ATTACHMENT B

2023 CITYGATE REPORT AND 2024 CITYGATE REPORT SUPPLEMENT (EMERGENCY RESPONSE & 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

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

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

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[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 (6^{th} 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.

<u>Table 1—MBI Exhibit 9 – Valley Center Road Modeled VCFPD Travel Time Comparison</u>

Scenario		Northbound / Eastbound Lilac Road to Cole Grade Road	Southbound 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 <u>intersection</u> controls on the *north* section of the corridor ranges from a 0:24-second to 0:36-second travel time *increase* from <u>all</u> 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

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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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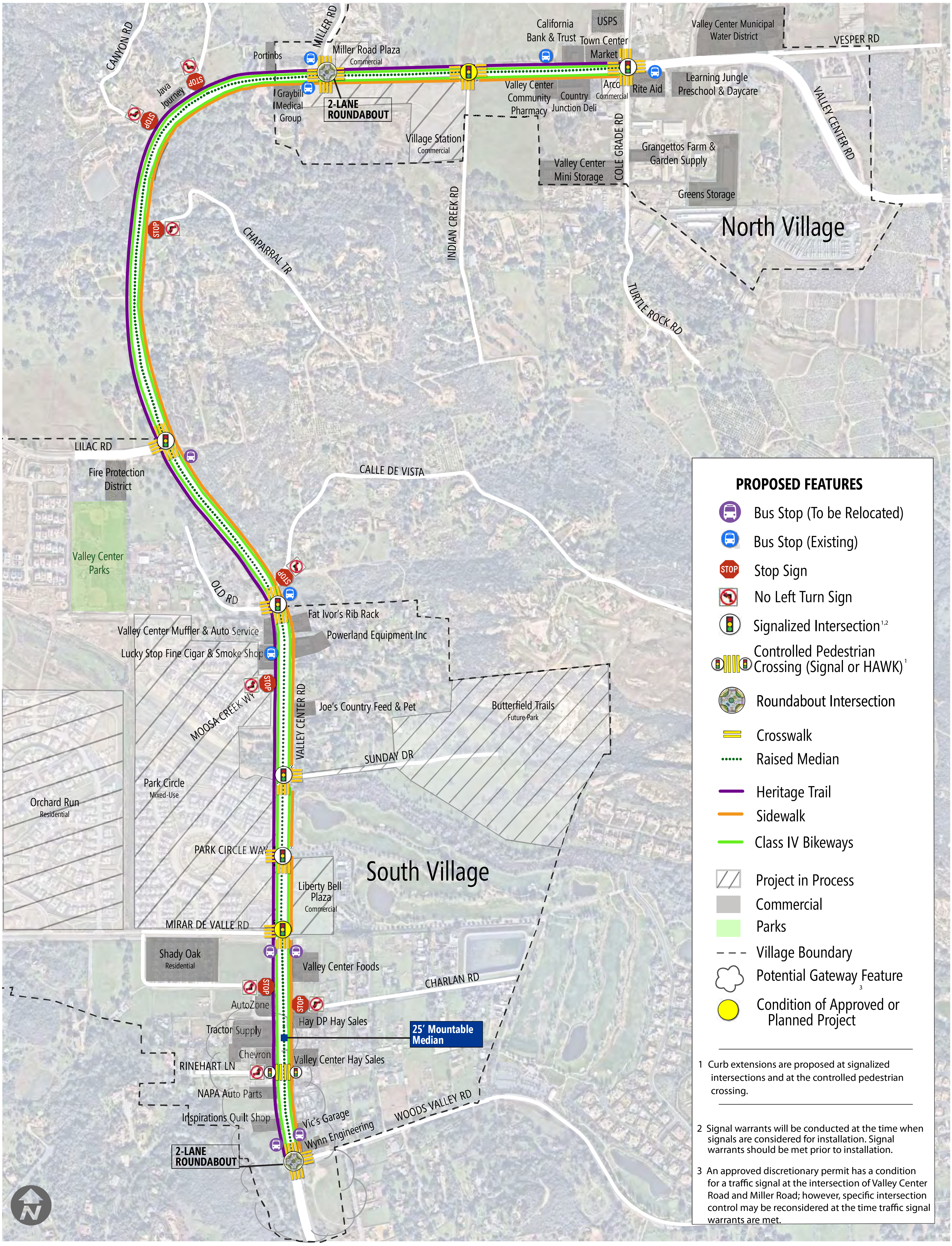
Exhibit 1 - Draft CCP Option A



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Draft Corridor Concept Plan-Option A

July 2023
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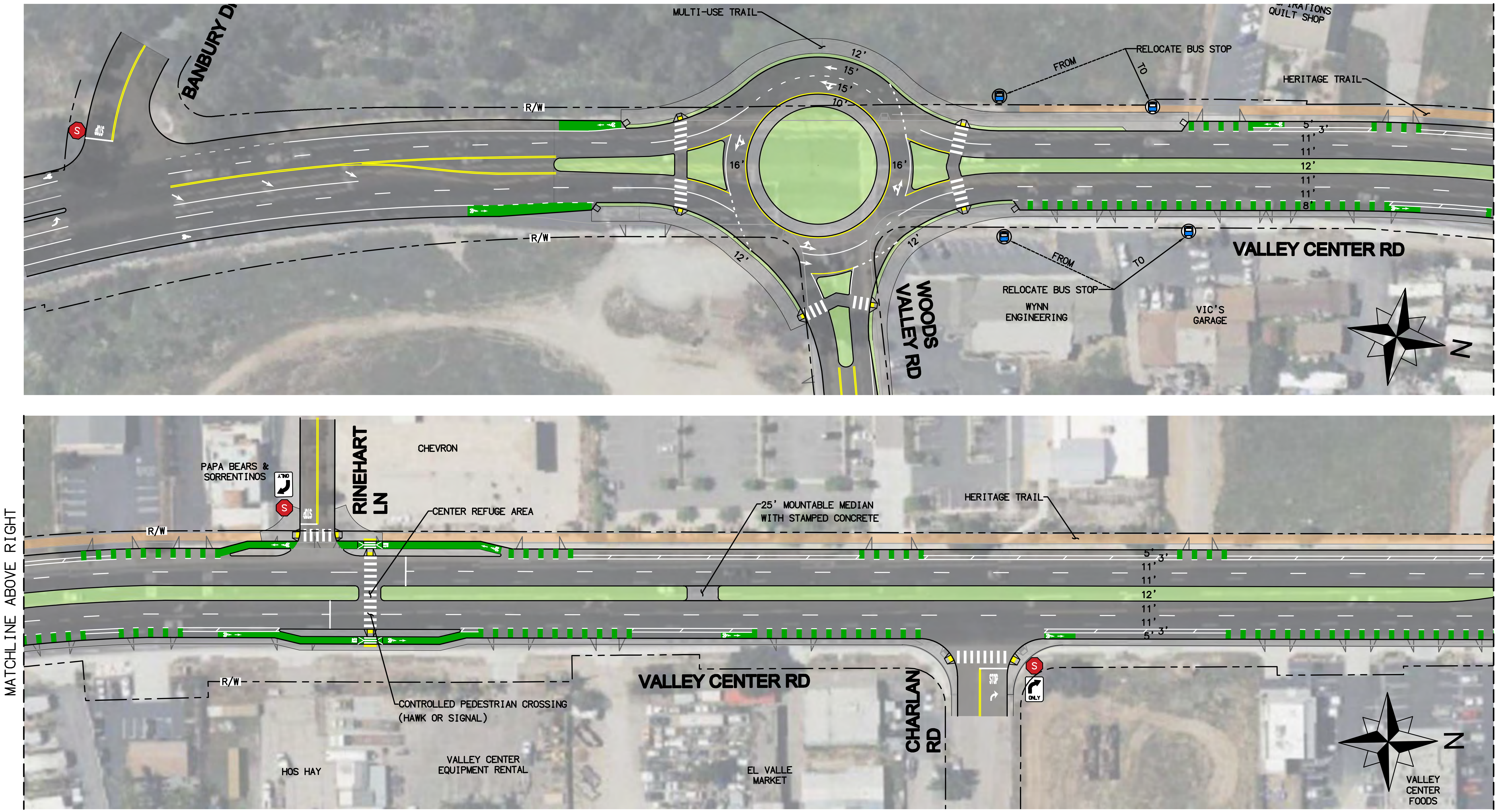
ATTACHMENT B



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

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Draft Corridor Concept Plan

OPTION A

SHEET 1 OF 6

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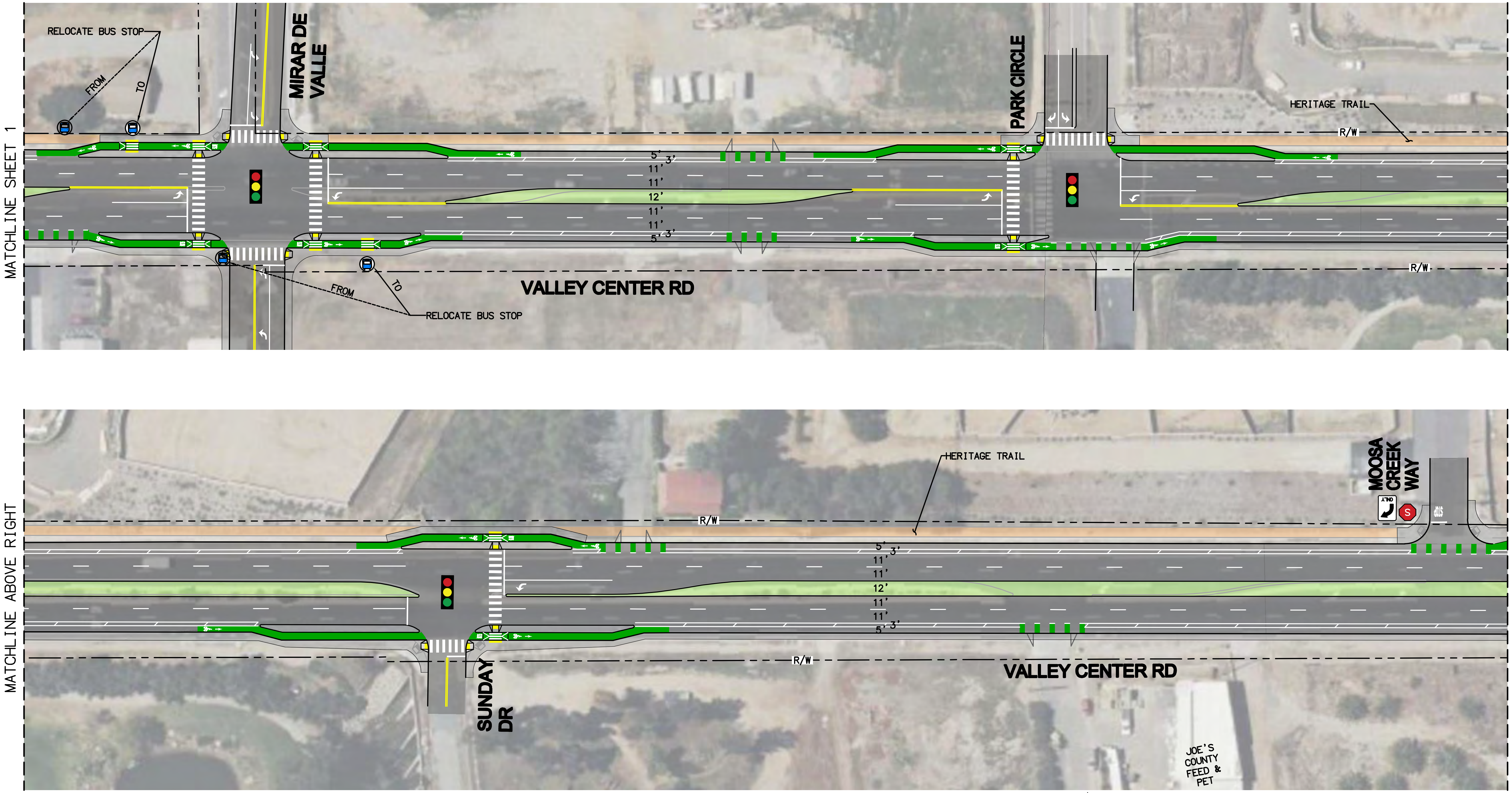
ATTACHMENT B



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- SIDEWALK
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- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

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Draft Corridor Concept Plan

OPTION A

SHEET 2 OF 6

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ATTACHMENT B

LEGEND

- SIDEWALK
- LANDSCAPING
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- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

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SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION A

