	0	788	788	0
Stage 1	788	-	-	-	-	-	-
Stage 2	598	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	6.48	4.18	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.54	2.24	-
Pot Cap-1 Maneuver	134	605	-	-	447	814	-
Stage 1	409	-	-	-	-	-	-
Stage 2	512	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	134	605	-	-	572	572	-
Mov Cap-2 Maneuver	134	-	-	-	-	-	-
Stage 1	409	-	-	-	-	-	-
Stage 2	510	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	32.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	134	572	-
HCM Lane V/C Ratio	-	-	0.03	0.004	-
HCM Control Delay (s)	-	-	32.7	11.3	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1148.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	17	2	12	1300	27
Future Vol, veh/h	34	17	2	12	1300	27
Conflicting Peds, #/hr	0	0	872	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	60	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	2	2	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	18	2	13	1413	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2311	1593	2314	0	-	0
Stage 1	2300	-	-	-	-	-
Stage 2	11	-	-	-	-	-
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	~ 32	96	213	-	-	-
Stage 1	62	-	-	-	-	-
Stage 2	1010	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 1	~ 16	36	-	-	-
Mov Cap-2 Maneuver	~ 1	-	-	-	-	-
Stage 1	~ 10	-	-	-	-	-
Stage 2	172	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 31338.7	15.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	36	-	1	-	-
HCM Lane V/C Ratio	0.06	-	55.435	-	-
HCM Control Delay (s)	111.3	-	$ 31338.7	-	-
HCM Lane LOS	F	-	F	-	-
HCM 95th %tile Q(veh)	0.2	-	9.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	304	0	264	2	0	0	1	193	568	0	0	921
Future Volume (veh/h)	304	0	264	2	0	0	1	193	568	0	0	921
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00		1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No
Adj Sat Flow, veh/h/ln	1841	1841	1914	1870	1870	1870		1746	1746	1816	1746	1746
Adj Flow Rate, veh/h	406	0	185	8	0	0		217	638	0	0	1001
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25		0.89	0.89	0.89	0.92	0.92
Percent Heavy Veh, %	4	4	4	2	2	2		4	4	4	4	4
Cap, veh/h	580	0	264	22	0	0		286	2130	0	2	1121
Arrive On Green	0.17	0.00	0.17	0.01	0.00	0.00		0.09	0.64	0.00	0.00	0.50
Sat Flow, veh/h	3506	0	1596	1781	0	0		3227	3406	0	1663	2260
Grp Volume(v), veh/h	406	0	185	8	0	0		217	638	0	0	730
Grp Sat Flow(s),veh/h/ln	1753	0	1596	1781	0	0		1613	1659	0	1663	1659
Q Serve(g_s), s	9.4	0.0	9.4	0.4	0.0	0.0		5.6	7.3	0.0	0.0	34.0
Cycle Q Clear(g_c), s	9.4	0.0	9.4	0.4	0.0	0.0		5.6	7.3	0.0	0.0	34.0
Prop In Lane	1.00		1.00	1.00		0.00		1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	580	0	264	22	0	0		286	2130	0	2	823
V/C Ratio(X)	0.70	0.00	0.70	0.37	0.00	0.00		0.76	0.30	0.00	0.00	0.89
Avail Cap(c_a), veh/h	1259	0	573	644	0	0		305	2130	0	109	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00		1.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	0.0	33.8	42.0	0.0	0.0		38.2	6.8	0.0	0.0	19.5
Incr Delay (d2), s/veh	0.6	0.0	1.3	7.6	0.0	0.0		8.6	0.0	0.0	0.0	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	3.5	0.2	0.0	0.0		2.5	2.0	0.0	0.0	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	0.0	35.1	49.7	0.0	0.0		46.7	6.8	0.0	0.0	27.7
LnGrp LOS	C	A	D	D	A	A		D	A	A	A	C
Approach Vol, veh/h		591			8				855			1436
Approach Delay, s/veh		34.6			49.7				17.0			29.1
Approach LOS		C			D				B			C

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.2	12.5	47.8		5.2	0.0	60.3				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.8	8.1	49.7		31.0	5.6	52.2				
Max Q Clear Time (g_c+I1), s		11.4	7.6	37.5		2.4	0.0	9.3				
Green Ext Time (p_c), s		1.0	0.0	5.1		0.0	0.0	2.7				

Intersection Summary	
HCM 6th Ctrl Delay	26.7
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	400
Future Volume (veh/h)	400
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.99
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1816
Adj Flow Rate, veh/h	435
Peak Hour Factor	0.92
Percent Heavy Veh, %	4
Cap, veh/h	479
Arrive On Green	0.50
Sat Flow, veh/h	965
Grp Volume(v), veh/h	706
Grp Sat Flow(s),veh/h/ln	1566
Q Serve(g_s), s	35.5
Cycle Q Clear(g_c), s	35.5
Prop In Lane	0.62
Lane Grp Cap(c), veh/h	777
V/C Ratio(X)	0.91
Avail Cap(c_a), veh/h	908
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	19.8
Incr Delay (d2), s/veh	10.8
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	13.2
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	30.6
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	18	883	0	1186	14	20	103
Future Vol, veh/h	18	883	0	1186	14	20	103
Conflicting Peds, #/hr	7	0	0	0	7	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	100	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	0	-	0	-
Grade, %	-	2	-	0	-	0	-
Peak Hour Factor	89	89	95	95	95	86	86
Heavy Vehicles, %	4	4	4	4	4	2	2
Mvmt Flow	20	992	0	1248	15	23	120

Major/Minor	Major1		Major2			Minor2	
Conflicting Flow All	1270	0	992	-	0	1799	639
Stage 1	-	-	-	-	-	1263	-
Stage 2	-	-	-	-	-	536	-
Critical Hdwy	4.18	-	6.48	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.24	-	2.54	-	-	3.52	3.32
Pot Cap-1 Maneuver	532	-	330	-	-	71	419
Stage 1	-	-	-	-	-	230	-
Stage 2	-	-	-	-	-	551	-
Platoon blocked, %		-		-	-		
Mov Cap-1 Maneuver	527	-	330	-	-	67	415
Mov Cap-2 Maneuver	-	-	-	-	-	67	-
Stage 1	-	-	-	-	-	219	-
Stage 2	-	-	-	-	-	546	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	45.3
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	527	-	330	-	-	225
HCM Lane V/C Ratio	0.038	-	-	-	-	0.636
HCM Control Delay (s)	12.1	-	0	-	-	45.3
HCM Lane LOS	B	-	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	0	-	-	3.8

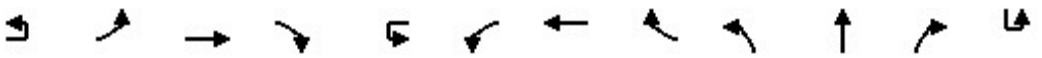
Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	918	2	2	1193	5	2
Future Vol, veh/h	918	2	2	1193	5	2
Conflicting Peds, #/hr	0	1	1	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	96	96	75	75
Heavy Vehicles, %	4	4	4	4	2	2
Mvmt Flow	1020	2	2	1243	7	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1023	0	1649	512
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	627	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	662	-	90	507
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	495	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	661	-	90	506
Mov Cap-2 Maneuver	-	-	-	-	211	-
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	493	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	253	-	-	661	-
HCM Lane V/C Ratio	0.037	-	-	0.003	-
HCM Control Delay (s)	19.8	-	-	10.5	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	25	380	492	31	1	14	451	158	30	11	11	10
Future Volume (veh/h)	25	380	492	31	1	14	451	158	30	11	11	10
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)		1.00		0.99		1.00		0.99	1.00		1.00	
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach			No				No			No		
Adj Sat Flow, veh/h/ln		1841	1841	1841		1841	1841	1914	1841	1841	1841	
Adj Flow Rate, veh/h		400	518	33		16	512	180	34	12	12	
Peak Hour Factor		0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	
Percent Heavy Veh, %		4	4	4		4	4	4	4	4	4	
Cap, veh/h		355	617	520		26	622	217	62	22	22	
Arrive On Green		0.10	0.34	0.34		0.02	0.25	0.25	0.06	0.06	0.06	
Sat Flow, veh/h		3401	1841	1551		1753	2530	885	1012	357	357	
Grp Volume(v), veh/h		400	518	33		16	353	339	58	0	0	
Grp Sat Flow(s),veh/h/ln		1700	1841	1551		1753	1749	1667	1726	0	0	
Q Serve(g_s), s		8.1	20.2	1.1		0.7	14.8	15.0	2.5	0.0	0.0	
Cycle Q Clear(g_c), s		8.1	20.2	1.1		0.7	14.8	15.0	2.5	0.0	0.0	
Prop In Lane		1.00		1.00		1.00		0.53	0.59		0.21	
Lane Grp Cap(c), veh/h		355	617	520		26	430	410	105	0	0	
V/C Ratio(X)		1.13	0.84	0.06		0.61	0.82	0.83	0.55	0.00	0.00	
Avail Cap(c_a), veh/h		355	737	621		126	644	614	644	0	0	
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	
Uniform Delay (d), s/veh		34.8	23.9	17.5		38.0	27.7	27.7	35.4	0.0	0.0	
Incr Delay (d2), s/veh		87.1	6.4	0.0		8.1	3.1	3.6	3.3	0.0	0.0	
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln		7.4	8.9	0.4		0.3	6.0	5.8	1.2	0.0	0.0	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		121.8	30.3	17.6		46.1	30.8	31.3	38.7	0.0	0.0	
LnGrp LOS		F	C	B		D	C	C	D	A	A	
Approach Vol, veh/h			951				708			58		
Approach Delay, s/veh			68.3				31.4			38.7		
Approach LOS			E				C			D		

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.1	31.3		30.9	13.0	24.4		9.3
Change Period (Y+Rc), s	4.9	5.3		5.3	4.9	5.3		4.6
Max Green Setting (Gmax), s	5.6	31.1		34.2	8.1	28.6		29.0
Max Q Clear Time (g_c+I1), s	2.7	22.2		21.9	10.1	17.0		4.5
Green Ext Time (p_c), s	0.0	1.4		3.3	0.0	2.0		0.2