SHEET 3 OF 6

Michael Baker INTERNATIONAL

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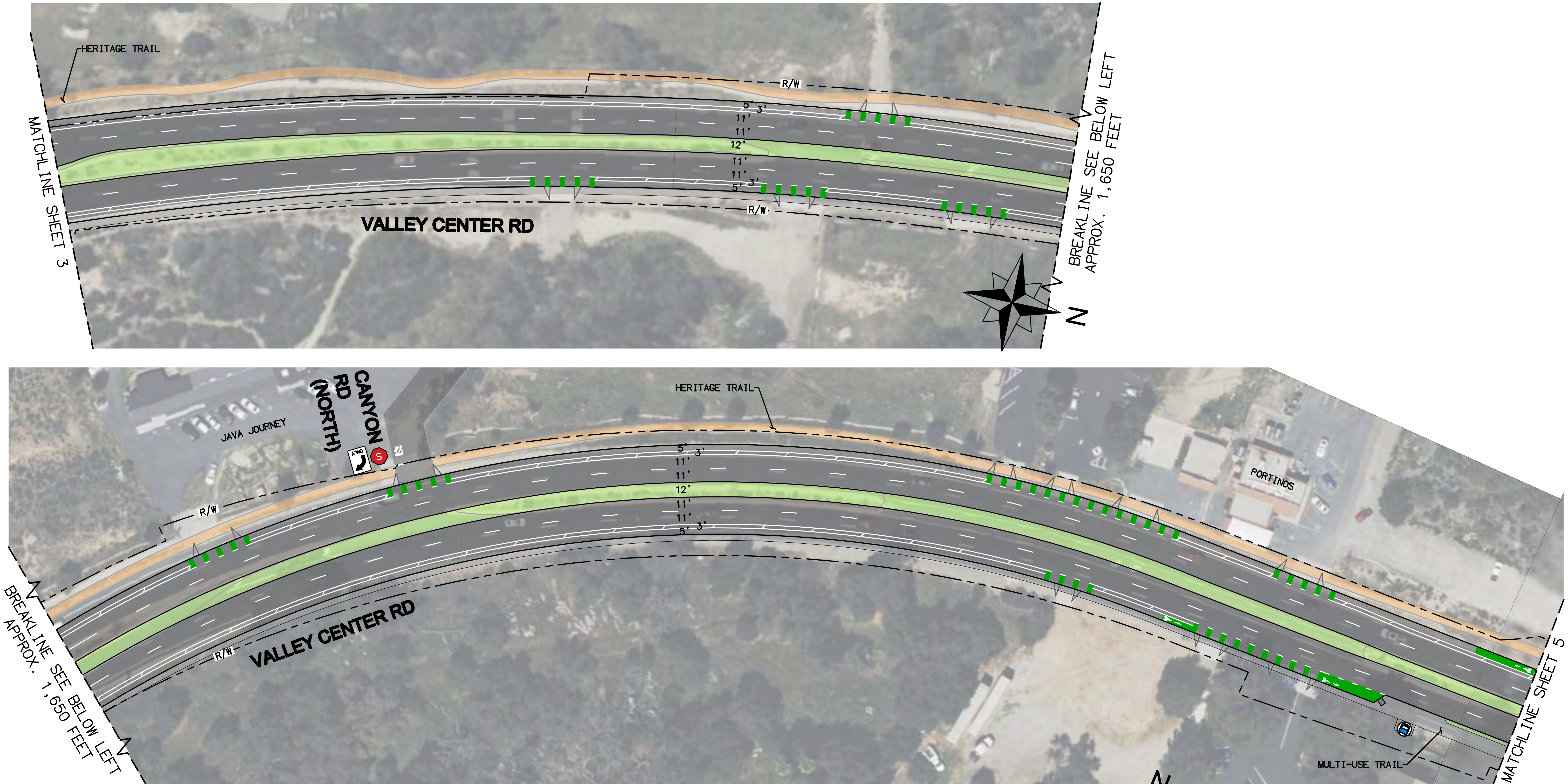

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- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

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SCALE: 1"=80'

Michael Baker INTERNATIONAL

Draft Corridor Concept Plan

OPTION A

SHEET 4 OF 6

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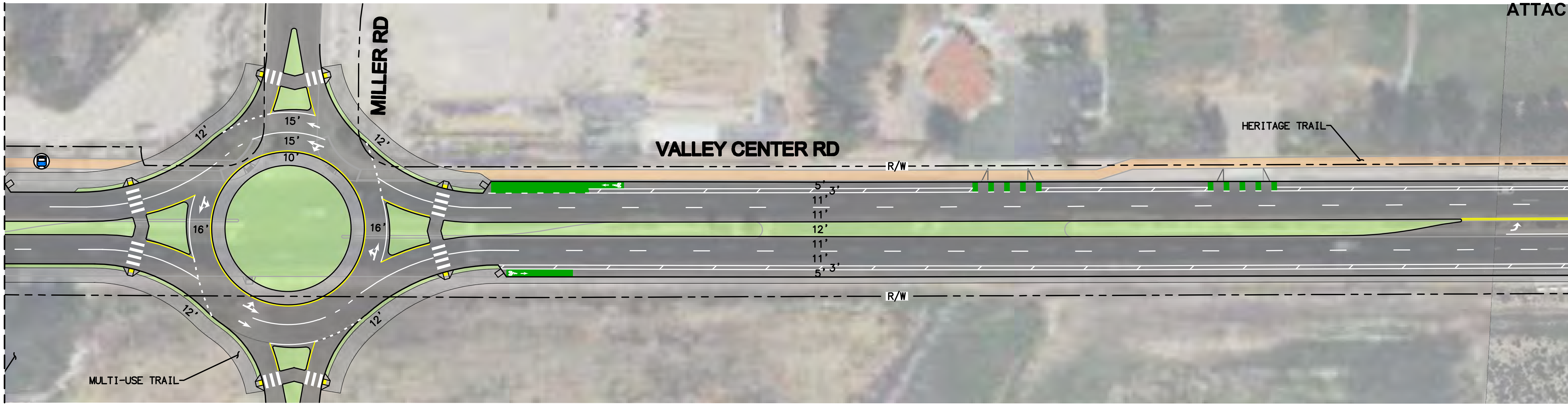

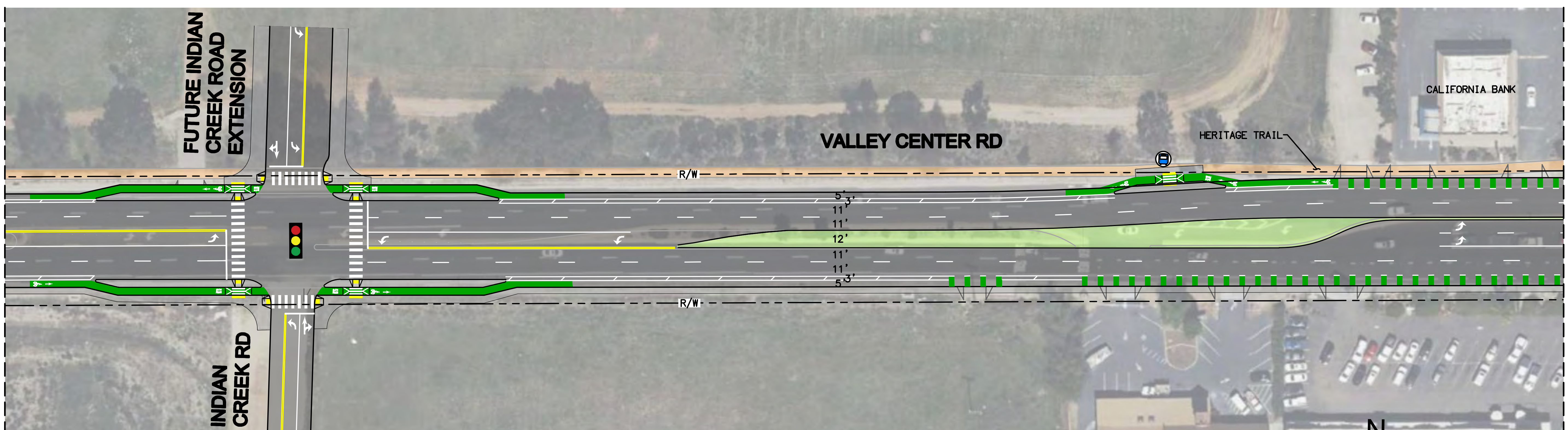

LEGEND

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

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Draft Corridor Concept Plan

OPTION A

SHEET 5 OF 6

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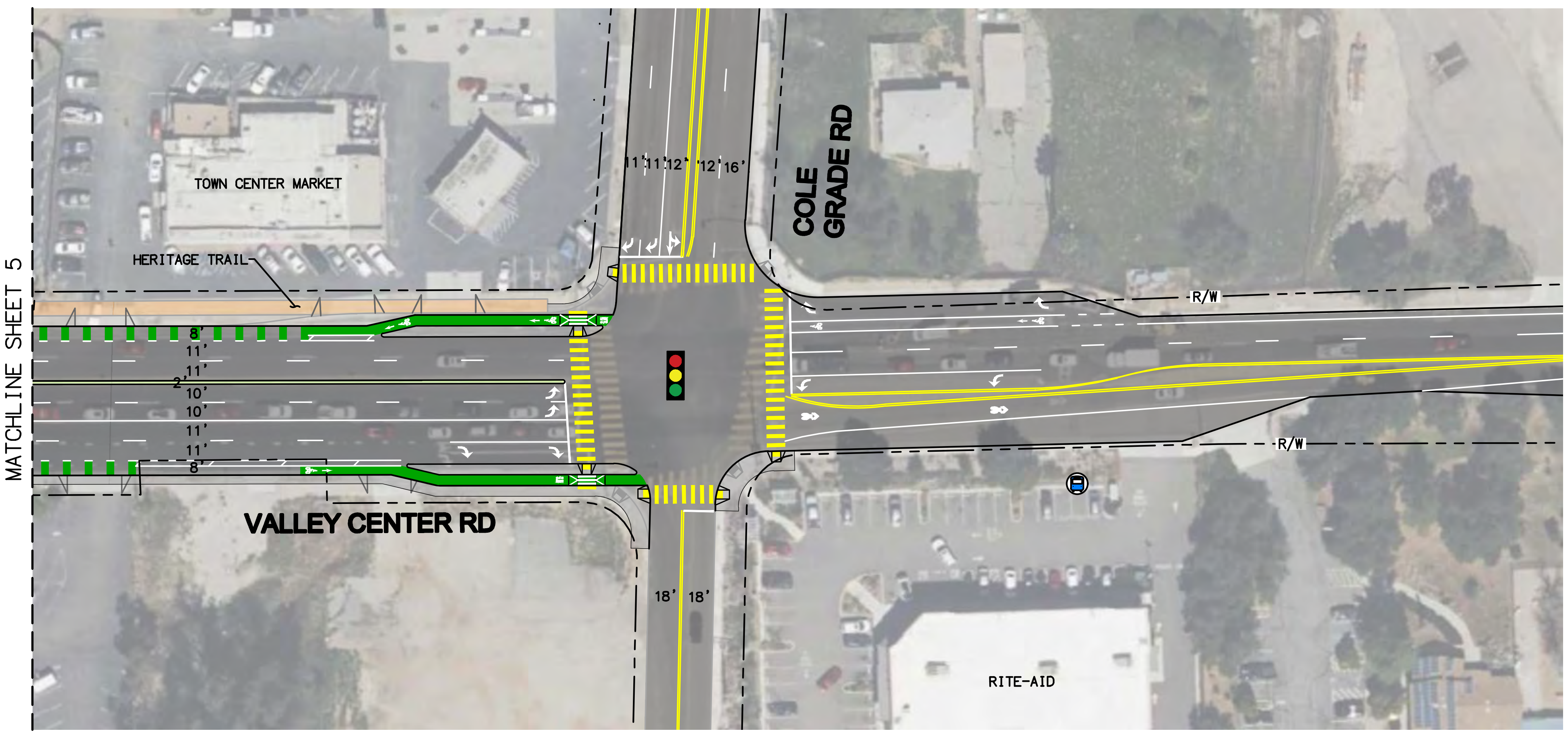

LEGEND

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

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SCALE: 1"=80'

Michael Baker INTERNATIONAL

Draft Corridor Concept Plan

OPTION A

SHEET 6 OF 6

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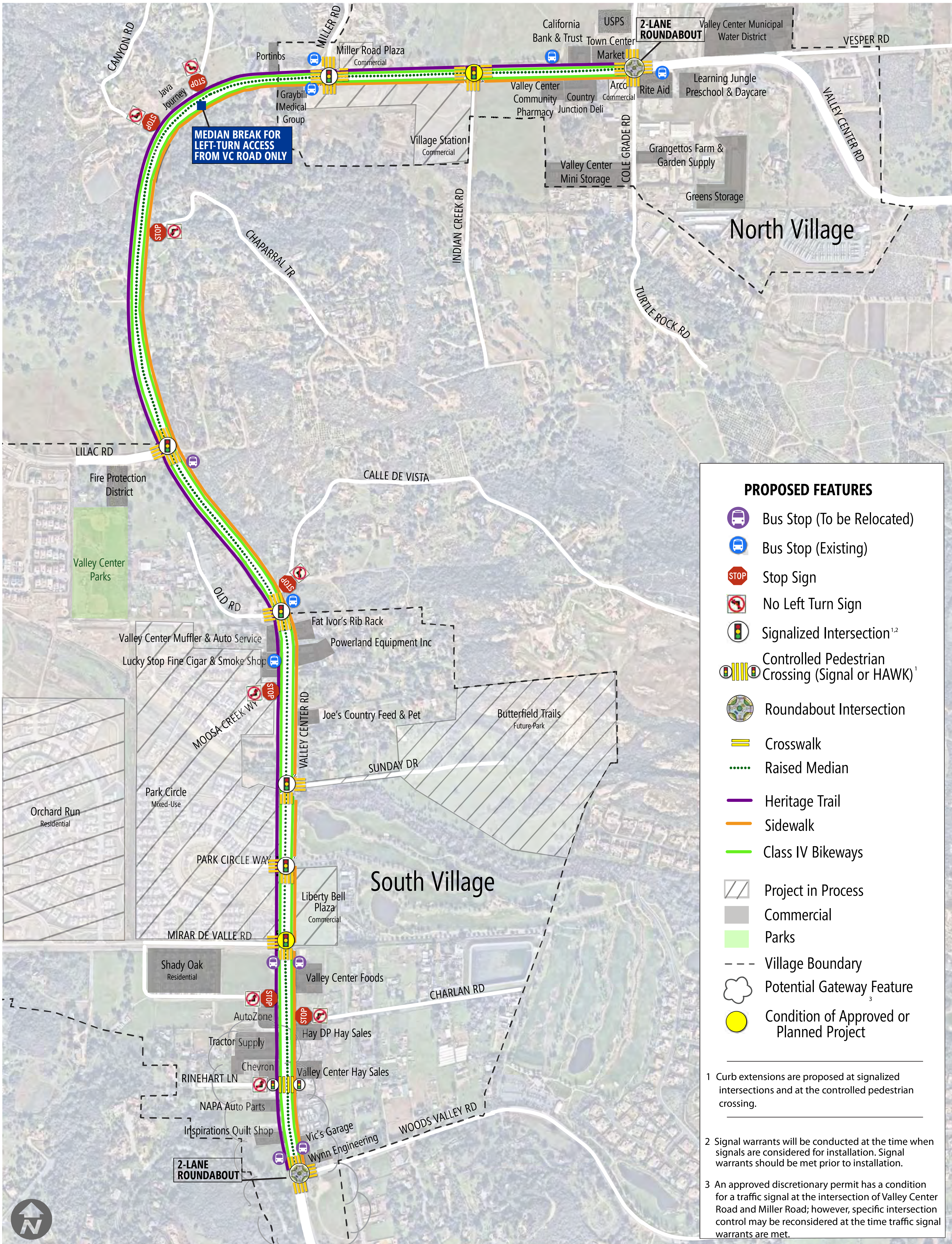
Michael Baker
INTERNATIONAL

Exhibit 2 –
Draft CCP Option B



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Draft Corridor Concept Plan-Option B

July 2023
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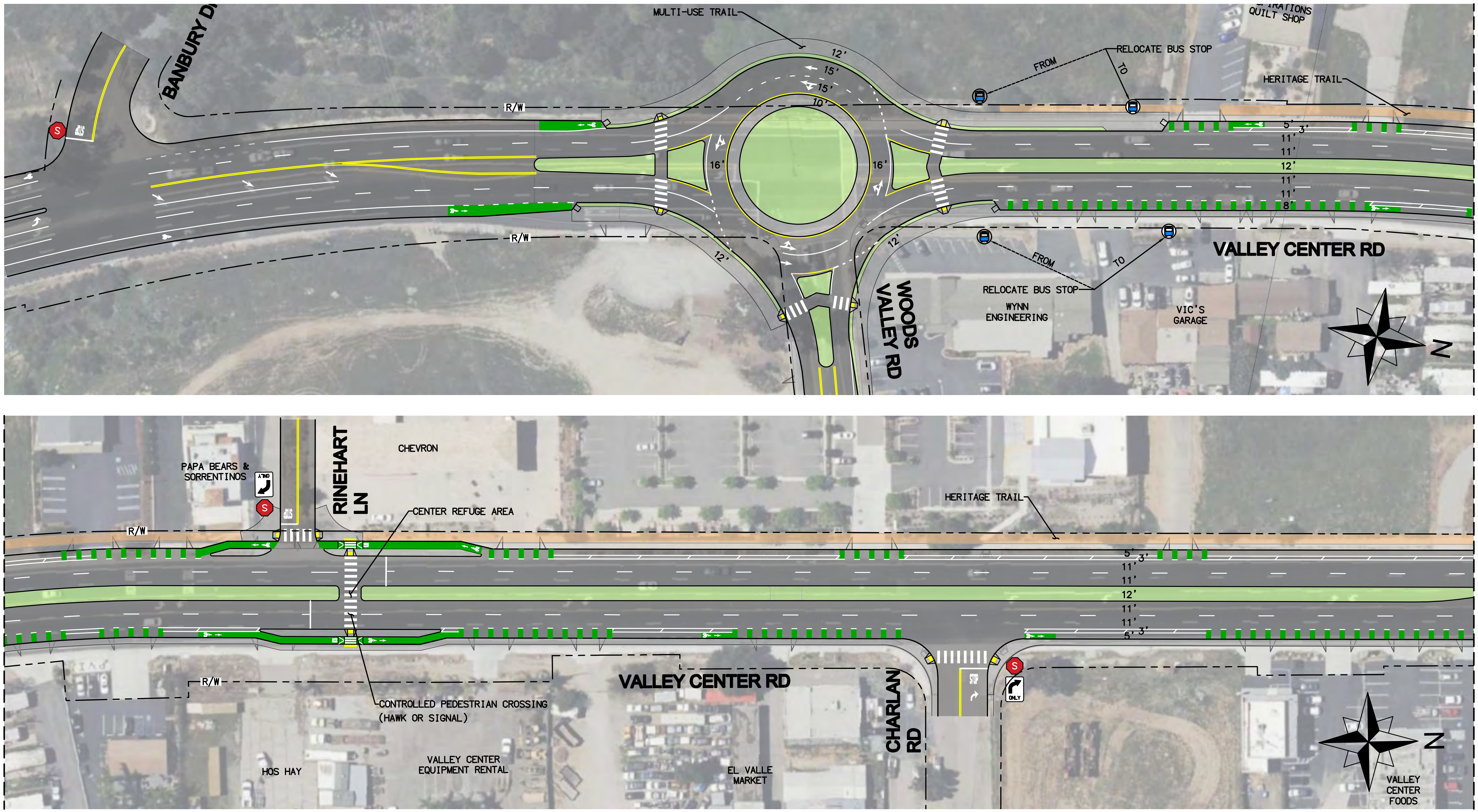

LEGEND

- 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

80 40 0
SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION B

SHEET 1 OF 6

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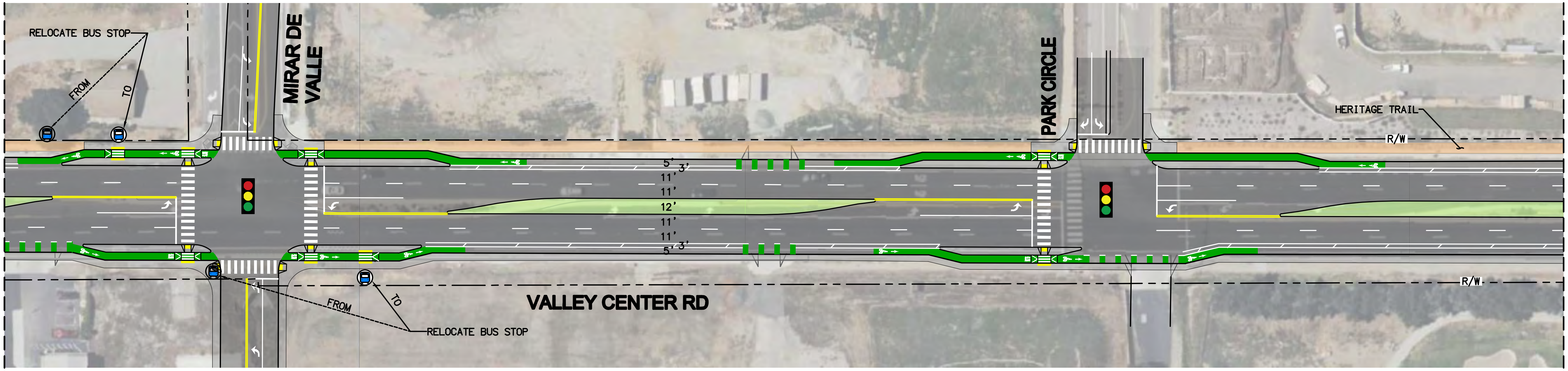

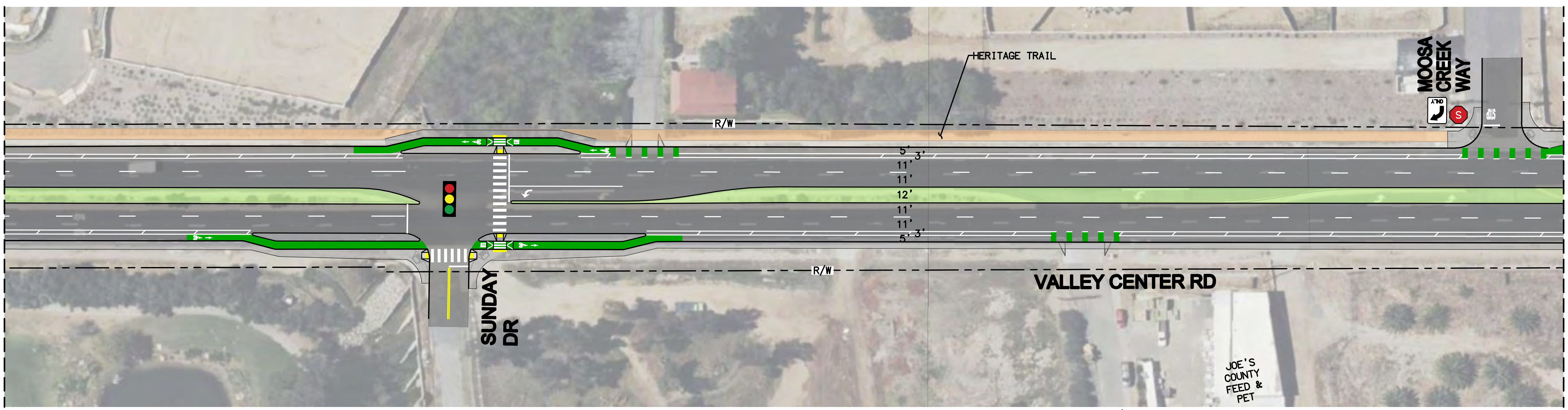

LEGEND

- 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'

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Draft Corridor Concept Plan

OPTION B

SHEET 2 OF 6

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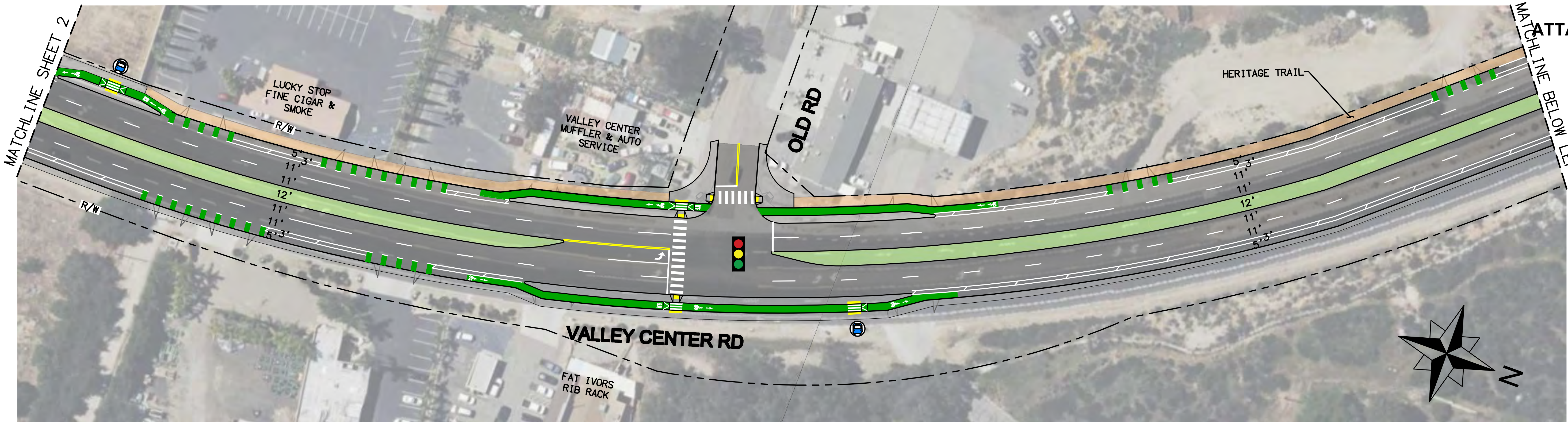

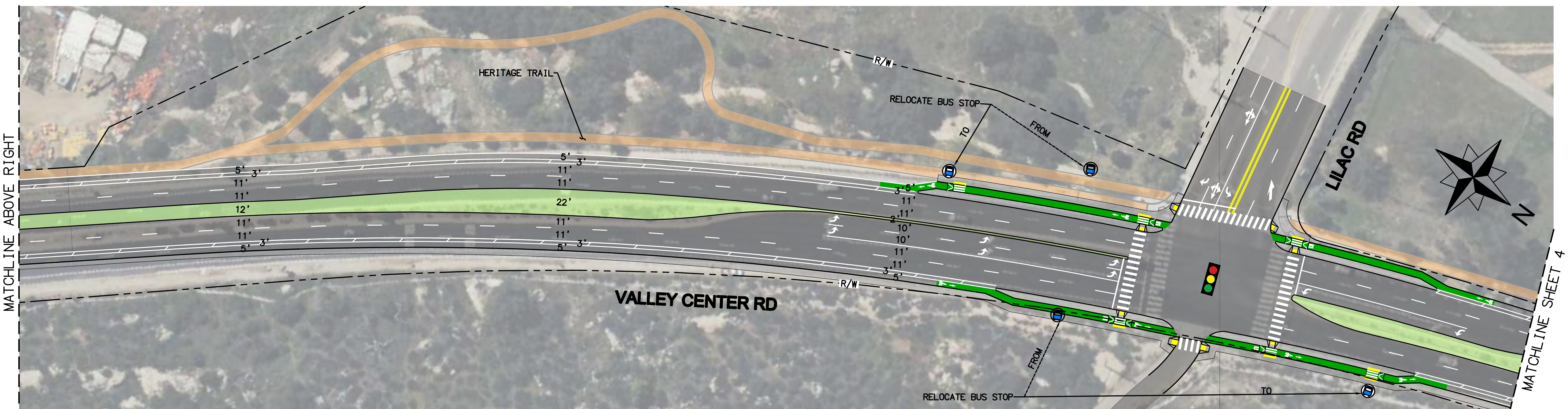

LEGEND

- 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

80 40 0

SCALE: 1"=80'

Draft Corridor Concept Plan

OPTION B

SHEET 3 OF 6

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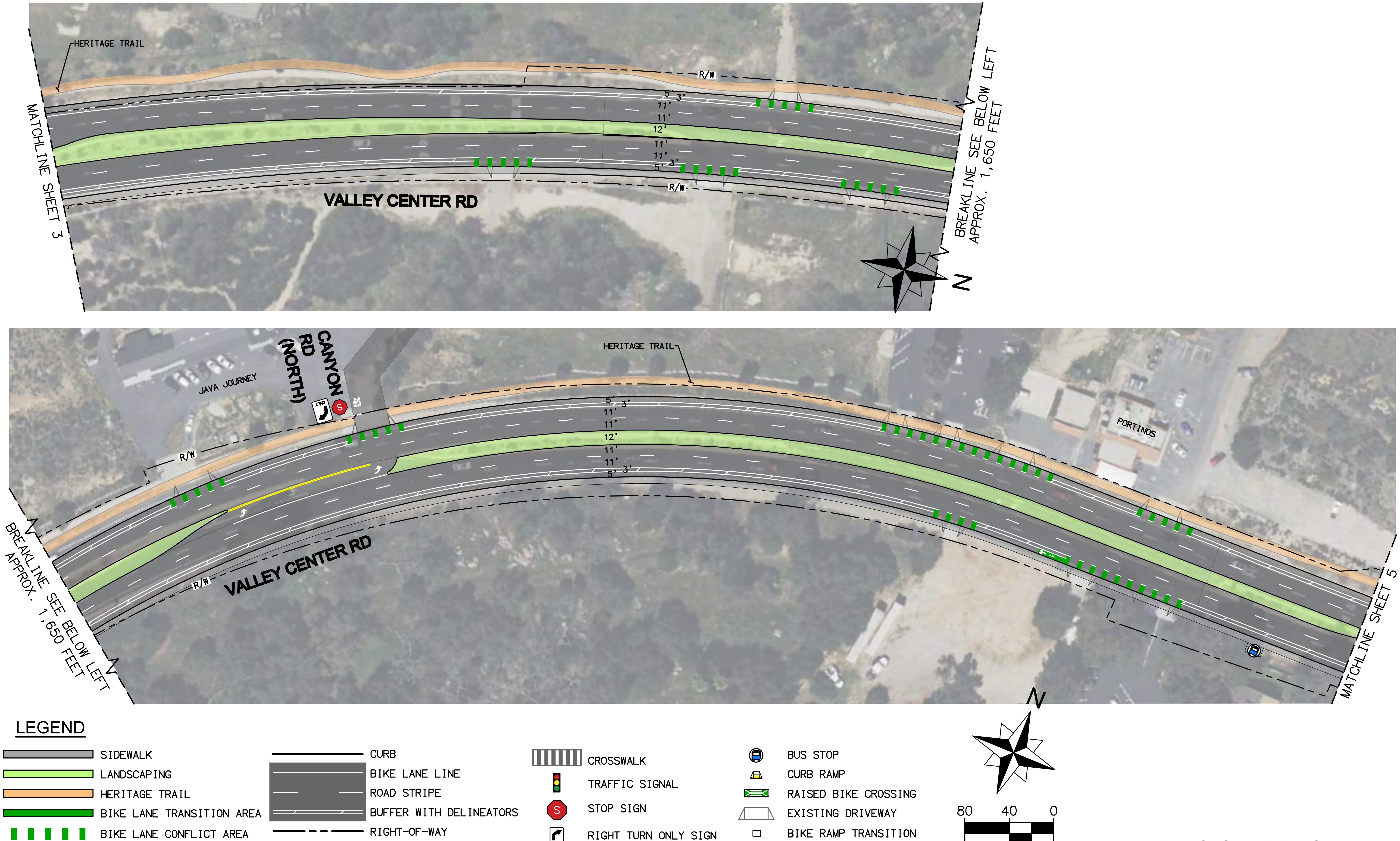