Intersection Summary	
HCM 6th Ctrl Delay	42.2
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	253	28	709
Future Volume (veh/h)	253	28	709
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Work Zone On Approach		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841
Adj Flow Rate, veh/h	269	30	754
Peak Hour Factor	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4
Cap, veh/h	523	58	899
Arrive On Green	0.33	0.33	0.33
Sat Flow, veh/h	1585	177	2725
Grp Volume(v), veh/h	299	0	754
Grp Sat Flow(s),veh/h/ln	1761	0	1362
Q Serve(g_s), s	10.6	0.0	19.9
Cycle Q Clear(g_c), s	10.6	0.0	19.9
Prop In Lane	0.90		1.00
Lane Grp Cap(c), veh/h	581	0	899
V/C Ratio(X)	0.51	0.00	0.84
Avail Cap(c_a), veh/h	776	0	1200
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.0	0.0	24.1
Incr Delay (d2), s/veh	0.5	0.0	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	6.6
Unsig. Movement Delay, s/veh			
LnGrp Delay(d),s/veh	21.5	0.0	27.8
LnGrp LOS	C	A	C
Approach Vol, veh/h		1053	
Approach Delay, s/veh		26.0	
Approach LOS		C	
Timer - Assigned Phs			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	83	115	1160	165	118	856
Future Volume (veh/h)	83	115	1160	165	118	856
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1717	1717	1811	1811
Adj Flow Rate, veh/h	92	128	1196	170	126	911
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	6	6	6	6	6	6
Cap, veh/h	408	187	1499	846	160	2254
Arrive On Green	0.12	0.12	0.46	0.46	0.09	0.66
Sat Flow, veh/h	3346	1535	3348	1455	1725	3532
Grp Volume(v), veh/h	92	128	1196	170	126	911
Grp Sat Flow(s),veh/h/ln	1673	1535	1631	1455	1725	1721
Q Serve(g_s), s	1.2	3.8	14.9	2.6	3.4	5.9
Cycle Q Clear(g_c), s	1.2	3.8	14.9	2.6	3.4	5.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	408	187	1499	846	160	2254
V/C Ratio(X)	0.23	0.68	0.80	0.20	0.79	0.40
Avail Cap(c_a), veh/h	1866	856	2108	1117	265	3107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.8	20.0	11.0	4.7	21.1	3.8
Incr Delay (d2), s/veh	0.1	1.7	1.0	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.1	3.6	0.7	1.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.9	21.6	11.9	4.8	24.4	3.9
LnGrp LOS	B	C	B	A	C	A
Approach Vol, veh/h	220		1366			1037
Approach Delay, s/veh	20.5		11.0			6.4
Approach LOS	C		B			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				36.4		11.1	9.3	27.1
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				42.9		26.5	7.3	30.7
Max Q Clear Time (g_c+I1), s				7.9		5.8	5.4	16.9
Green Ext Time (p_c), s				4.1		0.3	0.0	5.0

Intersection Summary								
HCM 6th Ctrl Delay			10.0					
HCM 6th LOS			A					

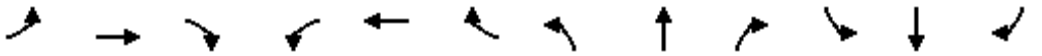
Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Vol, veh/h	16	19	1	51	1233	1006	17
Future Vol, veh/h	16	19	1	51	1233	1006	17
Conflicting Peds, #/hr	0	0	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	100	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	67	67	92	88	88	88	88
Heavy Vehicles, %	2	2	6	6	6	6	6
Mvmt Flow	24	28	1	58	1401	1143	19

Major/Minor	Minor2		Major1			Major2	
Conflicting Flow All	1977	586	1163	1167	0	-	0
Stage 1	1158	-	-	-	-	-	-
Stage 2	819	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.52	4.22	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.56	2.26	-	-	-
Pot Cap-1 Maneuver	54	454	252	572	-	-	-
Stage 1	261	-	-	-	-	-	-
Stage 2	394	-	-	-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	48	452	555	555	-	-	-
Mov Cap-2 Maneuver	48	-	-	-	-	-	-
Stage 1	232	-	-	-	-	-	-
Stage 2	392	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	70.8	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	555	-	48	452	-	-
HCM Lane V/C Ratio	0.106	-	0.498	0.063	-	-
HCM Control Delay (s)	12.3	-	138.9	13.5	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	1.8	0.2	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	0	59	1	0	1	168	1610	1	1	1383	106
Future Volume (veh/h)	108	0	59	1	0	1	168	1610	1	1	1383	106
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	117	0	64	1	0	1	183	1750	1	1	1503	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	0	143	2	0	2	218	2577	1	2	1962	149
Arrive On Green	0.09	0.00	0.09	0.00	0.00	0.00	0.12	0.71	0.71	0.00	0.59	0.59
Sat Flow, veh/h	1781	0	1585	839	0	839	1781	3645	2	1781	3347	255
Grp Volume(v), veh/h	117	0	64	2	0	0	183	853	898	1	794	824
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1677	0	0	1781	1777	1870	1781	1777	1825
Q Serve(g_s), s	5.8	0.0	3.5	0.1	0.0	0.0	9.1	24.5	24.5	0.1	30.3	30.9
Cycle Q Clear(g_c), s	5.8	0.0	3.5	0.1	0.0	0.0	9.1	24.5	24.5	0.1	30.3	30.9
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.00	1.00		0.14
Lane Grp Cap(c), veh/h	160	0	143	5	0	0	218	1256	1322	2	1042	1070
V/C Ratio(X)	0.73	0.00	0.45	0.44	0.00	0.00	0.84	0.68	0.68	0.41	0.76	0.77
Avail Cap(c_a), veh/h	354	0	315	333	0	0	254	1256	1322	98	1042	1070
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.1	0.0	39.1	45.1	0.0	0.0	38.9	7.5	7.5	45.2	14.0	14.1
Incr Delay (d2), s/veh	6.2	0.0	2.2	55.2	0.0	0.0	19.3	3.0	2.8	83.8	5.3	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	1.4	0.1	0.0	0.0	4.9	7.3	7.6	0.1	11.4	11.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.4	0.0	41.3	100.3	0.0	0.0	58.2	10.4	10.3	129.0	19.3	19.5
LnGrp LOS	D	A	D	F	A	A	E	B	B	F	B	B
Approach Vol, veh/h		181			2			1934			1619	
Approach Delay, s/veh		44.6			100.3			14.9			19.5	
Approach LOS		D			F			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	68.5		12.7	15.6	57.6		4.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	61.0		18.0	12.9	53.1		18.0				
Max Q Clear Time (g_c+I1), s	2.1	26.5		7.8	11.1	32.9		2.1				
Green Ext Time (p_c), s	0.0	16.5		0.4	0.1	11.1		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		18.4	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	0	1265	1	1	1046
Future Vol, veh/h	1	0	1265	1	1	1046
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	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	2
Peak Hour Factor	25	25	90	90	98	98
Heavy Vehicles, %	2	2	6	6	6	6
Mvmt Flow	4	0	1406	1	1	1067

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1943	704	0	0	1407	0
Stage 1	1407	-	-	-	-	-
Stage 2	536	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.22	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.26	-
Pot Cap-1 Maneuver	57	379	-	-	461	-
Stage 1	192	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	57	379	-	-	461	-
Mov Cap-2 Maneuver	57	-	-	-	-	-
Stage 1	192	-	-	-	-	-
Stage 2	550	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	72.9	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	57	461	-
HCM Lane V/C Ratio	-	-	0.07	0.002	-
HCM Control Delay (s)	-	-	72.9	12.8	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

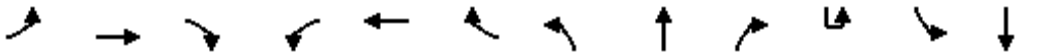
Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	12	19	1633	1503	19
Future Vol, veh/h	12	12	19	1633	1503	19
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	-	60	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	2	2	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	13	21	1775	1634	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2575	828	1655	0	-	0
Stage 1	1645	-	-	-	-	-
Stage 2	930	-	-	-	-	-
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	21	314	386	-	-	-
Stage 1	143	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	20	314	386	-	-	-
Mov Cap-2 Maneuver	20	-	-	-	-	-
Stage 1	135	-	-	-	-	-
Stage 2	344	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	214.2	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	386	-	38	-	-
HCM Lane V/C Ratio	0.054	-	0.686	-	-
HCM Control Delay (s)	14.9	-	214.2	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.2	-	2.5	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	344	0	206	0	0	0	276	992	0	3	0	861
Future Volume (veh/h)	344	0	206	0	0	0	276	992	0	3	0	861
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1811	1811	1884	1870	1870	1870	1717	1717	1786		1717	1717
Adj Flow Rate, veh/h	430	0	145	0	0	0	310	1115	0		0	936
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89		0.92	0.92
Percent Heavy Veh, %	6	6	6	2	2	2	6	6	6		6	6
Cap, veh/h	593	0	271	0	2	0	390	2213	0		2	1066
Arrive On Green	0.17	0.00	0.17	0.00	0.00	0.00	0.12	0.68	0.00		0.00	0.49
Sat Flow, veh/h	3450	0	1579	0	1870	0	3172	3348	0		1635	2173
Grp Volume(v), veh/h	430	0	145	0	0	0	310	1115	0		0	699
Grp Sat Flow(s),veh/h/ln	1725	0	1579	0	1870	0	1586	1631	0		1635	1631
Q Serve(g_s), s	8.9	0.0	6.3	0.0	0.0	0.0	7.2	12.6	0.0		0.0	28.9
Cycle Q Clear(g_c), s	8.9	0.0	6.3	0.0	0.0	0.0	7.2	12.6	0.0		0.0	28.9
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	593	0	271	0	2	0	390	2213	0		2	800
V/C Ratio(X)	0.73	0.00	0.53	0.00	0.00	0.00	0.79	0.50	0.00		0.00	0.87
Avail Cap(c_a), veh/h	1407	0	644	0	768	0	466	2254	0		121	1008
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		0.00	1.00
Uniform Delay (d), s/veh	29.6	0.0	28.5	0.0	0.0	0.0	32.2	5.9	0.0		0.0	17.2
Incr Delay (d2), s/veh	0.6	0.0	0.6	0.0	0.0	0.0	6.4	0.1	0.0		0.0	6.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	2.2	0.0	0.0	0.0	2.9	2.7	0.0		0.0	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.2	0.0	29.1	0.0	0.0	0.0	38.6	6.0	0.0		0.0	23.3
LnGrp LOS	C	A	C	A	A	A	D	A	A		A	C
Approach Vol, veh/h		575			0			1425				1370
Approach Delay, s/veh		30.0			0.0			13.1				24.1
Approach LOS		C						B				C