Draft Corridor Concept Plan

OPTION B

SHEET 4 OF 6

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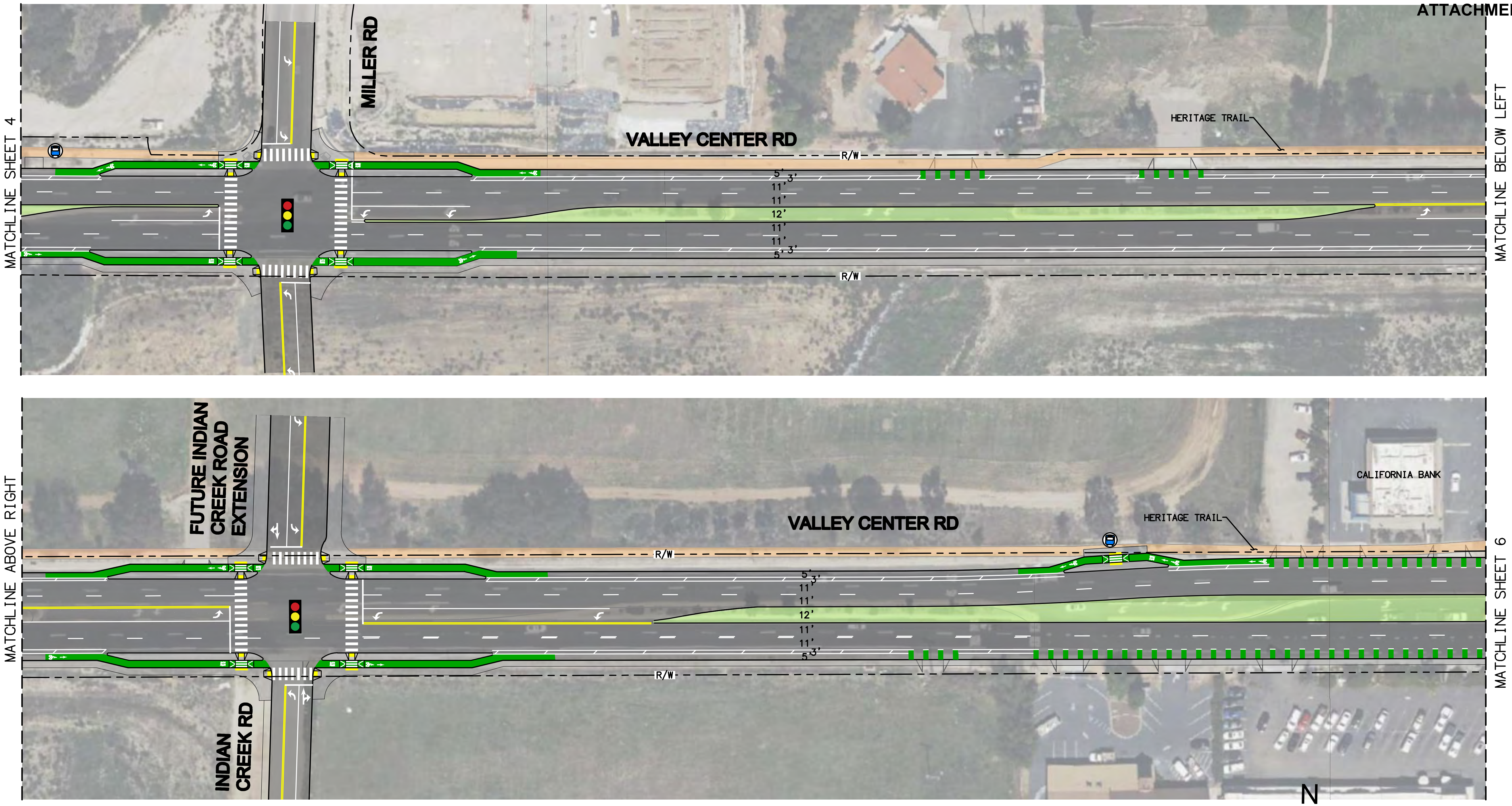
ATTACHMENT B



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

SHEET 5 OF 6

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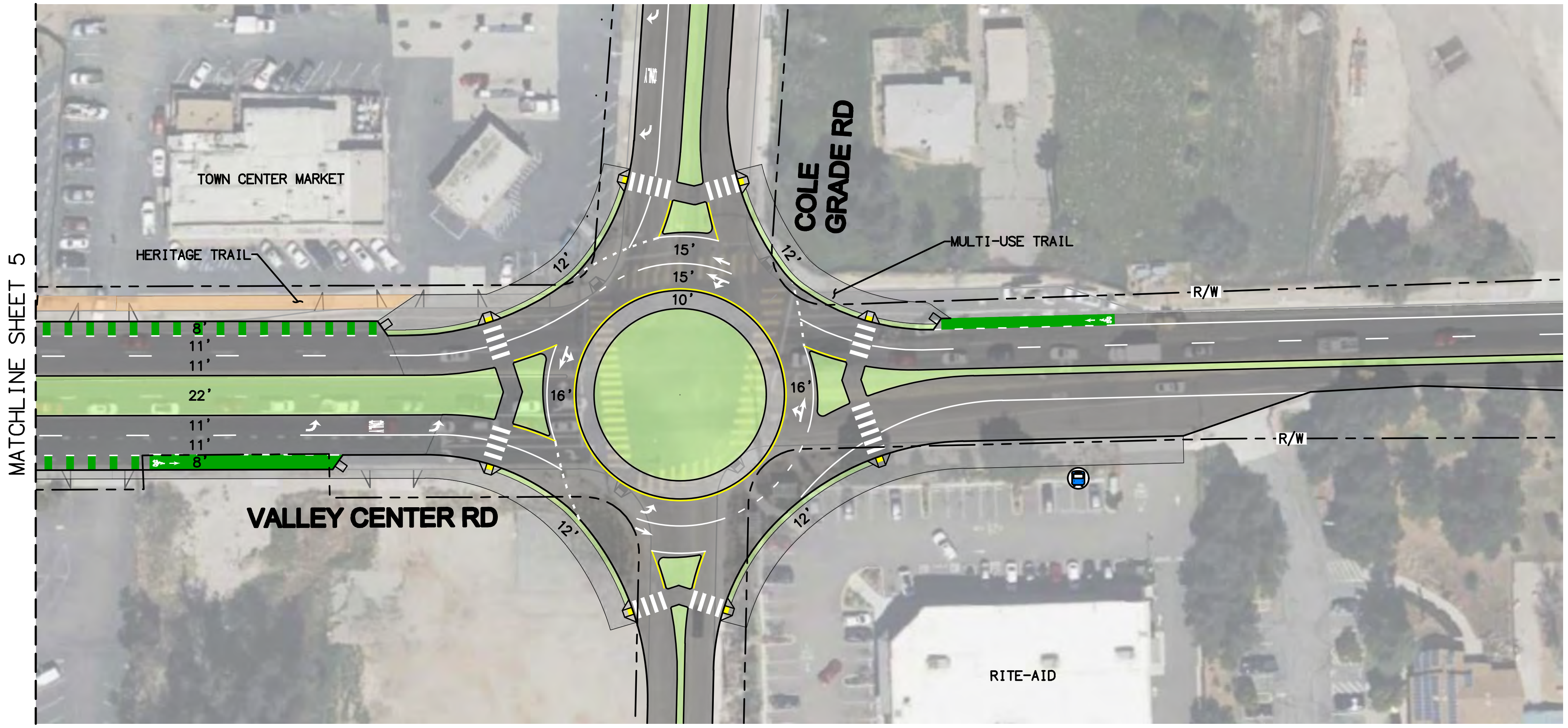

LEGEND

- SIDEWALK
- LANDSCAPING
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
- CURB
- BIKE LANE LINE
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- RAISED BIKE CROSSING
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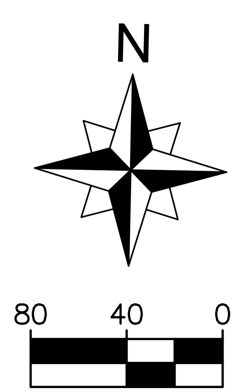

SCALE: 1"=80'

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Draft Corridor Concept Plan

OPTION B

SHEET 6 OF 6

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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.

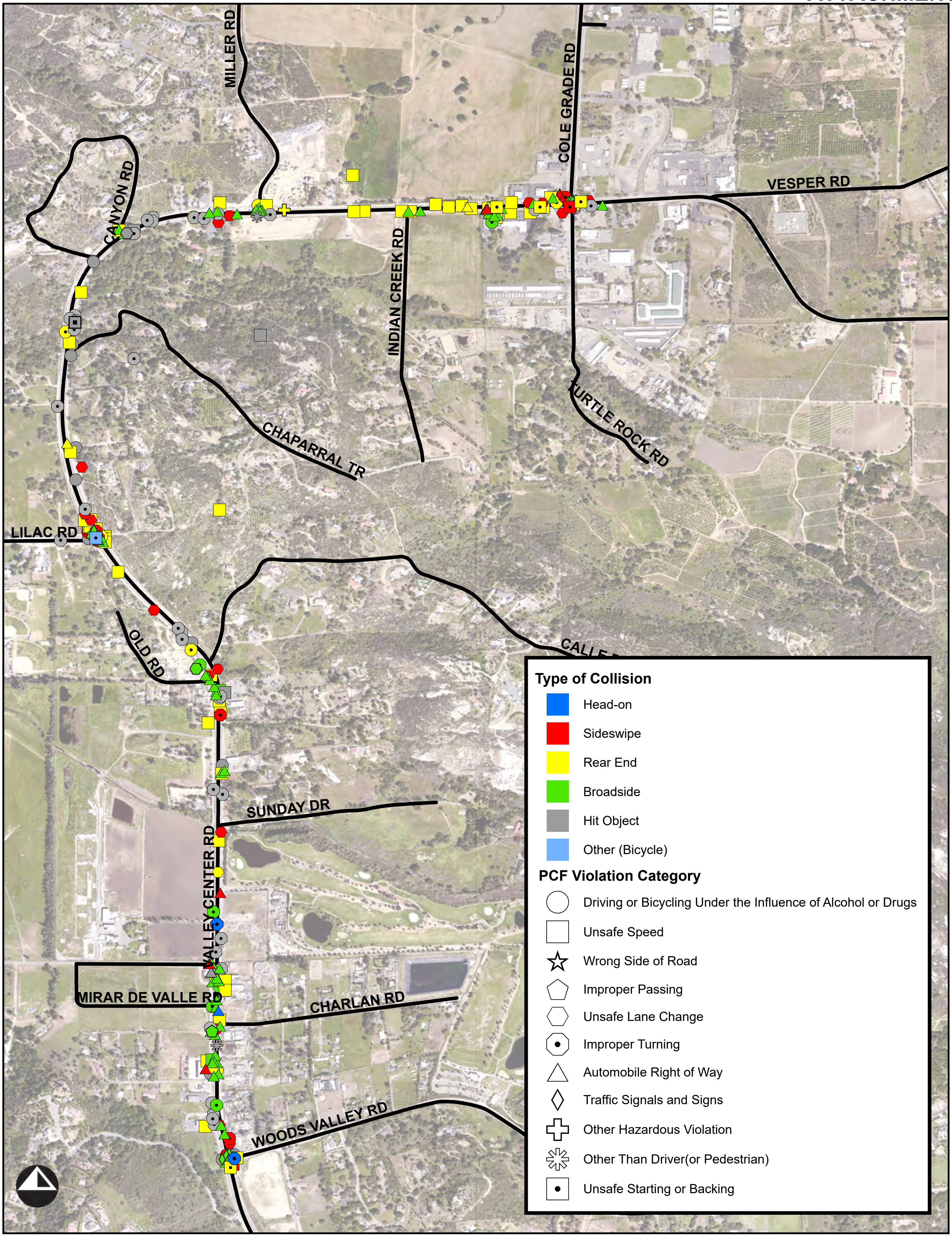
Crash by Location and Severity

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)

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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**.

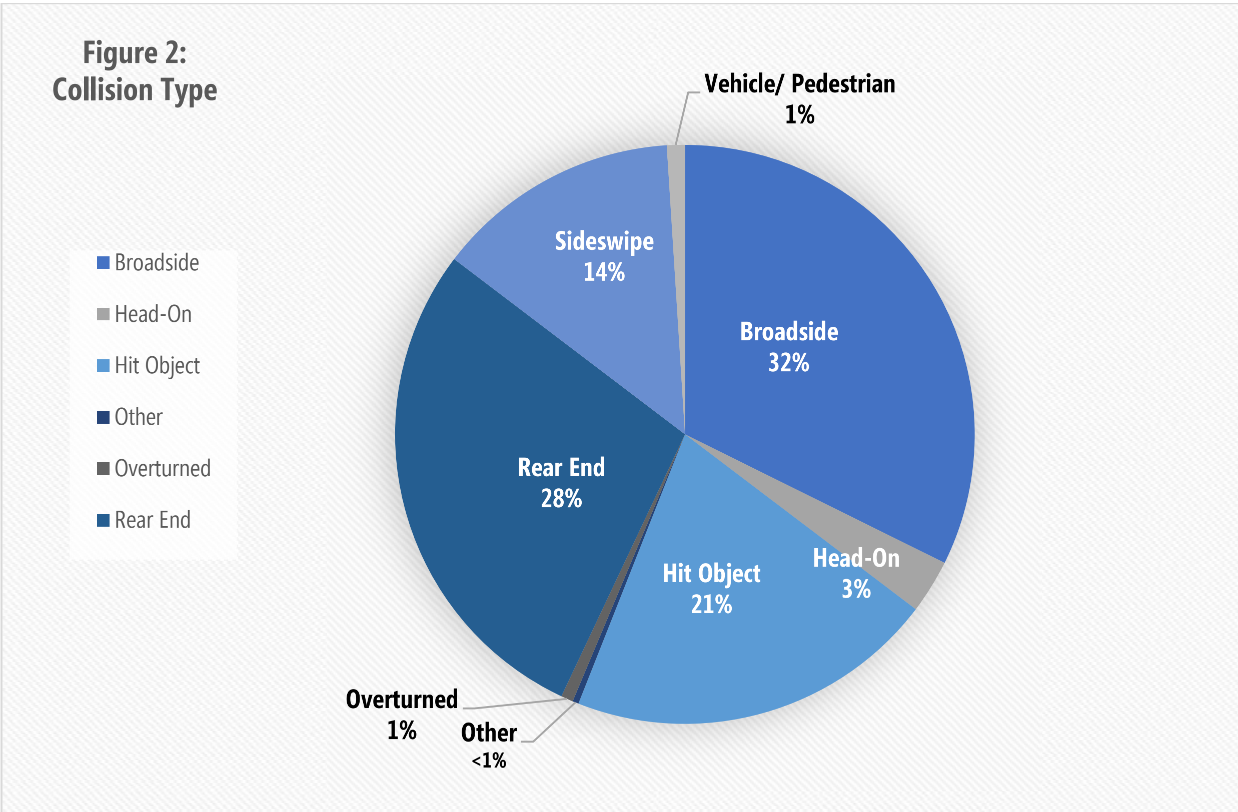


Table 2: Collision Type by Location

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.

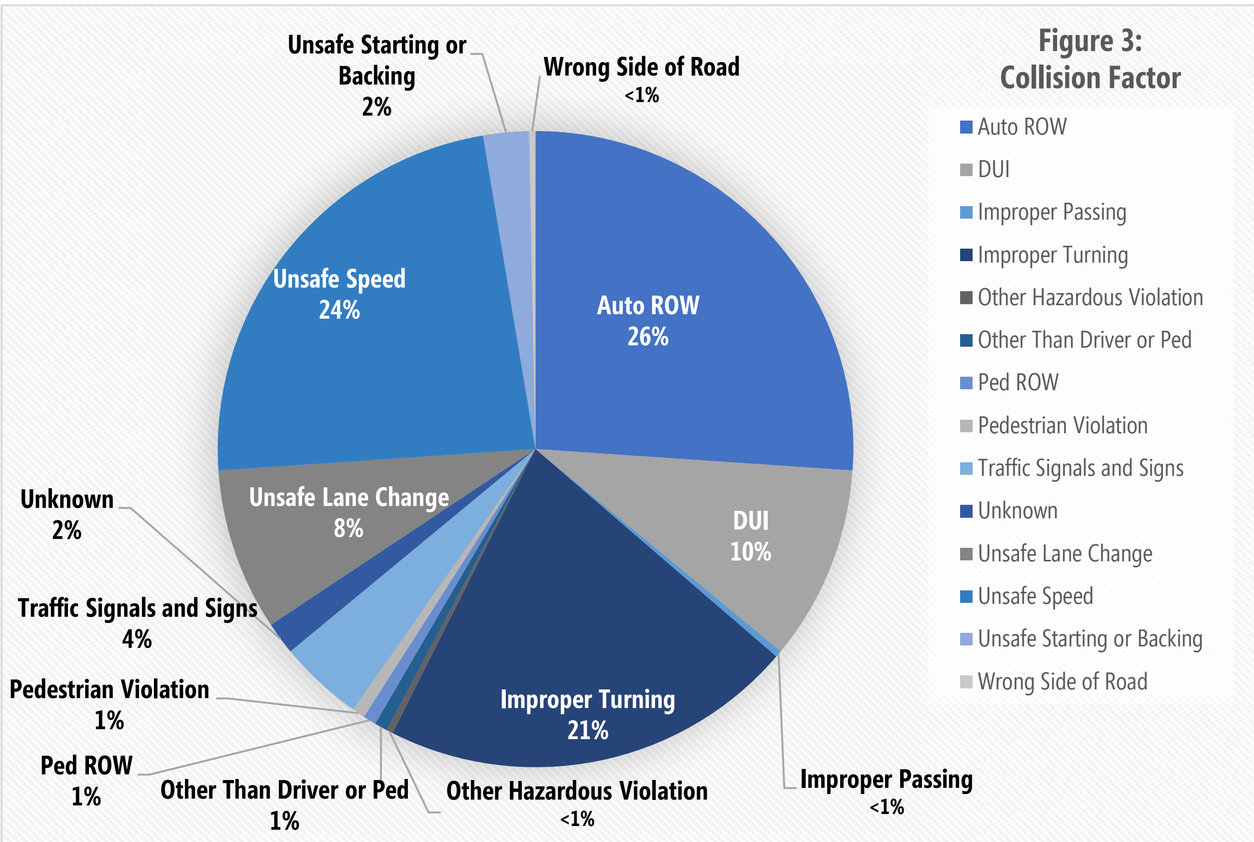


Table 3: Collision Factor by Location

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.

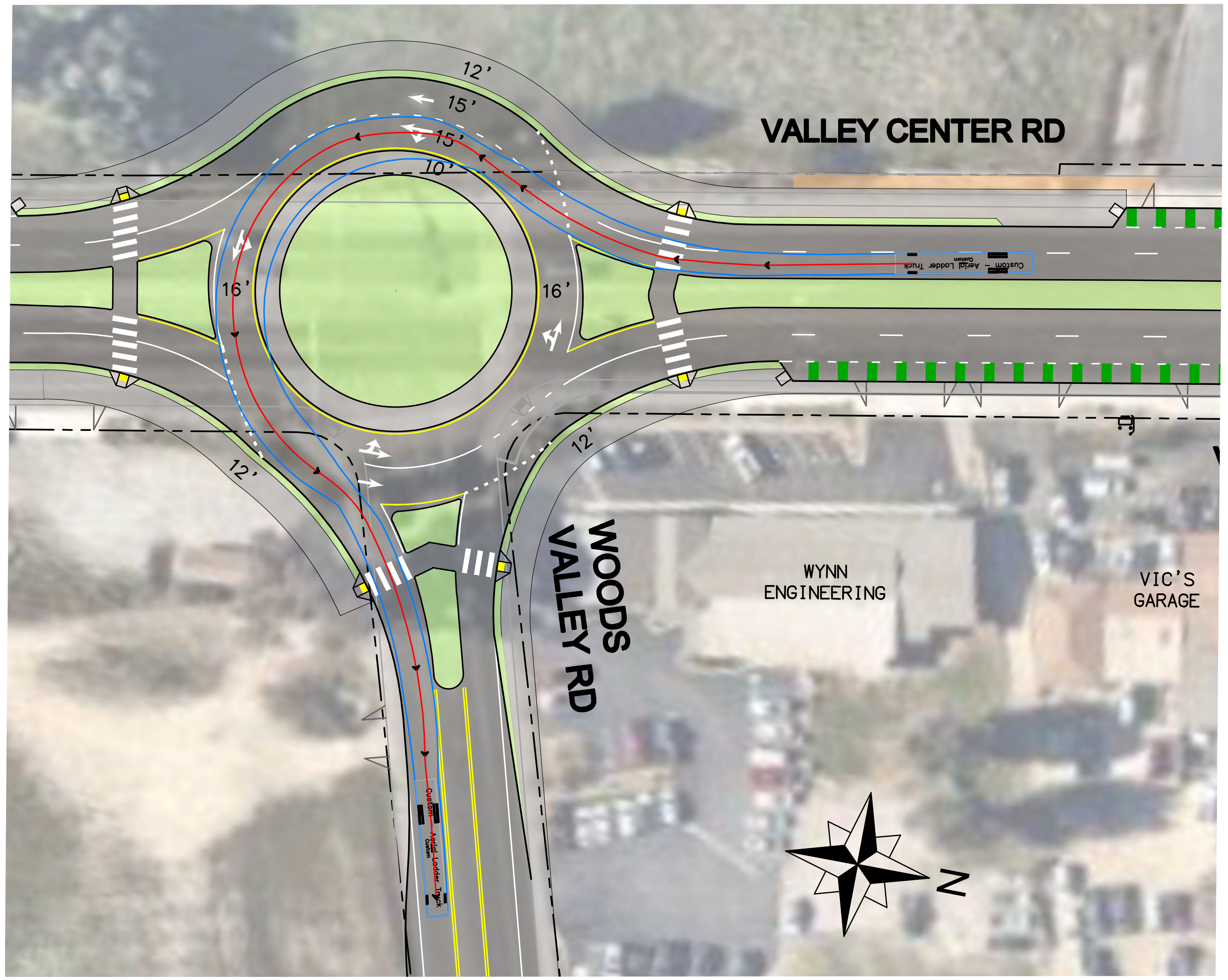
Three (3) pedestrian involved collisions were reported during the eight-and-a-half-year period. The pedestrian collisions at the intersections Cole Grade Road and Lilac Road resulted in complaints of pain and are attributed to pedestrian right-of-way violations. The pedestrian collision at Mirar de Valle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

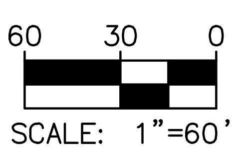
Time of Day Summary of Collisions

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:

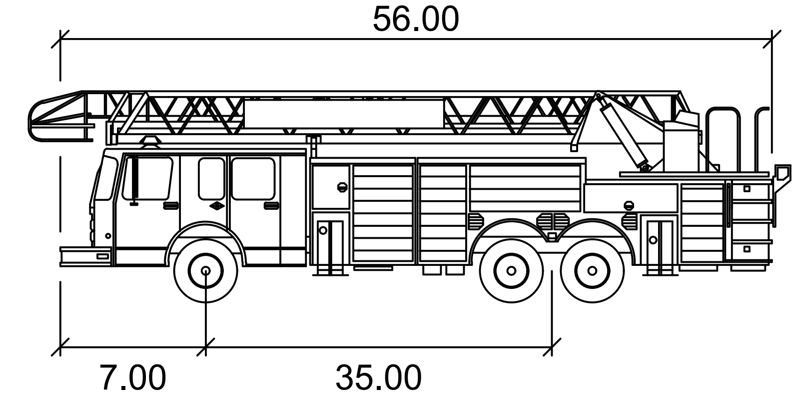
- Daylight – 185 crashes
- Dusk / Dawn – 7 crashes
- Dark - Street Lights – 54 crashes
- Dark - No Street Lights – 53 crashes
- Dark - Lights not Functioning – 1 crash

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





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

Exhibit 4:
Roundabout Turn Template: Aerial Ladder Truck
(Dimensions match the largest VCFPD vehicle)

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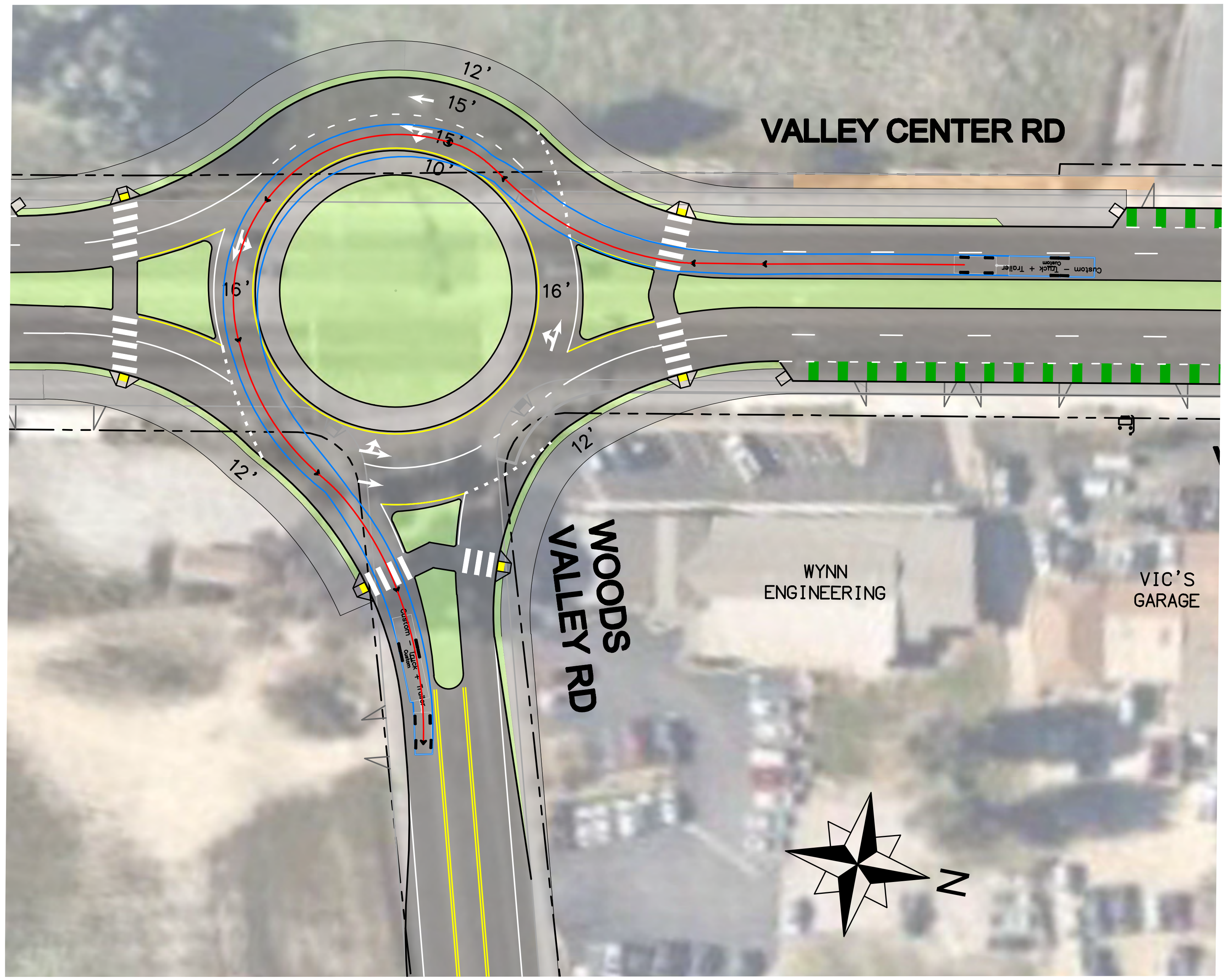