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		19.0	14.2	42.4		0.0	0.0	56.6				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.8	11.1	46.7		31.0	5.6	52.2				
Max Q Clear Time (g_c+I1), s		10.9	9.2	31.8		0.0	0.0	14.6				
Green Ext Time (p_c), s		0.9	0.1	5.3		0.0	0.0	5.5				

Intersection Summary	
HCM 6th Ctrl Delay	20.5
HCM 6th LOS	C

Notes
User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	399
Future Volume (veh/h)	399
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	434
Peak Hour Factor	0.92
Percent Heavy Veh, %	6
Cap, veh/h	488
Arrive On Green	0.49
Sat Flow, veh/h	994
Grp Volume(v), veh/h	671
Grp Sat Flow(s),veh/h/ln	1536
Q Serve(g_s), s	29.8
Cycle Q Clear(g_c), s	29.8
Prop In Lane	0.65
Lane Grp Cap(c), veh/h	754
V/C Ratio(X)	0.89
Avail Cap(c_a), veh/h	950
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	17.4
Incr Delay (d2), s/veh	7.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	10.1
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	25.0
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection	
Int Delay, s/veh	0.7

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Vol, veh/h	1	72	1261	0	1177	28	1	50
Future Vol, veh/h	1	72	1261	0	1177	28	1	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	-	100	-	100	-	-	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	2	-	0	-	0	-
Peak Hour Factor	92	89	89	95	95	95	86	86
Heavy Vehicles, %	6	6	6	6	6	6	2	2
Mvmt Flow	1	81	1417	0	1239	29	1	58

Major/Minor	Major1			Major2			Minor2	
Conflicting Flow All	1268	1268	0	1417	-	0	2127	634
Stage 1	-	-	-	-	-	-	1254	-
Stage 2	-	-	-	-	-	-	873	-
Critical Hdwy	6.52	4.22	-	6.52	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.84	-
Follow-up Hdwy	2.56	2.26	-	2.56	-	-	3.52	3.32
Pot Cap-1 Maneuver	215	523	-	171	-	-	43	422
Stage 1	-	-	-	-	-	-	232	-
Stage 2	-	-	-	-	-	-	369	-
Platoon blocked, %			-		-	-		
Mov Cap-1 Maneuver	511	511	-	171	-	-	36	422
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	-
Stage 1	-	-	-	-	-	-	195	-
Stage 2	-	-	-	-	-	-	369	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	17.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1
Capacity (veh/h)	511	-	171	-	-	349
HCM Lane V/C Ratio	0.16	-	-	-	-	0.17
HCM Control Delay (s)	13.4	-	0	-	-	17.4
HCM Lane LOS	B	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	-	0	-	-	0.6

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	1304	6	1	1	1206	2	0
Future Vol, veh/h	1304	6	1	1	1206	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	-	None	-	None
Storage Length	-	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	-	0	0	-
Grade, %	0	-	-	-	0	0	-
Peak Hour Factor	90	90	92	96	96	75	75
Heavy Vehicles, %	6	6	6	6	6	2	2
Mvmt Flow	1449	7	1	1	1256	3	0

Major/Minor	Major1		Major2			Minor1	
Conflicting Flow All	0	0	1456	1456	0	2085	728
Stage 1	-	-	-	-	-	1453	-
Stage 2	-	-	-	-	-	632	-
Critical Hdwy	-	-	6.52	4.22	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.56	2.26	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	162	441	-	46	366
Stage 1	-	-	-	-	-	181	-
Stage 2	-	-	-	-	-	492	-
Platoon blocked, %	-	-			-		
Mov Cap-1 Maneuver	-	-	235	235	-	46	366
Mov Cap-2 Maneuver	-	-	-	-	-	136	-
Stage 1	-	-	-	-	-	181	-
Stage 2	-	-	-	-	-	488	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	32
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	136	-	-	235	-
HCM Lane V/C Ratio	0.02	-	-	0.009	-
HCM Control Delay (s)	32	-	-	20.5	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	61	663	594	37	2	23	576	114	68	24	27	16
Future Volume (veh/h)	61	663	594	37	2	23	576	114	68	24	27	16
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		1.00	1.00		1.00	
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach			No				No			No		
Adj Sat Flow, veh/h/ln		1811	1811	1811		1811	1811	1884	1811	1811	1811	
Adj Flow Rate, veh/h		698	625	39		26	655	130	77	27	31	
Peak Hour Factor		0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	
Percent Heavy Veh, %		6	6	6		6	6	6	6	6	6	
Cap, veh/h		756	831	704		34	723	143	98	34	39	
Arrive On Green		0.23	0.46	0.46		0.02	0.25	0.25	0.10	0.10	0.10	
Sat Flow, veh/h		3346	1811	1535		1725	2862	567	966	339	389	
Grp Volume(v), veh/h		698	625	39		26	393	392	135	0	0	
Grp Sat Flow(s),veh/h/ln		1673	1811	1535		1725	1721	1709	1693	0	0	
Q Serve(g_s), s		22.3	31.1	1.5		1.6	24.2	24.2	8.5	0.0	0.0	
Cycle Q Clear(g_c), s		22.3	31.1	1.5		1.6	24.2	24.2	8.5	0.0	0.0	
Prop In Lane		1.00		1.00		1.00		0.33	0.57		0.23	
Lane Grp Cap(c), veh/h		756	831	704		34	435	432	172	0	0	
V/C Ratio(X)		0.92	0.75	0.06		0.75	0.90	0.91	0.79	0.00	0.00	
Avail Cap(c_a), veh/h		801	852	722		89	486	483	450	0	0	
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	
Uniform Delay (d), s/veh		41.3	24.4	16.4		53.2	39.5	39.5	47.9	0.0	0.0	
Incr Delay (d2), s/veh		15.3	3.3	0.0		11.6	18.0	18.4	5.9	0.0	0.0	
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln		10.4	13.0	0.5		0.8	11.9	11.9	3.9	0.0	0.0	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		56.6	27.7	16.4		64.8	57.5	57.9	53.7	0.0	0.0	
LnGrp LOS		E	C	B		E	E	E	D	A	A	
Approach Vol, veh/h			1362				811			135		
Approach Delay, s/veh			42.2				57.9			53.7		
Approach LOS			D				E			D		

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.1	55.3		31.0	29.5	32.9		15.7
Change Period (Y+Rc), s	4.9	5.3		5.3	4.9	5.3		4.6
Max Green Setting (Gmax), s	5.6	51.3		34.0	26.1	30.8		29.0
Max Q Clear Time (g_c+I1), s	3.6	33.1		23.8	24.3	26.2		10.5
Green Ext Time (p_c), s	0.0	2.3		1.9	0.4	1.3		0.6

Intersection Summary		
HCM 6th Ctrl Delay		47.7
HCM 6th LOS		D

Notes

User approved ignoring U-Turning movement.

Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	128	14	527
Future Volume (veh/h)	128	14	527
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00
Work Zone On Approach		No	
Adj Sat Flow, veh/h/ln	1811	1811	1811
Adj Flow Rate, veh/h	136	15	561
Peak Hour Factor	0.94	0.94	0.94
Percent Heavy Veh, %	6	6	6
Cap, veh/h	368	41	637
Arrive On Green	0.24	0.24	0.24
Sat Flow, veh/h	1561	172	2701
Grp Volume(v), veh/h	151	0	561
Grp Sat Flow(s),veh/h/ln	1733	0	1351
Q Serve(g_s), s	8.0	0.0	21.8
Cycle Q Clear(g_c), s	8.0	0.0	21.8
Prop In Lane	0.90		1.00
Lane Grp Cap(c), veh/h	409	0	637
V/C Ratio(X)	0.37	0.00	0.88
Avail Cap(c_a), veh/h	540	0	842
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.9	0.0	40.2
Incr Delay (d2), s/veh	0.4	0.0	8.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	8.0
Unsig. Movement Delay, s/veh			
LnGrp Delay(d),s/veh	35.3	0.0	48.2
LnGrp LOS	D	A	D
Approach Vol, veh/h		712	
Approach Delay, s/veh		45.4	
Approach LOS		D	
Timer - Assigned Phs			

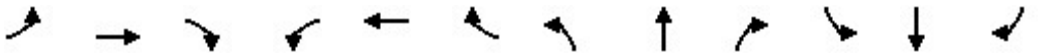
Future Year 2035 Volumes with VCRCCP – Intersection Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	182	109	517	57	44	1117
Future Volume (veh/h)	182	109	517	57	44	1117
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1841	1841	1746	1746	1841	1841
Adj Flow Rate, veh/h	202	121	533	59	47	1188
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4
Cap, veh/h	493	226	995	658	76	1766
Arrive On Green	0.14	0.14	0.30	0.30	0.04	0.50
Sat Flow, veh/h	3401	1560	3406	1480	1753	3589
Grp Volume(v), veh/h	202	121	533	59	47	1188
Grp Sat Flow(s),veh/h/ln	1700	1560	1659	1480	1753	1749
Q Serve(g_s), s	1.6	2.2	4.1	0.7	0.8	7.7
Cycle Q Clear(g_c), s	1.6	2.2	4.1	0.7	0.8	7.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	493	226	995	658	76	1766
V/C Ratio(X)	0.41	0.54	0.54	0.09	0.62	0.67
Avail Cap(c_a), veh/h	2944	1351	2379	1276	382	3837
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.8	12.0	8.8	4.9	14.2	5.6
Incr Delay (d2), s/veh	0.2	0.7	0.2	0.0	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.9	0.8	0.1	0.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.0	12.7	9.0	4.9	17.3	5.8
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	323		592			1235
Approach Delay, s/veh	12.3		8.6			6.2
Approach LOS	B		A			A

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		20.6		9.7	6.2	14.4
Change Period (Y+Rc), s		5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s		33.2		26.2	6.6	21.7
Max Q Clear Time (g_c+I1), s		9.7		4.2	2.8	6.1
Green Ext Time (p_c), s		5.6		0.5	0.0	2.0

Intersection Summary	
HCM 6th Ctrl Delay	7.8
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
2: Valley Center Rd. & Mirar De Valle Rd.