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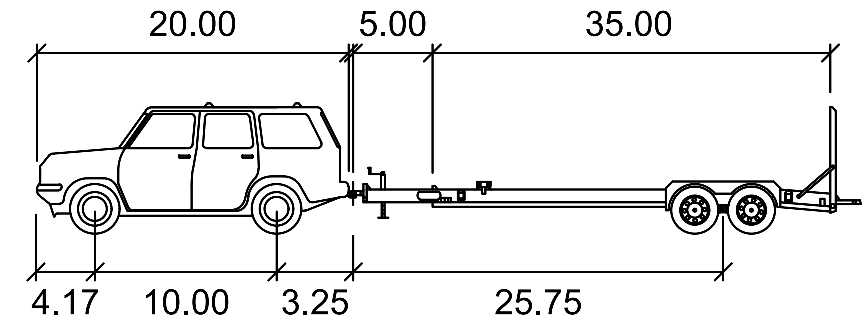
VALLEY CENTER RD – WOODS VALLEY RD TURN TEMPLATE



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
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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)

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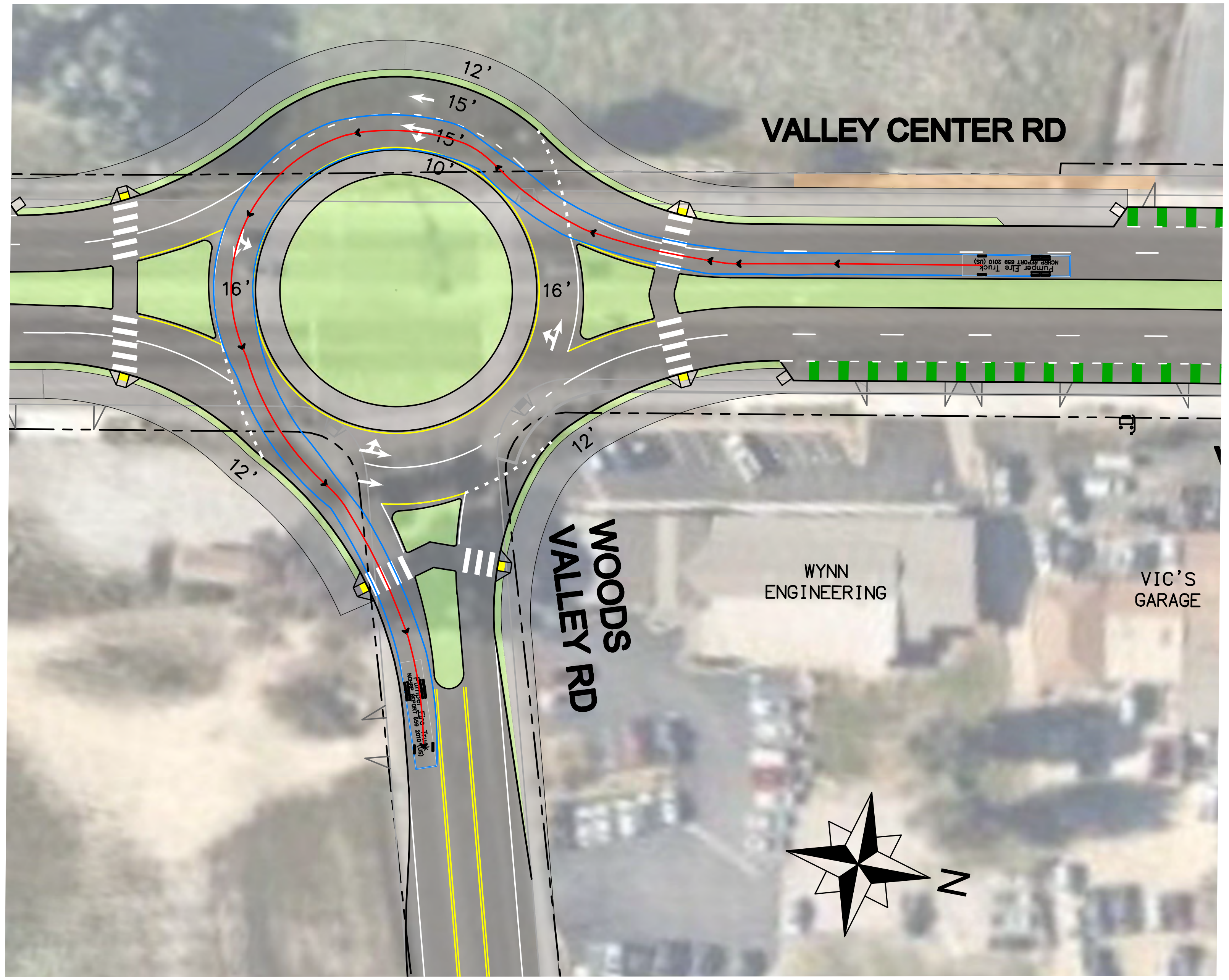

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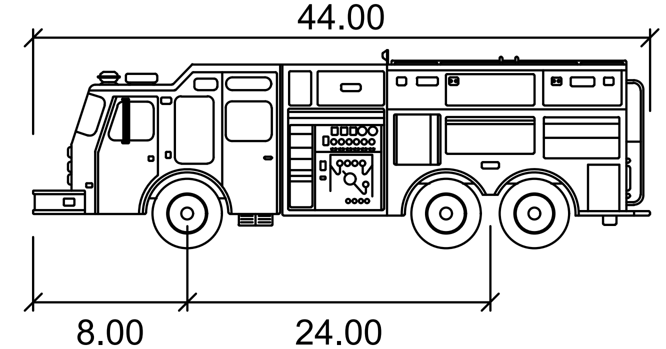
VALLEY CENTER RD - WOODS VALLEY RD TURN TEMPLATE



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
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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

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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	Traffic 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**	Traffic Signal (condition of private development)	11.4 - B	13.2 - B	Traffic Signal (condition of private development)	11.4 - B	13.2 - B
3- Valley Center Road / Park Circle Way [3]	Traffic Signal	3.4 - A	3.7 - A	Traffic Signal	3.4 A	3.7 A	Traffic Signal	3.4 A	3.7 A
4- Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**	Traffic Signal	4.2 - A	4.7 - A	Traffic Signal	4.2 - A	4.7 - A
5- Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D	Traffic Signal	5.4 - A	5.6 - A	Traffic Signal	5.4 - A	5.6 - A
6- Valley Center Road / Lilac Road	Traffic Signal	17.5 - B	13.5 - B	Traffic Signal	18.2 - B	14.0 - B	Traffic 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	Traffic Signal	27.4 - C	38.7 - D
8- Valley Center Road / Indian Creek Road	STOP	16.9 - C	26.1 - D	Traffic Signal (condition of private development)	6.4 - A	6.6 - B	Traffic Signal (condition of private development)	6.4 - A	6.6 - B
9- Valley Center Road / Cole Grade Road	Traffic Signal	31.3 - C	33.5 - C	Traffic 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. 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		7.8 - A	10.0 - A		4.3 - A	7.6 - A		4.3 - A	7.6 - A
2- Valley Center Road / Mirar De Valle Road		**42.5 - E**	**70.8 - F**		15.1 - B	15.2 - B		15.1 - B	15.2 - B
3- Valley Center Road / Park Circle Way [3]		12.8 - B	18.4 - B		12.8 - B	6.7 - A		12.8 - B	6.7 - A
4- Valley Center Road / Sunday Drive		32.7 - D	**72.9 - F**		5.6 - A	5.1 - A		5.6 - A	5.1 - A
5- Valley Center Road / Old Road		**1338.7 - F**	**214.2 - F**		8.6 - A	6.3 - A		8.6 - A	6.3 - A
6- Valley Center Road / Lilac Road		26.7 - C	20.5 - C		26.7 - C	19.4 - B		26.7 - C	19.4 - B
7- Valley Center Road / Miller Road		**45.3 - E**	17.4 - C		9.0 - A	11.6 - B		28.4 - C	50.5 - D
8- Valley Center Road / Indian Creek Road		19.8 - C	32.0 - D		6.5 - A	8.5 - A		6.5 - A	8.5 - A
9- Valley Center Road / Cole Grade Road		42.2 - C	47.7 - D		40.2 - D	47.3 - D		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.

Valley Center Road VCFPD Travel Time Comparison

Scenario		Northbound / Eastbound Lilac Road to Cole Grade Road	Southbound 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).

ATTACHMENT B

EXHIBIT 10

AVL of E161 to Cool Valley Rd

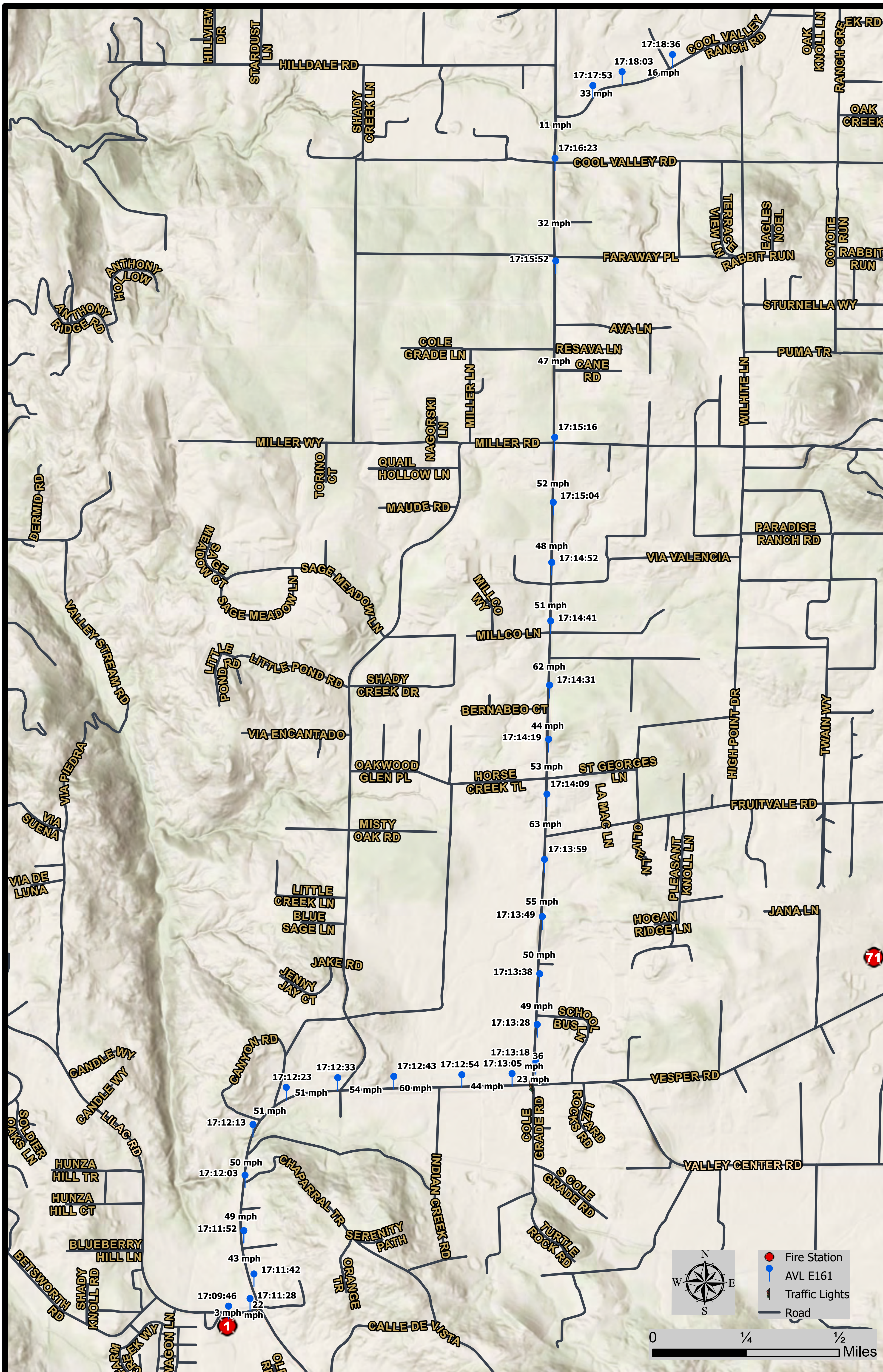
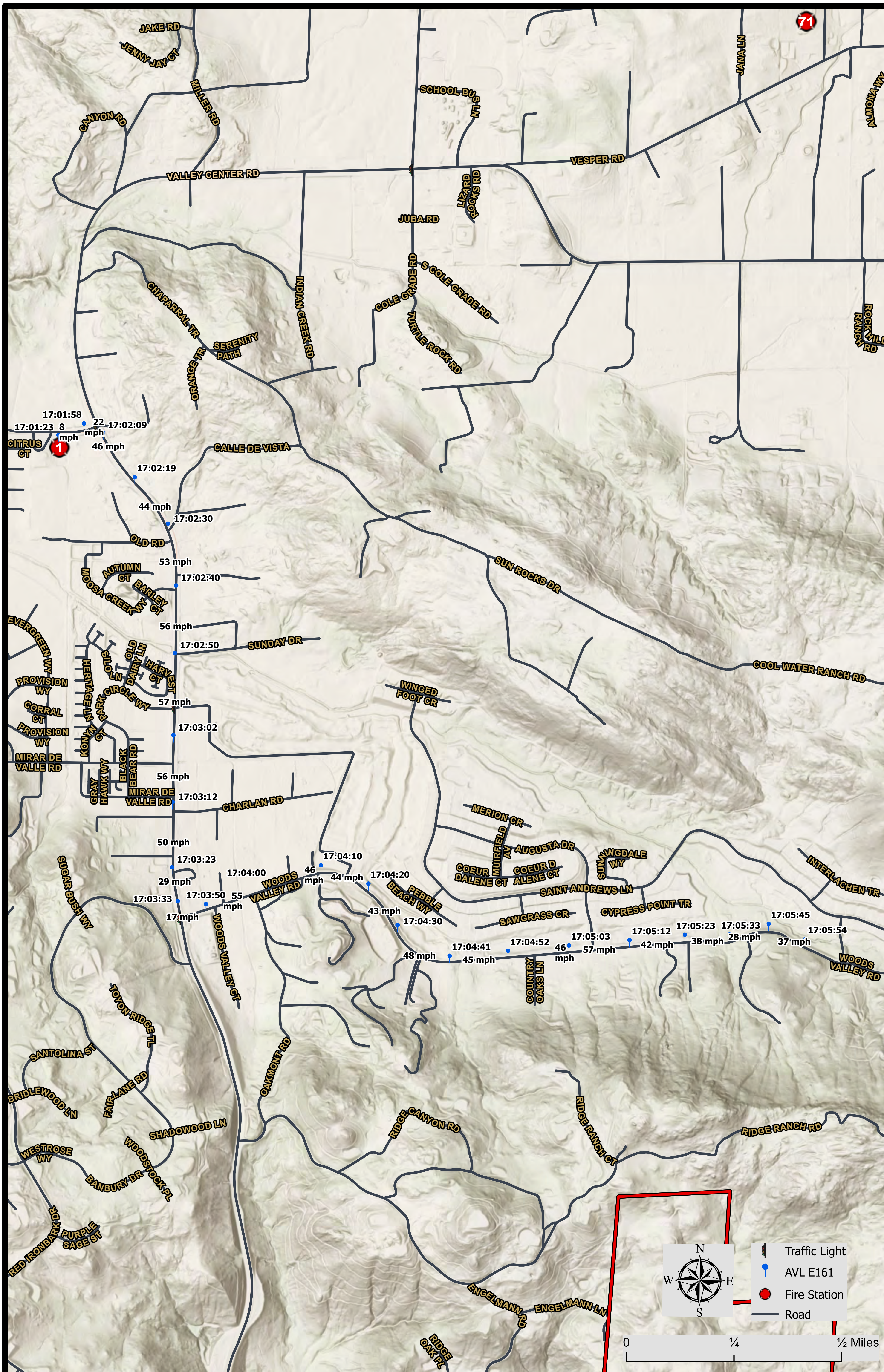
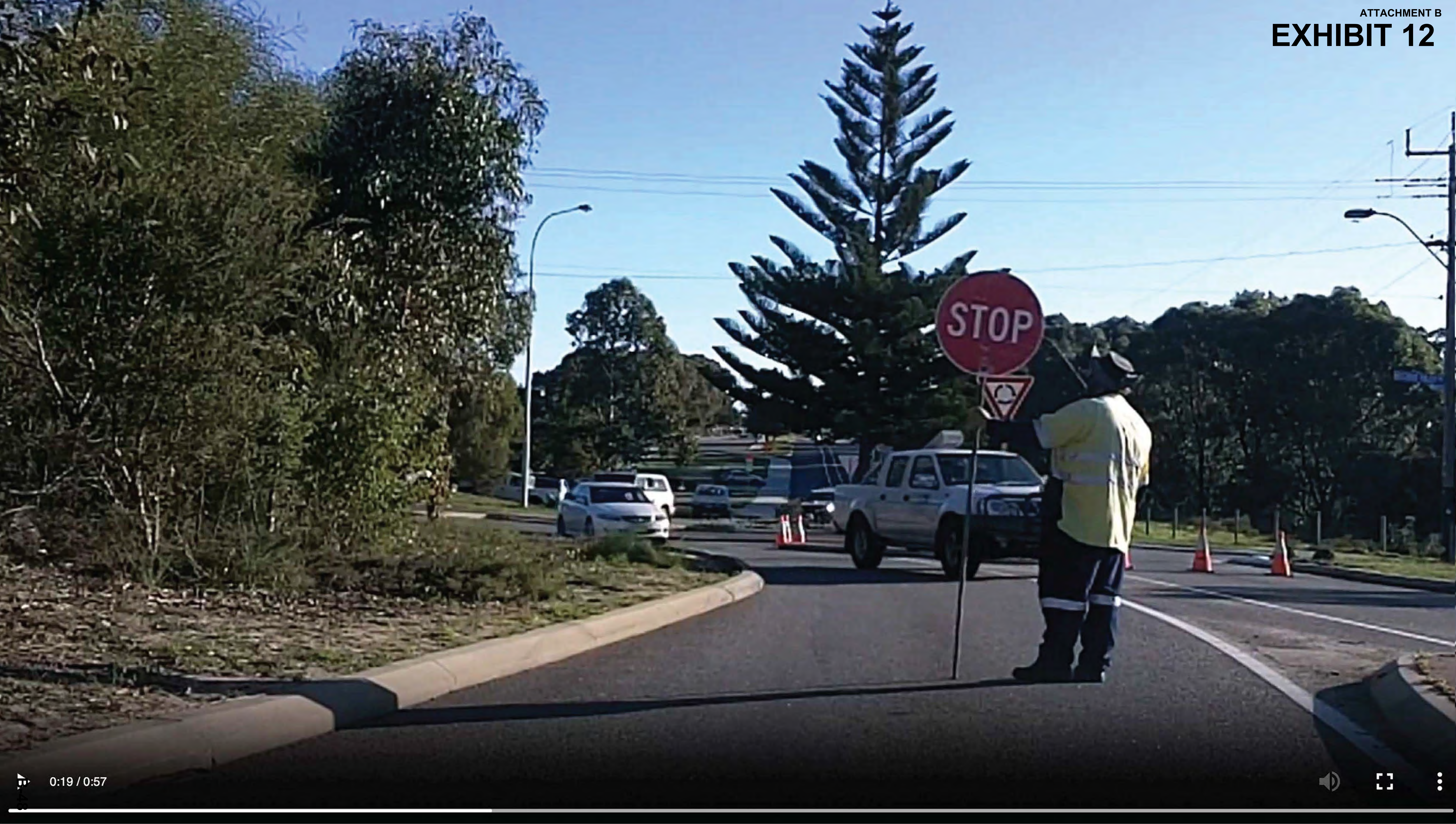


EXHIBIT 11 AVL of E161 to Woods Valley Rd



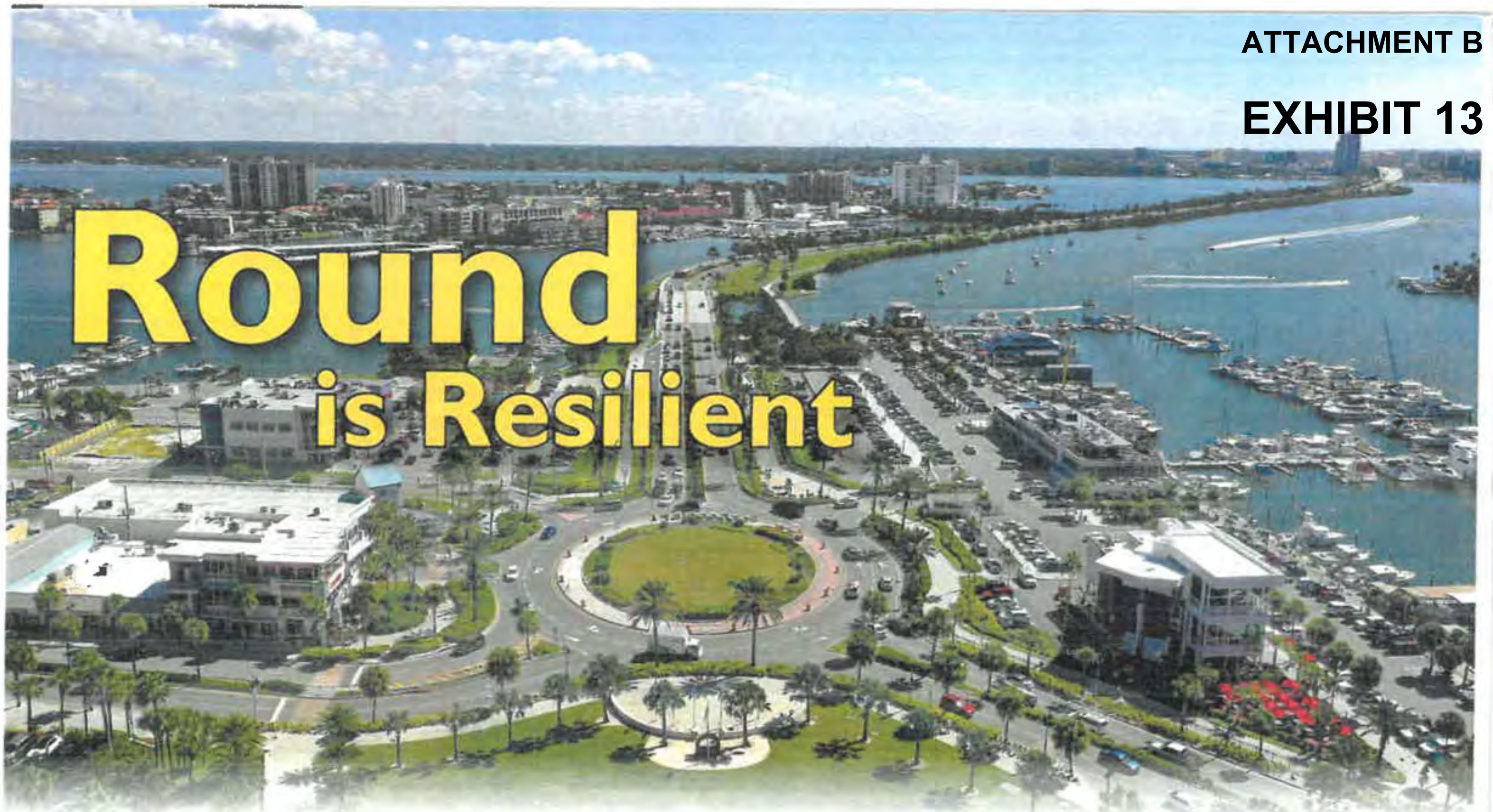
ATTACHMENT B

EXHIBIT 12



ATTACHMENT B

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

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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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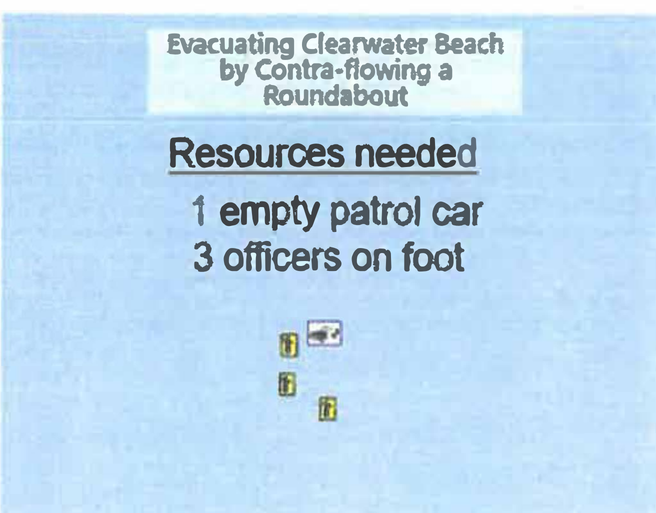
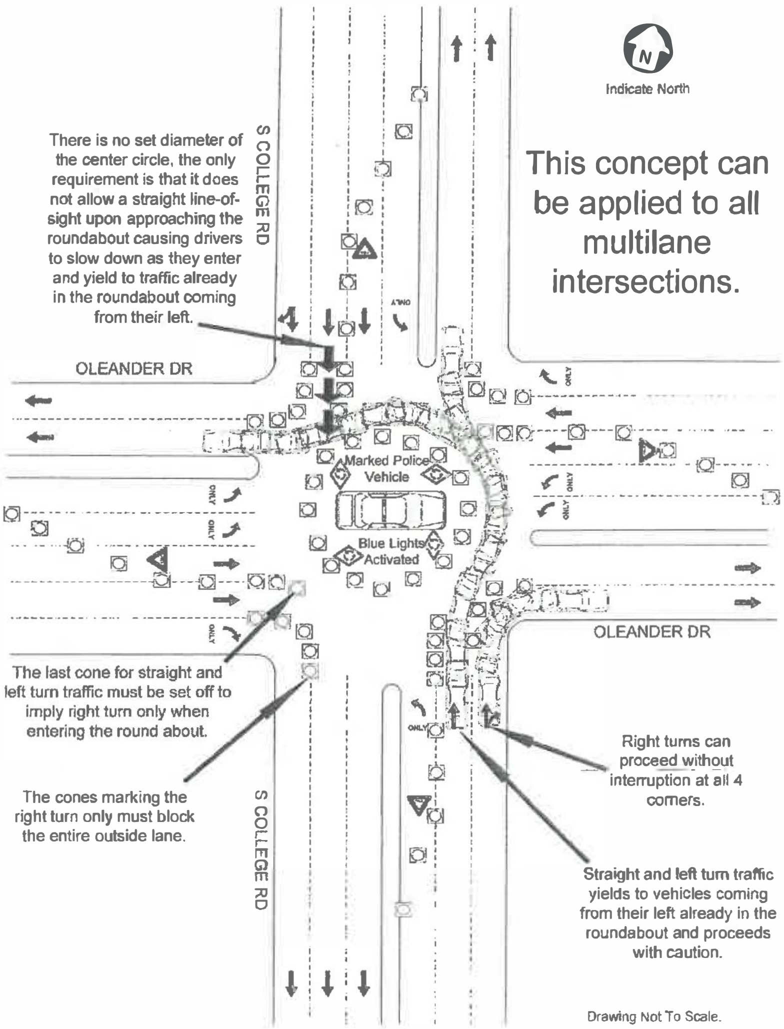


Round is Resilient continued from page 25



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.

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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

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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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.