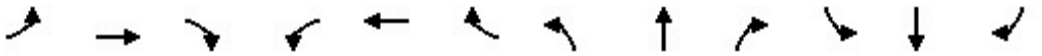
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	5	59	25	5	25	17	637	25	25	1149	24
Future Volume (veh/h)	28	5	59	25	5	25	17	637	25	25	1149	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1945	1870	1870	1870	1811	1811	1870	1870	1811	1811
Adj Flow Rate, veh/h	42	5	88	27	5	27	19	724	27	27	1306	27
Peak Hour Factor	0.67	0.92	0.67	0.92	0.92	0.92	0.88	0.88	0.92	0.92	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	6	6	2	2	6	6
Cap, veh/h	151	12	208	55	21	114	40	1572	59	55	1630	34
Arrive On Green	0.08	0.14	0.14	0.03	0.08	0.08	0.02	0.46	0.46	0.03	0.47	0.47
Sat Flow, veh/h	1781	86	1512	1781	254	1370	1725	3382	126	1781	3447	71
Grp Volume(v), veh/h	42	0	93	27	0	32	19	368	383	27	652	681
Grp Sat Flow(s),veh/h/ln	1781	0	1598	1781	0	1624	1725	1721	1788	1781	1721	1798
Q Serve(g_s), s	1.2	0.0	2.9	0.8	0.0	1.0	0.6	7.8	7.8	0.8	17.2	17.3
Cycle Q Clear(g_c), s	1.2	0.0	2.9	0.8	0.0	1.0	0.6	7.8	7.8	0.8	17.2	17.3
Prop In Lane	1.00		0.95	1.00		0.84	1.00		0.07	1.00		0.04
Lane Grp Cap(c), veh/h	151	0	220	55	0	136	40	800	831	55	813	850
V/C Ratio(X)	0.28	0.00	0.42	0.49	0.00	0.24	0.48	0.46	0.46	0.49	0.80	0.80
Avail Cap(c_a), veh/h	598	0	909	183	0	545	161	800	831	169	979	1023
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	0.0	21.2	25.6	0.0	23.0	25.9	9.8	9.8	25.6	12.0	12.0
Incr Delay (d2), s/veh	1.0	0.0	1.3	6.6	0.0	0.9	8.7	0.4	0.4	6.6	4.1	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.1	0.4	0.0	0.4	0.3	2.1	2.2	0.4	5.4	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	0.0	22.5	32.2	0.0	23.8	34.6	10.2	10.2	32.2	16.0	15.9
LnGrp LOS	C	A	C	C	A	C	C	B	B	C	B	B
Approach Vol, veh/h		135			59			770			1360	
Approach Delay, s/veh		22.9			27.7			10.8			16.3	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	29.4	6.2	11.9	5.7	29.8	9.1	9.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.1	20.9	5.5	30.5	5.0	30.5	18.0	18.0
Max Q Clear Time (g_c+I1), s	2.8	9.8	2.8	4.9	2.6	19.3	3.2	3.0
Green Ext Time (p_c), s	0.0	3.2	0.0	0.5	0.0	6.1	0.1	0.1

Intersection Summary	
HCM 6th Ctrl Delay	15.1
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	0	88	1	0	1	52	820	1	1	1297	55
Future Volume (veh/h)	57	0	88	1	0	1	52	820	1	1	1297	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	62	0	96	1	0	1	57	891	1	1	1410	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	161	0	143	2	0	2	86	2337	3	3	2065	88
Arrive On Green	0.09	0.00	0.09	0.00	0.00	0.00	0.05	0.64	0.64	0.00	0.59	0.59
Sat Flow, veh/h	1781	0	1585	839	0	839	1781	3642	4	1781	3473	148
Grp Volume(v), veh/h	62	0	96	2	0	0	57	435	457	1	720	750
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1677	0	0	1781	1777	1870	1781	1777	1844
Q Serve(g_s), s	2.2	0.0	4.0	0.1	0.0	0.0	2.1	7.9	7.9	0.0	18.9	19.0
Cycle Q Clear(g_c), s	2.2	0.0	4.0	0.1	0.0	0.0	2.1	7.9	7.9	0.0	18.9	19.0
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	161	0	143	5	0	0	86	1140	1200	3	1057	1097
V/C Ratio(X)	0.38	0.00	0.67	0.44	0.00	0.00	0.66	0.38	0.38	0.38	0.68	0.68
Avail Cap(c_a), veh/h	472	0	420	442	0	0	138	1140	1200	133	1057	1097
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.3	0.0	30.1	34.0	0.0	0.0	31.9	5.8	5.8	34.1	9.4	9.5
Incr Delay (d2), s/veh	1.5	0.0	5.3	54.4	0.0	0.0	8.4	1.0	0.9	73.3	3.6	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.7	0.1	0.0	0.0	1.1	2.2	2.3	0.1	6.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.8	0.0	35.3	88.4	0.0	0.0	40.3	6.8	6.7	107.3	13.0	12.9
LnGrp LOS	C	A	D	F	A	A	D	A	A	F	B	B
Approach Vol, veh/h		158			2			949			1471	
Approach Delay, s/veh		33.5			88.4			8.8			13.0	
Approach LOS		C			F			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	48.3		10.7	7.8	45.1		4.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.1	40.8		18.1	5.3	40.6		18.0				
Max Q Clear Time (g_c+I1), s	2.0	9.9		6.0	4.1	21.0		2.1				
Green Ext Time (p_c), s	0.0	5.6		0.5	0.0	9.6		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		12.8	
HCM 6th LOS		B	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	708	10	10	1163
Future Volume (veh/h)	10	10	708	10	10	1163
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1945	1945	1811	1811	1788	1788
Adj Flow Rate, veh/h	40	40	787	11	10	1187
Peak Hour Factor	0.25	0.25	0.90	0.90	0.98	0.98
Percent Heavy Veh, %	2	2	6	6	6	6
Cap, veh/h	72	72	1419	20	23	1992
Arrive On Green	0.08	0.08	0.41	0.41	0.01	0.59
Sat Flow, veh/h	863	863	3564	49	1702	3486
Grp Volume(v), veh/h	81	0	390	408	10	1187
Grp Sat Flow(s),veh/h/ln	1747	0	1721	1801	1702	1698
Q Serve(g_s), s	1.2	0.0	4.7	4.7	0.2	6.1
Cycle Q Clear(g_c), s	1.2	0.0	4.7	4.7	0.2	6.1
Prop In Lane	0.49	0.49		0.03	1.00	
Lane Grp Cap(c), veh/h	147	0	703	736	23	1992
V/C Ratio(X)	0.55	0.00	0.55	0.55	0.44	0.60
Avail Cap(c_a), veh/h	1183	0	1102	1154	343	3419
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.0	0.0	6.2	6.2	13.4	3.6
Incr Delay (d2), s/veh	3.2	0.0	0.7	0.7	12.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.6	0.6	0.1	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.2	0.0	6.9	6.8	26.1	3.9
LnGrp LOS	B	A	A	A	C	A
Approach Vol, veh/h	81		798			1197
Approach Delay, s/veh	15.2		6.9			4.1
Approach LOS	B		A			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	4.9	15.7			20.5	6.8
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	5.5	17.5			27.5	18.5
Max Q Clear Time (g_c+I1), s	2.2	6.7			8.1	3.2
Green Ext Time (p_c), s	0.0	3.4			8.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	5.6
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

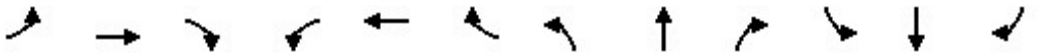
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	17	12	807	1203	27
Future Volume (veh/h)	34	17	12	807	1203	27
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.90	1.00			0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1847	1847	1847	1847
Adj Flow Rate, veh/h	37	18	13	877	1308	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	134	65	30	2186	1677	37
Arrive On Green	0.12	0.12	0.02	0.62	0.48	0.48
Sat Flow, veh/h	1093	532	1759	3601	3596	78
Grp Volume(v), veh/h	56	0	13	877	654	683
Grp Sat Flow(s),veh/h/ln	1654	0	1759	1754	1754	1827
Q Serve(g_s), s	1.1	0.0	0.3	4.4	11.0	11.0
Cycle Q Clear(g_c), s	1.1	0.0	0.3	4.4	11.0	11.0
Prop In Lane	0.66	0.32	1.00			0.04
Lane Grp Cap(c), veh/h	203	0	30	2186	840	874
V/C Ratio(X)	0.28	0.00	0.44	0.40	0.78	0.78
Avail Cap(c_a), veh/h	842	0	249	2780	918	956
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	0.0	17.2	3.4	7.7	7.7
Incr Delay (d2), s/veh	0.7	0.0	9.7	0.1	4.0	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.2	0.1	2.6	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.8	0.0	26.9	3.5	11.7	11.6
LnGrp LOS	B	A	C	A	B	B
Approach Vol, veh/h	56			890	1337	
Approach Delay, s/veh	14.8			3.8	11.6	
Approach LOS	B			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		26.5		8.8	5.1	21.4
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		28.0		18.0	5.0	18.5
Max Q Clear Time (g_c+I1), s		6.4		3.1	2.3	13.0
Green Ext Time (p_c), s		5.7		0.1	0.0	3.5

Intersection Summary	
HCM 6th Ctrl Delay	8.6
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	304	0	264	2	0	0	194	568	0	0	921	400
Future Volume (veh/h)	304	0	264	2	0	0	194	568	0	0	921	400
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1914	1870	1870	1870	1746	1746	1816	1746	1746	1816
Adj Flow Rate, veh/h	406	0	185	8	0	0	218	638	0	0	1001	435
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	2	2	2	4	4	4	4	4	4
Cap, veh/h	580	0	264	22	0	0	287	2130	0	2	1121	479
Arrive On Green	0.17	0.00	0.17	0.01	0.00	0.00	0.09	0.64	0.00	0.00	0.50	0.50
Sat Flow, veh/h	3506	0	1596	1781	0	0	3227	3406	0	1663	2260	965
Grp Volume(v), veh/h	406	0	185	8	0	0	218	638	0	0	730	706
Grp Sat Flow(s),veh/h/ln	1753	0	1596	1781	0	0	1613	1659	0	1663	1659	1566
Q Serve(g_s), s	9.4	0.0	9.4	0.4	0.0	0.0	5.7	7.3	0.0	0.0	34.0	35.5
Cycle Q Clear(g_c), s	9.4	0.0	9.4	0.4	0.0	0.0	5.7	7.3	0.0	0.0	34.0	35.5
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.62
Lane Grp Cap(c), veh/h	580	0	264	22	0	0	287	2130	0	2	823	777
V/C Ratio(X)	0.70	0.00	0.70	0.37	0.00	0.00	0.76	0.30	0.00	0.00	0.89	0.91
Avail Cap(c_a), veh/h	1258	0	573	643	0	0	305	2130	0	109	961	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	33.8	0.0	33.8	42.1	0.0	0.0	38.2	6.8	0.0	0.0	19.5	19.9
Incr Delay (d2), s/veh	0.6	0.0	1.3	3.9	0.0	0.0	8.7	0.0	0.0	0.0	8.3	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	3.5	0.2	0.0	0.0	2.5	2.0	0.0	0.0	12.9	13.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	0.0	35.1	45.9	0.0	0.0	46.9	6.8	0.0	0.0	27.8	30.7
LnGrp LOS	C	A	D	D	A	A	D	A	A	A	C	C
Approach Vol, veh/h		591			8			856			1436	
Approach Delay, s/veh		34.6			45.9			17.0			29.2	
Approach LOS		C			D			B			C	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.2	12.5	47.8		5.2	0.0	60.4				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		30.8	8.1	49.7		31.0	5.6	52.2				
Max Q Clear Time (g_c+I1), s		11.4	7.7	37.5		2.4	0.0	9.3				
Green Ext Time (p_c), s		1.0	0.0	5.1		0.0	0.0	2.7				

Intersection Summary	
HCM 6th Ctrl Delay	26.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

AM
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: RoadName														
3	L2	72	3.0	78	3.0	0.215	10.3	LOS B	0.7	18.5	0.69	0.69	0.69	30.4
8	T1	1	3.0	1	3.0	0.215	10.3	LOS B	0.7	18.5	0.69	0.69	0.69	30.5
18	R2	25	3.0	27	3.0	0.215	10.3	LOS B	0.7	18.5	0.69	0.69	0.69	29.8
Approach		98	3.0	107	3.0	0.215	10.3	LOS B	0.7	18.5	0.69	0.69	0.69	30.3
East: Valley Center Road														
1	L2	64	3.0	70	3.0	0.547	9.0	LOS A	3.8	99.1	0.39	0.22	0.39	32.3
6	T1	1211	4.0	1275	4.0	0.547	9.1	LOS A	3.8	99.1	0.39	0.22	0.39	32.5
16	R2	14	4.0	15	4.0	0.547	9.1	LOS A	3.8	99.0	0.39	0.22	0.39	31.7
Approach		1289	4.0	1359	3.9	0.547	9.1	LOS A	3.8	99.1	0.39	0.22	0.39	32.5
North: Miller Road														
7	L2	20	2.0	23	2.0	0.364	16.0	LOS C	1.4	35.1	0.80	0.86	1.05	29.3
4	T1	1	3.0	1	3.0	0.364	16.1	LOS C	1.4	35.1	0.80	0.86	1.05	29.3
14	R2	103	2.0	120	2.0	0.364	16.0	LOS C	1.4	35.1	0.80	0.86	1.05	28.6
Approach		124	2.0	144	2.0	0.364	16.0	LOS C	1.4	35.1	0.80	0.86	1.05	28.7
West: Valley Center Road														
5	L2	18	4.0	20	4.0	0.478	7.9	LOS A	3.0	77.9	0.34	0.18	0.34	33.0
2	T1	991	4.0	1113	4.0	0.478	7.9	LOS A	3.0	78.0	0.34	0.18	0.34	33.1
12	R2	56	3.0	61	3.0	0.478	7.9	LOS A	3.0	78.0	0.34	0.18	0.34	32.3
Approach		1065	3.9	1195	3.9	0.478	7.9	LOS A	3.0	78.0	0.34	0.18	0.34	33.1
All Vehicles		2576	3.8	2804	3.8	0.547	9.0	LOS A	3.8	99.1	0.40	0.25	0.41	32.4

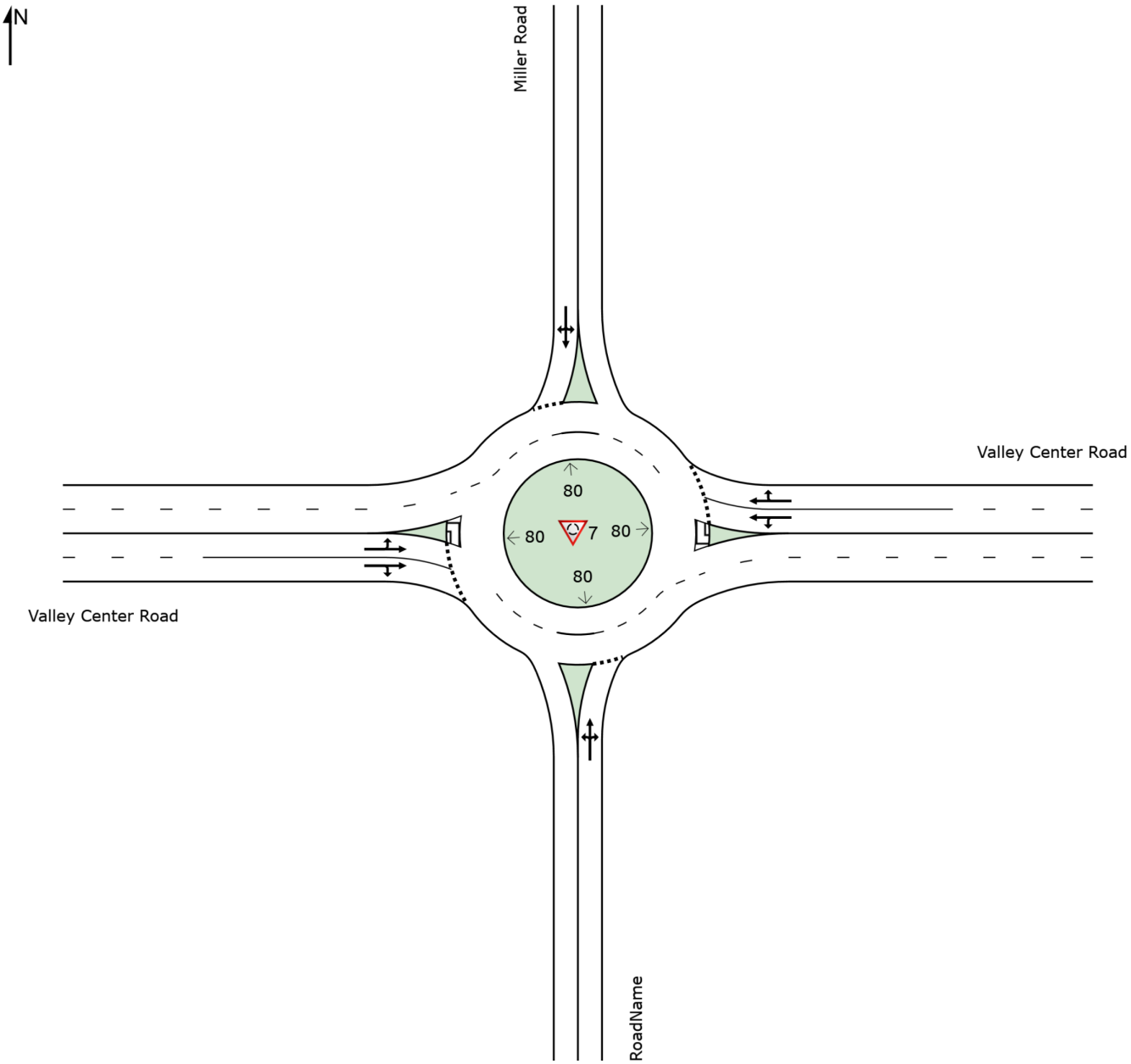
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

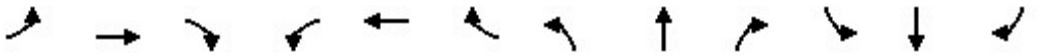
SITE LAYOUT

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

AM
Site Category: Existing
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	918	2	2	1193	0	5	0	2	0	0	0
Future Volume (veh/h)	0	918	2	2	1193	0	5	0	2	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.93	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1811	1811	1811	1811	1870	1945	1870	1945	1870	1870	1870
Adj Flow Rate, veh/h	0	1020	2	2	1243	0	7	0	3	0	0	0
Peak Hour Factor	0.92	0.90	0.90	0.96	0.96	0.92	0.75	0.92	0.75	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	6	6	6	2	2	2	2	2	2	2
Cap, veh/h	201	1862	4	380	1819	0	409	0	326	5	5	0
Arrive On Green	0.00	0.53	0.53	0.53	0.53	0.00	0.22	0.00	0.22	0.00	0.00	0.00
Sat Flow, veh/h	447	3523	7	534	3532	0	1853	0	1477	1781	1870	0
Grp Volume(v), veh/h	0	498	524	2	1243	0	7	0	3	0	0	0
Grp Sat Flow(s),veh/h/ln	447	1721	1810	534	1721	0	1853	0	1477	1781	1870	0
Q Serve(g_s), s	0.0	6.9	6.9	0.1	9.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	6.9	6.9	7.0	9.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	201	909	956	380	1819	0	409	0	326	5	5	0
V/C Ratio(X)	0.00	0.55	0.55	0.01	0.68	0.00	0.02	0.00	0.01	0.00	0.00	0.00
Avail Cap(c_a), veh/h	282	1223	1286	478	2446	0	929	0	741	894	938	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.6	5.6	7.9	6.2	0.0	10.9	0.0	10.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.3	1.3	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.1	6.1	7.9	6.7	0.0	11.0	0.0	10.9	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	B	A	A	A
Approach Vol, veh/h		1022			1245			10			0	
Approach Delay, s/veh		6.1			6.7			10.9			0.0	
Approach LOS		A			A			B				

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.4		23.5		0.0		23.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		25.5		18.0		25.5				
Max Q Clear Time (g_c+I1), s		2.1		8.9		0.0		11.6				
Green Ext Time (p_c), s		0.0		6.0		0.0		7.4				

Intersection Summary												
HCM 6th Ctrl Delay			6.5									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	405	492	31	1	14	451	158	30	11	11	253	28
Future Volume (veh/h)	405	492	31	1	14	451	158	30	11	11	253	28
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811		1811	1811	1884	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	426	518	33		16	512	180	34	12	12	269	30
Peak Hour Factor	0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94
Percent Heavy Veh, %	6	6	6		6	6	6	6	6	6	6	6
Cap, veh/h	378	582	493		26	789	366	44	16	16	520	58
Arrive On Green	0.11	0.32	0.32		0.02	0.23	0.23	0.04	0.04	0.04	0.33	0.33
Sat Flow, veh/h	3346	1811	1535		1725	3441	1596	995	351	351	1559	174
Grp Volume(v), veh/h	426	518	33		16	512	180	58	0	0	299	0
Grp Sat Flow(s),veh/h/ln	1673	1811	1535		1725	1721	1596	1698	0	0	1733	0
Q Serve(g_s), s	8.1	19.5	1.1		0.7	9.7	7.0	2.4	0.0	0.0	10.0	0.0
Cycle Q Clear(g_c), s	8.1	19.5	1.1		0.7	9.7	7.0	2.4	0.0	0.0	10.0	0.0
Prop In Lane	1.00		1.00		1.00		1.00	0.59		0.21	0.90	
Lane Grp Cap(c), veh/h	378	582	493		26	789	366	75	0	0	578	0
V/C Ratio(X)	1.13	0.89	0.07		0.61	0.65	0.49	0.77	0.00	0.00	0.52	0.00
Avail Cap(c_a), veh/h	378	785	665		135	1372	636	686	0	0	826	0
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	31.8	23.1	16.9		35.1	25.0	24.0	33.9	0.0	0.0	19.3	0.0
Incr Delay (d2), s/veh	85.6	8.0	0.0		8.2	0.3	0.4	11.7	0.0	0.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	8.9	0.4		0.3	3.7	2.5	1.2	0.0	0.0	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.4	31.1	16.9		43.3	25.4	24.4	45.6	0.0	0.0	19.8	0.0
LnGrp LOS	F	C	B		D	C	C	D	A	A	B	A
Approach Vol, veh/h		977				708			58			1053
Approach Delay, s/veh		68.3				25.5			45.6			23.6
Approach LOS		E				C			D			C

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.4	28.4		29.2	13.0	21.8		7.8				
Change Period (Y+Rc), s	5.3	* 5.3		5.3	4.9	5.3		4.6				
Max Green Setting (Gmax), s	5.6	* 31		34.2	8.1	28.6		29.0				
Max Q Clear Time (g_c+I1), s	2.7	21.5		20.5	10.1	11.7		4.4				
Green Ext Time (p_c), s	0.0	1.6		3.4	0.0	2.3		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		40.2
HCM 6th LOS		D

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	709
Future Volume (veh/h)	709
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1811
Adj Flow Rate, veh/h	754
Peak Hour Factor	0.94
Percent Heavy Veh, %	6
Cap, veh/h	900
Arrive On Green	0.33
Sat Flow, veh/h	2701
Grp Volume(v), veh/h	754
Grp Sat Flow(s),veh/h/ln	1351
Q Serve(g_s), s	18.5
Cycle Q Clear(g_c), s	18.5
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	900
V/C Ratio(X)	0.84
Avail Cap(c_a), veh/h	1288
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	22.1
Incr Delay (d2), s/veh	3.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	5.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	25.1
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	83	115	1160	165	118	856
Future Volume (veh/h)	83	115	1160	165	118	856
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1717	1717	1811	1811
Adj Flow Rate, veh/h	92	128	1196	170	126	911
Peak Hour Factor	0.90	0.90	0.97	0.97	0.94	0.94
Percent Heavy Veh, %	6	6	6	6	6	6
Cap, veh/h	408	187	1499	846	160	2254
Arrive On Green	0.12	0.12	0.46	0.46	0.09	0.66
Sat Flow, veh/h	3346	1535	3348	1455	1725	3532
Grp Volume(v), veh/h	92	128	1196	170	126	911
Grp Sat Flow(s),veh/h/ln	1673	1535	1631	1455	1725	1721
Q Serve(g_s), s	1.2	3.8	14.9	2.6	3.4	5.9
Cycle Q Clear(g_c), s	1.2	3.8	14.9	2.6	3.4	5.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	408	187	1499	846	160	2254
V/C Ratio(X)	0.23	0.68	0.80	0.20	0.79	0.40
Avail Cap(c_a), veh/h	1866	856	2108	1117	265	3107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.8	20.0	11.0	4.7	21.1	3.8
Incr Delay (d2), s/veh	0.1	1.7	1.0	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.1	3.6	0.7	1.3	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.9	21.6	11.9	4.8	24.4	3.9
LnGrp LOS	B	C	B	A	C	A
Approach Vol, veh/h	220		1366			1037
Approach Delay, s/veh	20.5		11.0			6.4
Approach LOS	C		B			A

Timer - Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				36.4		11.1	9.3	27.1
Change Period (Y+Rc), s				5.3		5.3	4.9	5.3
Max Green Setting (Gmax), s				42.9		26.5	7.3	30.7
Max Q Clear Time (g_c+I1), s				7.9		5.8	5.4	16.9
Green Ext Time (p_c), s				4.1		0.3	0.0	5.0

Intersection Summary								
HCM 6th Ctrl Delay			10.0					
HCM 6th LOS			A					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	16	5	19	50	5	50	1	51	1233	50	50	1006
Future Volume (veh/h)	16	5	19	50	5	50	1	51	1233	50	50	1006
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		0.99	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No
Adj Sat Flow, veh/h/ln	1870	1870	1945	1870	1870	1870		1811	1811	1870	1870	1811
Adj Flow Rate, veh/h	24	5	28	54	5	54		58	1401	54	54	1143
Peak Hour Factor	0.67	0.92	0.67	0.92	0.92	0.92		0.88	0.88	0.92	0.92	0.88
Percent Heavy Veh, %	2	2	2	2	2	2		6	6	2	2	6
Cap, veh/h	128	24	137	89	11	115		325	1656	64	89	2140
Arrive On Green	0.07	0.10	0.10	0.05	0.08	0.08		0.49	0.49	0.49	0.05	0.62
Sat Flow, veh/h	1781	246	1377	1781	136	1470		468	3377	130	1781	3463
Grp Volume(v), veh/h	24	0	33	54	0	59		58	713	742	54	568
Grp Sat Flow(s),veh/h/ln	1781	0	1623	1781	0	1606		468	1721	1787	1781	1721
Q Serve(g_s), s	0.7	0.0	1.1	1.7	0.0	2.0		4.7	20.9	21.0	1.7	10.9
Cycle Q Clear(g_c), s	0.7	0.0	1.1	1.7	0.0	2.0		8.2	20.9	21.0	1.7	10.9
Prop In Lane	1.00		0.85	1.00		0.92		1.00		0.07	1.00	
Lane Grp Cap(c), veh/h	128	0	162	89	0	125		325	843	876	89	1063
V/C Ratio(X)	0.19	0.00	0.20	0.61	0.00	0.47		0.18	0.84	0.85	0.61	0.53
Avail Cap(c_a), veh/h	552	0	810	215	0	498		345	919	954	153	1063
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00		1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	0.0	24.0	27.0	0.0	25.6		10.8	12.9	12.9	27.0	6.3
Incr Delay (d2), s/veh	0.7	0.0	0.6	6.5	0.0	2.7		0.3	6.9	6.8	6.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.9	0.0	0.8		0.4	7.2	7.5	0.8	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.1	0.0	24.6	33.5	0.0	28.4		11.0	19.7	19.7	33.5	6.9
LnGrp LOS	C	A	C	C	A	C		B	B	B	C	A
Approach Vol, veh/h		57			113				1513			1216
Approach Delay, s/veh		25.2			30.8				19.4			8.0
Approach LOS		C			C				B			A

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	7.4	33.0	7.4	10.3		40.4	8.7	9.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	31.0	7.0	29.0		31.0	18.0	18.0
Max Q Clear Time (g_c+I1), s	3.7	23.0	3.7	3.1		12.9	2.7	4.0
Green Ext Time (p_c), s	0.0	5.4	0.0	0.1		6.8	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	15.2
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	17
Future Volume (veh/h)	17
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1811
Adj Flow Rate, veh/h	19
Peak Hour Factor	0.88
Percent Heavy Veh, %	6
Cap, veh/h	36
Arrive On Green	0.62
Sat Flow, veh/h	58
Grp Volume(v), veh/h	594
Grp Sat Flow(s),veh/h/ln	1800
Q Serve(g_s), s	10.9
Cycle Q Clear(g_c), s	10.9
Prop In Lane	0.03
Lane Grp Cap(c), veh/h	1112
V/C Ratio(X)	0.53
Avail Cap(c_a), veh/h	1112
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	6.3
Incr Delay (d2), s/veh	0.5
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	2.4
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	6.8
LnGrp LOS	A
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	0	59	0	0	0	168	1454	0	0	1227	106
Future Volume (veh/h)	108	0	59	0	0	0	168	1454	0	0	1227	106
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	0	1870	1870	1870
Adj Flow Rate, veh/h	117	0	64	0	0	0	183	1580	0	0	1334	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	0	2	2	2
Cap, veh/h	341	0	167	0	197	0	338	2498	0	153	2328	200
Arrive On Green	0.11	0.00	0.11	0.00	0.00	0.00	0.70	0.70	0.00	0.00	0.70	0.70
Sat Flow, veh/h	1781	0	1585	0	1870	0	367	3647	0	324	3312	284
Grp Volume(v), veh/h	117	0	64	0	0	0	183	1580	0	0	714	735
Grp Sat Flow(s),veh/h/ln	1781	0	1585	0	1870	0	367	1777	0	324	1777	1819
Q Serve(g_s), s	3.0	0.0	1.8	0.0	0.0	0.0	23.2	11.2	0.0	0.0	9.4	9.5
Cycle Q Clear(g_c), s	3.0	0.0	1.8	0.0	0.0	0.0	32.7	11.2	0.0	0.0	9.4	9.5
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00	1.00		0.16
Lane Grp Cap(c), veh/h	341	0	167	0	197	0	338	2498	0	153	1249	1279
V/C Ratio(X)	0.34	0.00	0.38	0.00	0.00	0.00	0.54	0.63	0.00	0.00	0.57	0.58
Avail Cap(c_a), veh/h	836	0	608	0	717	0	338	2498	0	153	1249	1279
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.1	0.0	19.6	0.0	0.0	0.0	11.6	3.7	0.0	0.0	3.5	3.5
Incr Delay (d2), s/veh	0.6	0.0	1.4	0.0	0.0	0.0	6.1	1.2	0.0	0.0	1.9	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.7	0.0	0.0	0.0	1.6	0.9	0.0	0.0	1.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.7	0.0	21.0	0.0	0.0	0.0	17.7	5.0	0.0	0.0	5.4	5.4
LnGrp LOS	C	A	C	A	A	A	B	A	A	A	A	A
Approach Vol, veh/h		181			0			1763			1449	
Approach Delay, s/veh		20.8			0.0			6.3			5.4	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		37.5		9.4		37.5		9.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0		33.0		18.0				
Max Q Clear Time (g_c+I1), s		34.7		5.0		11.5		0.0				
Green Ext Time (p_c), s		0.0		0.5		9.9		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			6.7									
HCM 6th LOS			A									

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	1265	10	10	1046
Future Volume (veh/h)	10	10	1265	10	10	1046
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1945	1945	1811	1811	1788	1788
Adj Flow Rate, veh/h	40	40	1406	11	10	1067
Peak Hour Factor	0.25	0.25	0.90	0.90	0.98	0.98
Percent Heavy Veh, %	2	2	6	6	6	6
Cap, veh/h	73	73	1991	16	378	1932
Arrive On Green	0.09	0.09	0.57	0.57	0.57	0.57
Sat Flow, veh/h	863	863	3589	27	362	3486
Grp Volume(v), veh/h	81	0	691	726	10	1067
Grp Sat Flow(s),veh/h/ln	1747	0	1721	1805	362	1698
Q Serve(g_s), s	1.2	0.0	7.5	7.5	0.5	5.1
Cycle Q Clear(g_c), s	1.2	0.0	7.5	7.5	8.1	5.1
Prop In Lane	0.49	0.49		0.02	1.00	
Lane Grp Cap(c), veh/h	149	0	979	1027	378	1932
V/C Ratio(X)	0.54	0.00	0.71	0.71	0.03	0.55
Avail Cap(c_a), veh/h	1208	0	1190	1249	422	2349
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.4	0.0	4.0	4.0	7.0	3.5
Incr Delay (d2), s/veh	3.1	0.0	1.5	1.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.4	0.4	0.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.5	0.0	5.5	5.5	7.0	3.8
LnGrp LOS	B	A	A	A	A	A
Approach Vol, veh/h	81		1417			1077
Approach Delay, s/veh	14.5		5.5			3.8
Approach LOS	B		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		19.3			19.3	6.7
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.0			18.0	18.0
Max Q Clear Time (g_c+I1), s		9.5			10.1	3.2
Green Ext Time (p_c), s		5.3			4.2	0.2

Intersection Summary	
HCM 6th Ctrl Delay	5.1
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	12	19	1477	1347	19
Future Volume (veh/h)	12	12	19	1477	1347	19
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.89	1.00			0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1847	1847	1847	1847
Adj Flow Rate, veh/h	13	13	21	1605	1464	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	73	73	45	2443	2005	29
Arrive On Green	0.10	0.10	0.03	0.70	0.57	0.57
Sat Flow, veh/h	761	761	1759	3601	3630	51
Grp Volume(v), veh/h	27	0	21	1605	725	760
Grp Sat Flow(s),veh/h/ln	1580	0	1759	1754	1754	1834
Q Serve(g_s), s	0.7	0.0	0.5	11.1	13.3	13.3
Cycle Q Clear(g_c), s	0.7	0.0	0.5	11.1	13.3	13.3
Prop In Lane	0.48	0.48	1.00			0.03
Lane Grp Cap(c), veh/h	152	0	45	2443	994	1039
V/C Ratio(X)	0.18	0.00	0.46	0.66	0.73	0.73
Avail Cap(c_a), veh/h	655	0	203	3477	1354	1416
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.0	0.0	20.8	3.7	6.9	7.0
Incr Delay (d2), s/veh	0.5	0.0	7.2	0.3	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.3	0.3	2.4	2.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.6	0.0	28.0	4.0	8.3	8.2
LnGrp LOS	B	A	C	A	A	A
Approach Vol, veh/h	27			1626	1485	
Approach Delay, s/veh	18.6			4.3	8.2	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		34.7		8.7	5.6	29.1
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		43.0		18.0	5.0	33.5
Max Q Clear Time (g_c+I1), s		13.1		2.7	2.5	15.3
Green Ext Time (p_c), s		14.4		0.0	0.0	9.3

Intersection Summary	
HCM 6th Ctrl Delay	6.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	344	0	206	0	0	0	276	992	0	3	0	861
Future Volume (veh/h)	344	0	206	0	0	0	276	992	0	3	0	861
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1811	1811	1884	1870	1870	1870	1717	1717	1786		1717	1717
Adj Flow Rate, veh/h	430	0	145	0	0	0	310	1115	0		0	936
Peak Hour Factor	0.95	0.95	0.95	0.25	0.25	0.25	0.89	0.89	0.89		0.92	0.92
Percent Heavy Veh, %	6	6	6	2	2	2	6	6	6		6	6
Cap, veh/h	590	0	270	0	2	0	392	2226	0		2	1076
Arrive On Green	0.17	0.00	0.17	0.00	0.00	0.00	0.12	0.68	0.00		0.00	0.50
Sat Flow, veh/h	3450	0	1579	0	1870	0	3172	3348	0		1635	2173
Grp Volume(v), veh/h	430	0	145	0	0	0	310	1115	0		0	699
Grp Sat Flow(s),veh/h/ln	1725	0	1579	0	1870	0	1586	1631	0		1635	1631
Q Serve(g_s), s	9.1	0.0	6.5	0.0	0.0	0.0	7.3	12.7	0.0		0.0	29.2
Cycle Q Clear(g_c), s	9.1	0.0	6.5	0.0	0.0	0.0	7.3	12.7	0.0		0.0	29.2
Prop In Lane	1.00		1.00	0.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	590	0	270	0	2	0	392	2226	0		2	808
V/C Ratio(X)	0.73	0.00	0.54	0.00	0.00	0.00	0.79	0.50	0.00		0.00	0.87
Avail Cap(c_a), veh/h	1423	0	652	0	752	0	539	2590	0		119	1136
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		0.00	1.00
Uniform Delay (d), s/veh	30.3	0.0	29.2	0.0	0.0	0.0	32.8	5.9	0.0		0.0	17.2
Incr Delay (d2), s/veh	0.7	0.0	0.6	0.0	0.0	0.0	3.6	0.1	0.0		0.0	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	2.3	0.0	0.0	0.0	2.8	2.8	0.0		0.0	9.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.9	0.0	29.8	0.0	0.0	0.0	36.4	6.0	0.0		0.0	21.2
LnGrp LOS	C	A	C	A	A	A	D	A	A		A	C
Approach Vol, veh/h		575			0			1425				1370
Approach Delay, s/veh		30.6			0.0			12.6				21.8
Approach LOS		C						B				C

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		19.2	14.4	43.5		0.0	0.0	57.9				
Change Period (Y+Rc), s		6.0	4.9	5.3		4.2	4.9	5.3				
Max Green Setting (Gmax), s		31.8	13.1	53.7		31.0	5.6	61.2				
Max Q Clear Time (g_c+I1), s		11.1	9.3	32.1		0.0	0.0	14.7				
Green Ext Time (p_c), s		0.9	0.2	6.0		0.0	0.0	5.6				

Intersection Summary												
HCM 6th Ctrl Delay			19.4									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	399
Future Volume (veh/h)	399
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1786
Adj Flow Rate, veh/h	434
Peak Hour Factor	0.92
Percent Heavy Veh, %	6
Cap, veh/h	492
Arrive On Green	0.50
Sat Flow, veh/h	994
Grp Volume(v), veh/h	671
Grp Sat Flow(s),veh/h/ln	1536
Q Serve(g_s), s	30.1
Cycle Q Clear(g_c), s	30.1
Prop In Lane	0.65
Lane Grp Cap(c), veh/h	761
V/C Ratio(X)	0.88
Avail Cap(c_a), veh/h	1070
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	17.4
Incr Delay (d2), s/veh	5.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	9.7
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	22.5
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

MOVEMENT SUMMARY

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

PM
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: RoadName														
3	L2	92	3.0	100	3.0	0.419	21.1	LOS C	1.6	40.1	0.85	0.94	1.21	26.6
8	T1	1	3.0	1	3.0	0.419	21.1	LOS C	1.6	40.1	0.85	0.94	1.21	26.6
18	R2	31	3.0	34	3.0	0.419	21.1	LOS C	1.6	40.1	0.85	0.94	1.21	26.1
Approach		124	3.0	135	3.0	0.419	21.1	LOS C	1.6	40.1	0.85	0.94	1.21	26.5
East: Valley Center Road														
1	L2	64	3.0	70	3.0	0.597	10.6	LOS B	4.2	108.4	0.55	0.39	0.55	31.6
6	T1	1211	4.0	1275	4.0	0.597	10.7	LOS B	4.2	108.4	0.55	0.39	0.55	31.8
16	R2	28	4.0	29	4.0	0.597	10.7	LOS B	4.2	108.2	0.55	0.39	0.55	31.0
Approach		1303	4.0	1374	3.9	0.597	10.7	LOS B	4.2	108.4	0.55	0.39	0.55	31.7
North: Miller Road														
7	L2	1	2.0	1	2.0	0.155	11.7	LOS B	0.5	12.6	0.75	0.75	0.75	31.3
4	T1	1	3.0	1	3.0	0.155	11.8	LOS B	0.5	12.6	0.75	0.75	0.75	31.3
14	R2	50	2.0	58	2.0	0.155	11.7	LOS B	0.5	12.6	0.75	0.75	0.75	30.6
Approach		52	2.0	60	2.0	0.155	11.7	LOS B	0.5	12.6	0.75	0.75	0.75	30.6
West: Valley Center Road														
5	L2	72	4.0	81	4.0	0.668	11.7	LOS B	6.1	158.3	0.42	0.21	0.42	31.2
2	T1	1391	4.0	1563	4.0	0.668	11.6	LOS B	6.1	158.5	0.42	0.21	0.42	31.3
12	R2	56	3.0	61	3.0	0.668	11.6	LOS B	6.1	158.5	0.42	0.21	0.42	30.6
Approach		1519	4.0	1705	4.0	0.668	11.6	LOS B	6.1	158.5	0.42	0.21	0.42	31.3
All Vehicles		2998	3.9	3274	3.9	0.668	11.6	LOS B	6.1	158.5	0.50	0.32	0.51	31.2

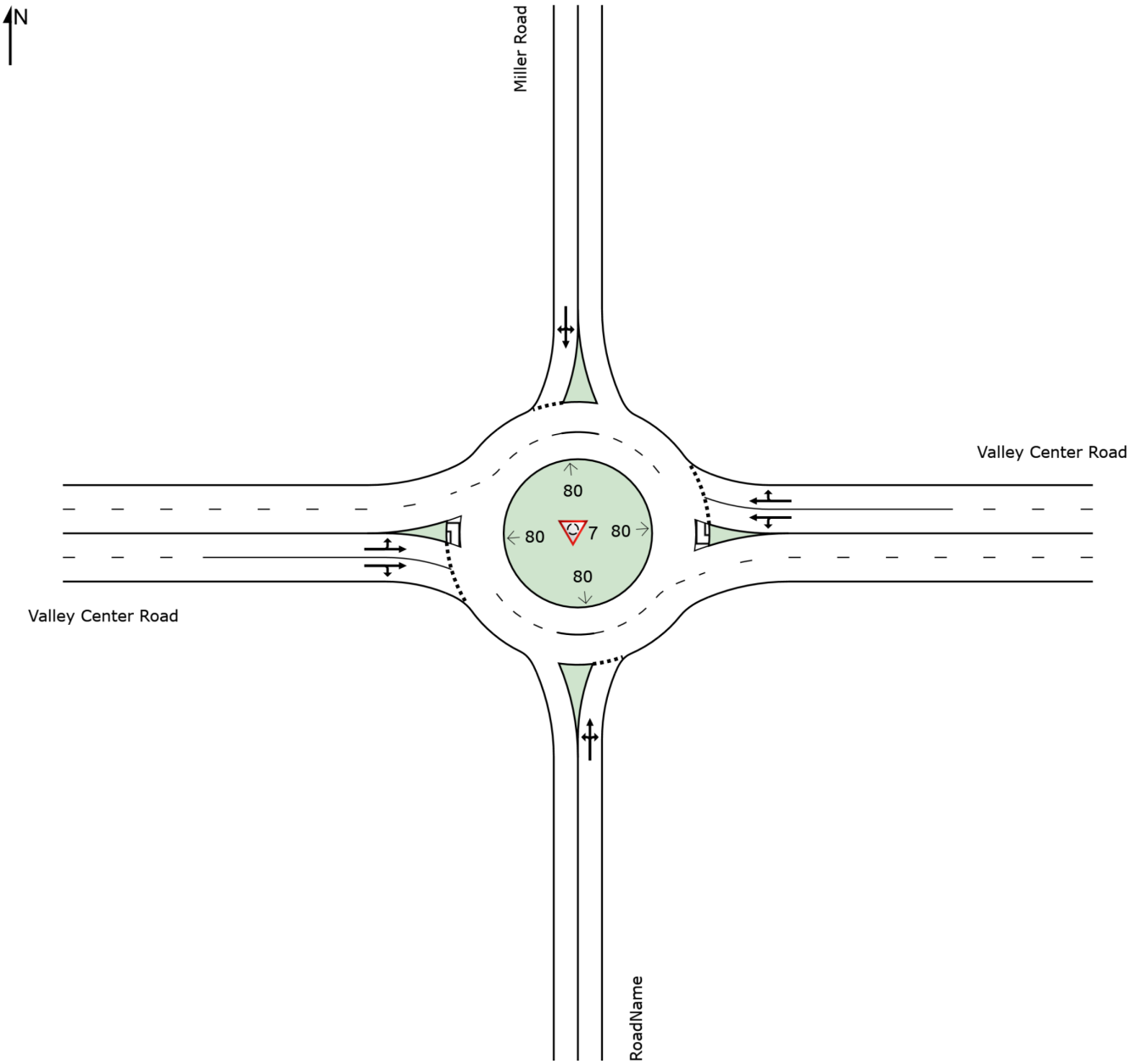
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 7 [Miller Road (Site Folder: Valley Center Road)]

PM
Site Category: Existing
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (veh/h)	1304	6	1	1	1206	2	1
Future Volume (veh/h)	1304	6	1	1	1206	2	1
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00	0.92
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach	No				No	No	
Adj Sat Flow, veh/h/ln	1811	1811		1811	1811	1945	1945
Adj Flow Rate, veh/h	1449	7		1	1256	3	1
Peak Hour Factor	0.90	0.90		0.96	0.96	0.75	0.75
Percent Heavy Veh, %	6	6		6	6	2	2
Cap, veh/h	1896	9		4	2182	194	65
Arrive On Green	0.54	0.54		0.00	0.63	0.18	0.18
Sat Flow, veh/h	3602	17		1725	3532	1073	358
Grp Volume(v), veh/h	710	746		1	1256	5	0
Grp Sat Flow(s),veh/h/ln	1721	1808		1725	1721	1789	0
Q Serve(g_s), s	15.7	15.7		0.0	10.2	0.1	0.0
Cycle Q Clear(g_c), s	15.7	15.7		0.0	10.2	0.1	0.0
Prop In Lane		0.01		1.00		0.60	0.20
Lane Grp Cap(c), veh/h	929	976		4	2182	323	0
V/C Ratio(X)	0.76	0.76		0.28	0.58	0.02	0.00
Avail Cap(c_a), veh/h	1151	1209		181	2981	696	0
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00		1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.8	8.8		24.2	5.1	16.4	0.0
Incr Delay (d2), s/veh	2.4	2.3		38.4	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	4.6		0.0	1.9	0.0	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	11.2	11.1		62.6	5.4	16.4	0.0
LnGrp LOS	B	B		E	A	B	A
Approach Vol, veh/h	1456				1257	5	
Approach Delay, s/veh	11.1				5.4	16.4	
Approach LOS	B				A	B	

Timer - Assigned Phs	2	3	4			8
Phs Duration (G+Y+Rc), s	13.3	4.6	30.7			35.3
Change Period (Y+Rc), s	4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s	18.9	5.1	32.5			42.1
Max Q Clear Time (g_c+I1), s	2.1	2.0	17.7			12.2
Green Ext Time (p_c), s	0.0	0.0	8.5			11.1

Intersection Summary	
HCM 6th Ctrl Delay	8.5
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	725	594	37	2	23	576	114	68	24	27	128	14
Future Volume (veh/h)	725	594	37	2	23	576	114	68	24	27	128	14
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97		1.00		0.97	1.00		0.93	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No				No			No			No
Adj Sat Flow, veh/h/ln	1811	1811	1811		1811	1811	1884	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	763	625	39		26	655	130	77	27	31	136	15
Peak Hour Factor	0.95	0.95	0.95		0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94
Percent Heavy Veh, %	6	6	6		6	6	6	6	6	6	6	6
Cap, veh/h	823	673	550		157	758	342	96	34	39	383	42
Arrive On Green	0.25	0.37	0.37		0.09	0.22	0.22	0.10	0.10	0.10	0.25	0.25
Sat Flow, veh/h	3346	1811	1481		1725	3441	1553	946	332	381	1561	172
Grp Volume(v), veh/h	763	625	39		26	655	130	135	0	0	151	0
Grp Sat Flow(s),veh/h/ln	1673	1811	1481		1725	1721	1553	1659	0	0	1733	0
Q Serve(g_s), s	23.9	35.6	1.8		1.5	19.7	7.7	8.6	0.0	0.0	7.7	0.0
Cycle Q Clear(g_c), s	23.9	35.6	1.8		1.5	19.7	7.7	8.6	0.0	0.0	7.7	0.0
Prop In Lane	1.00		1.00		1.00		1.00	0.57		0.23	0.90	
Lane Grp Cap(c), veh/h	823	673	550		157	758	342	169	0	0	425	0
V/C Ratio(X)	0.93	0.93	0.07		0.17	0.86	0.38	0.80	0.00	0.00	0.36	0.00
Avail Cap(c_a), veh/h	875	864	707		157	922	416	448	0	0	548	0
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	39.6	32.4	21.8		45.1	40.4	35.7	47.2	0.0	0.0	33.5	0.0
Incr Delay (d2), s/veh	14.7	12.4	0.0		0.2	6.4	0.3	6.4	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	17.3	0.6		0.6	8.8	2.9	3.9	0.0	0.0	3.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.3	44.8	21.8		45.3	46.8	35.9	53.7	0.0	0.0	33.9	0.0
LnGrp LOS	D	D	C		D	D	D	D	A	A	C	A
Approach Vol, veh/h		1427				811			135			712
Approach Delay, s/veh		49.2				45.0			53.7			44.9
Approach LOS		D				D			D			D

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.1	45.2		31.7	31.3	29.0		15.5				
Change Period (Y+Rc), s	5.3	* 5.3		5.3	4.9	5.3		4.6				
Max Green Setting (Gmax), s	5.6	* 51		34.0	28.1	28.8		29.0				
Max Q Clear Time (g_c+I1), s	3.5	37.6		24.5	25.9	21.7		10.6				
Green Ext Time (p_c), s	0.0	2.3		1.9	0.5	2.0		0.6				

Intersection Summary		
HCM 6th Ctrl Delay		47.3
HCM 6th LOS		D

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	527
Future Volume (veh/h)	527
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	0.96
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1811
Adj Flow Rate, veh/h	561
Peak Hour Factor	0.94
Percent Heavy Veh, %	6
Cap, veh/h	634
Arrive On Green	0.25
Sat Flow, veh/h	2586
Grp Volume(v), veh/h	561
Grp Sat Flow(s),veh/h/ln	1293
Q Serve(g_s), s	22.5
Cycle Q Clear(g_c), s	22.5
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	634
V/C Ratio(X)	0.88
Avail Cap(c_a), veh/h	818
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	39.1
Incr Delay (d2), s/veh	8.8
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	7.9
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	47.9
LnGrp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	