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FINAL REPORT SUPPLEMENT

ALL EXHIBITS

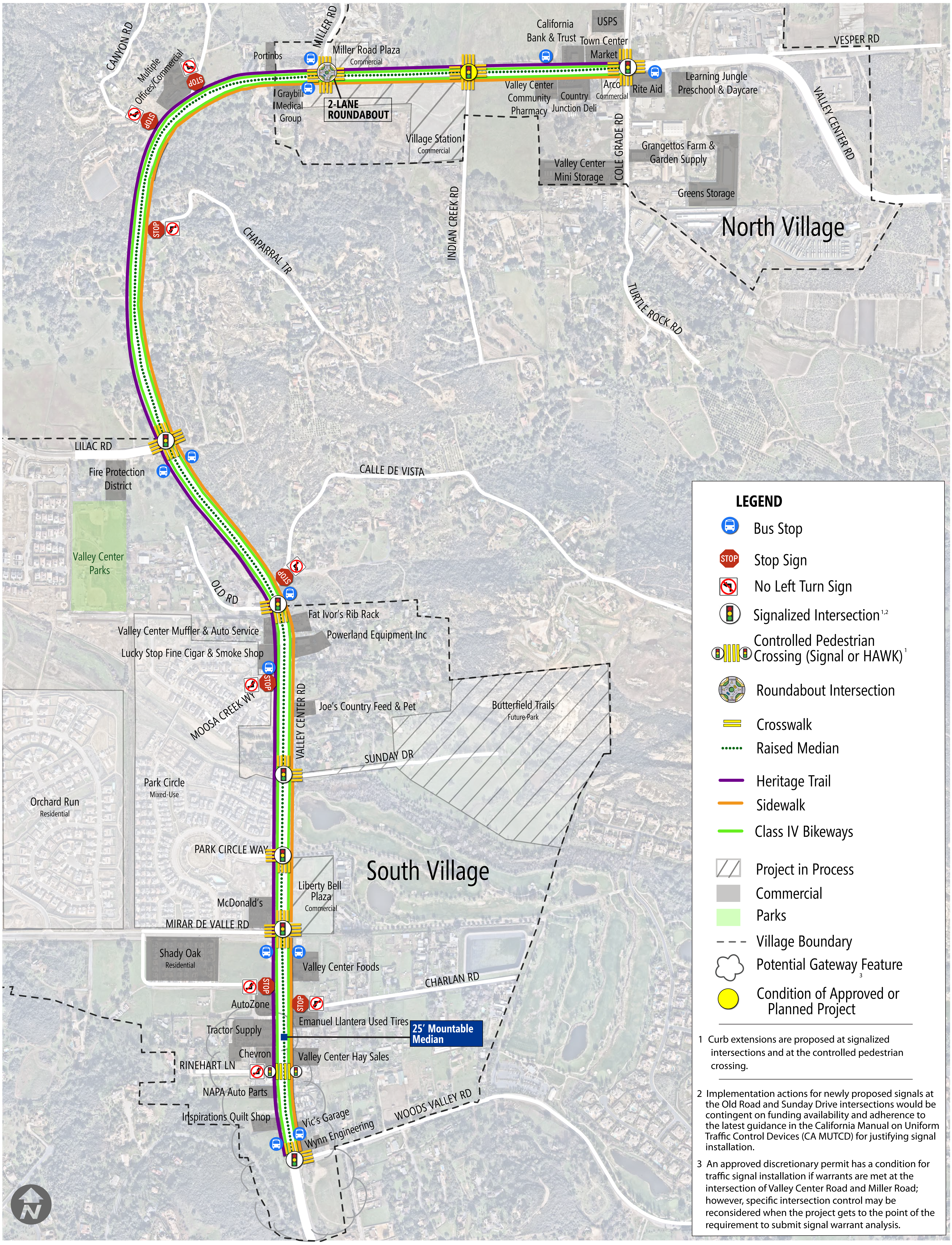
SAN DIEGO COUNTY

JUNE 24, 2024

CITYGATE
FIRE & EMS
WWW.CITYGATEASSOCIATES.COM
600 COOLIDGE DRIVE, SUITE 150
FOLSOM, CA 95630
PHONE: (916) 458-5100
FAX: (916) 983-2090

Michael Baker
INTERNATIONAL

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



Valley Center Road Corridor Concept Plan

May 2024
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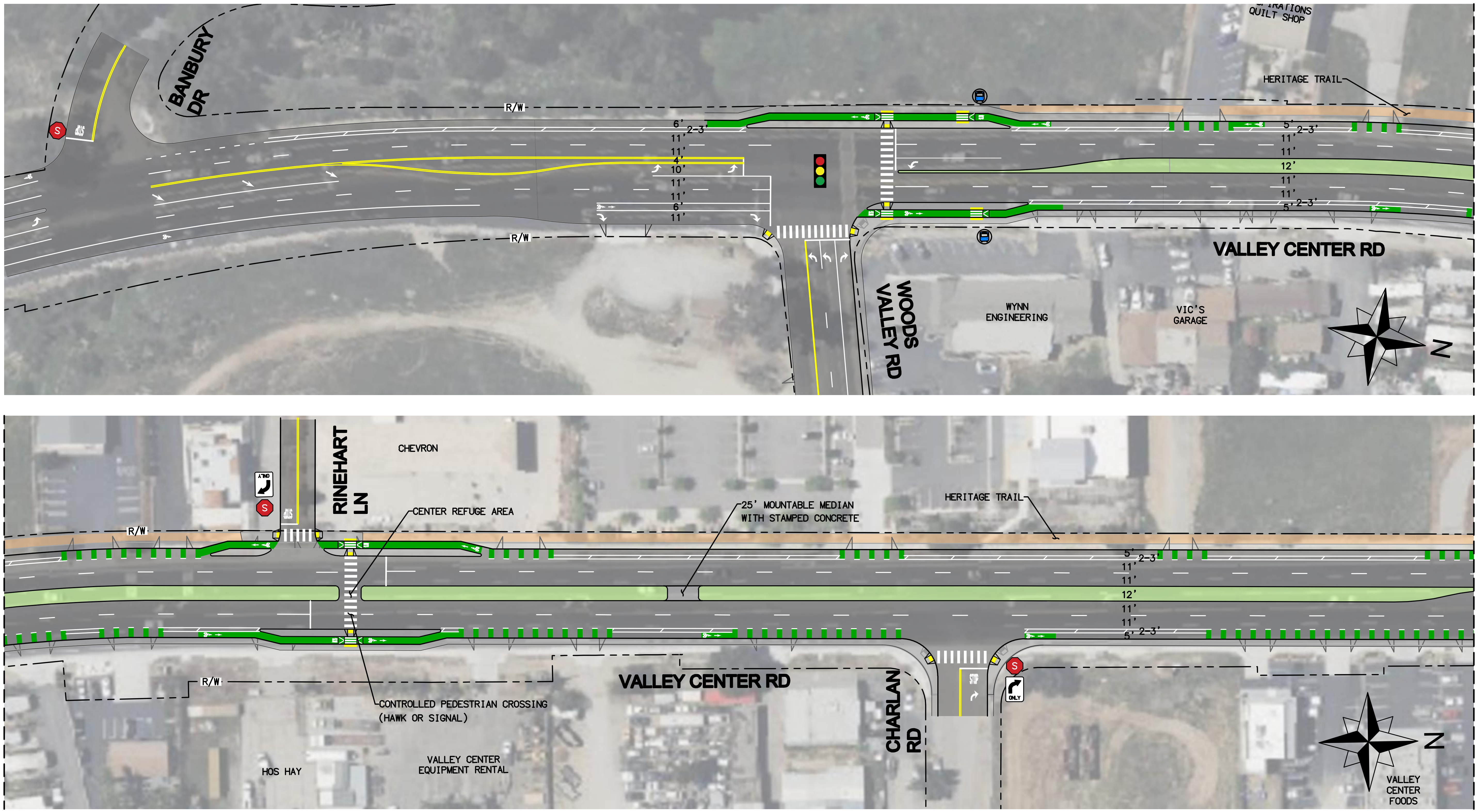

LEGEND

- 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

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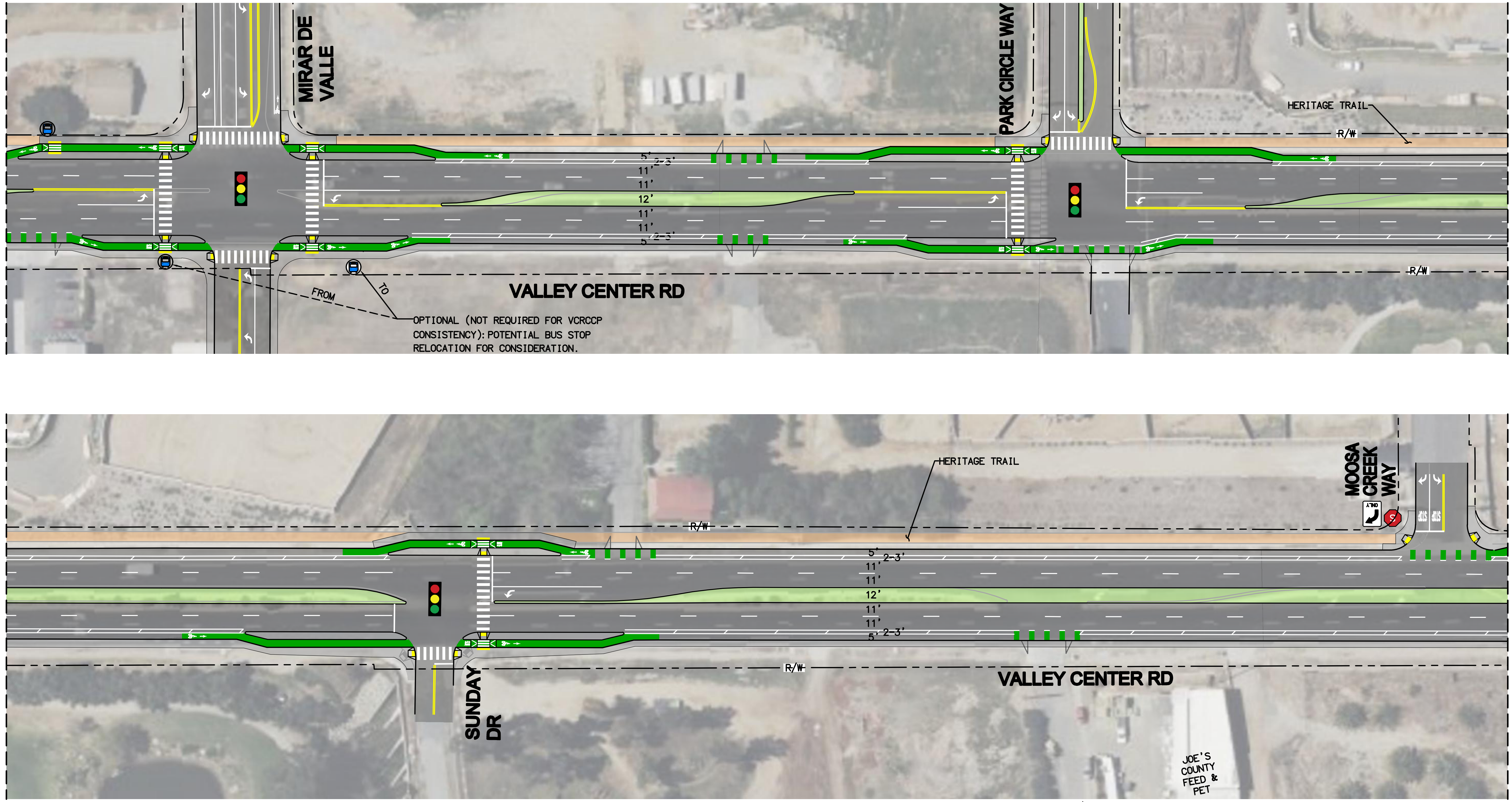

LEGEND

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- RIGHT TURN ONLY SIGN
- BUS STOP
- CURB RAMP
- RAISED BIKE CROSSING
- EXISTING DRIVEWAY
- BIKE RAMP TRANSITION

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SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 2 OF 6

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LEGEND

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- 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

COUNTY OF SAN DIEGO

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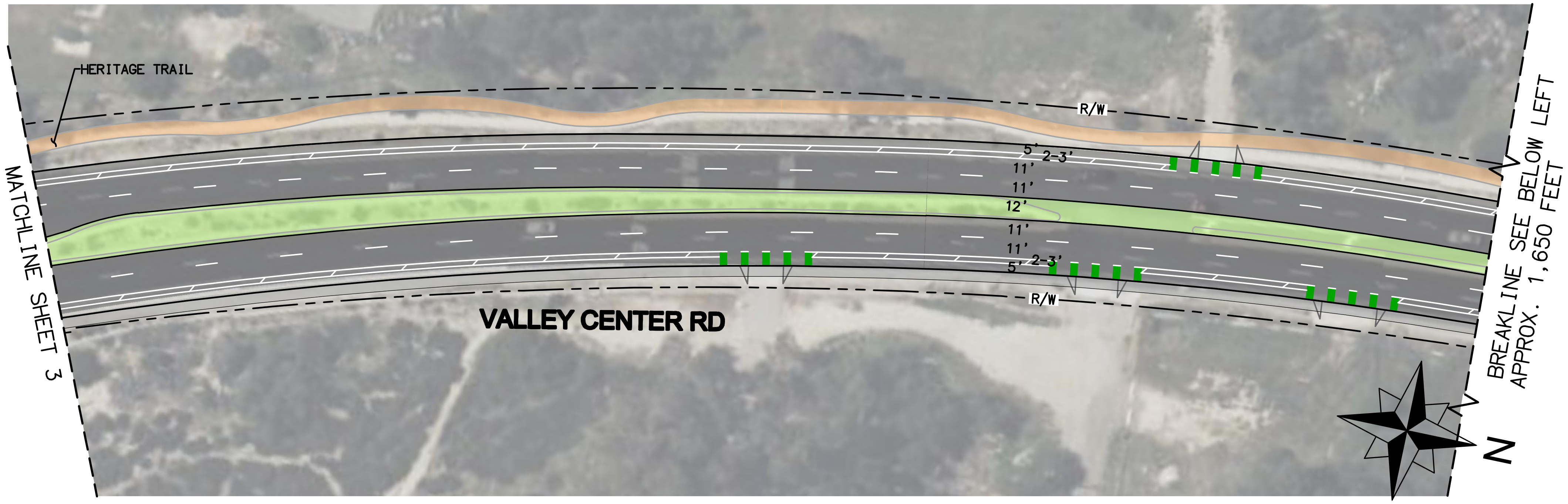

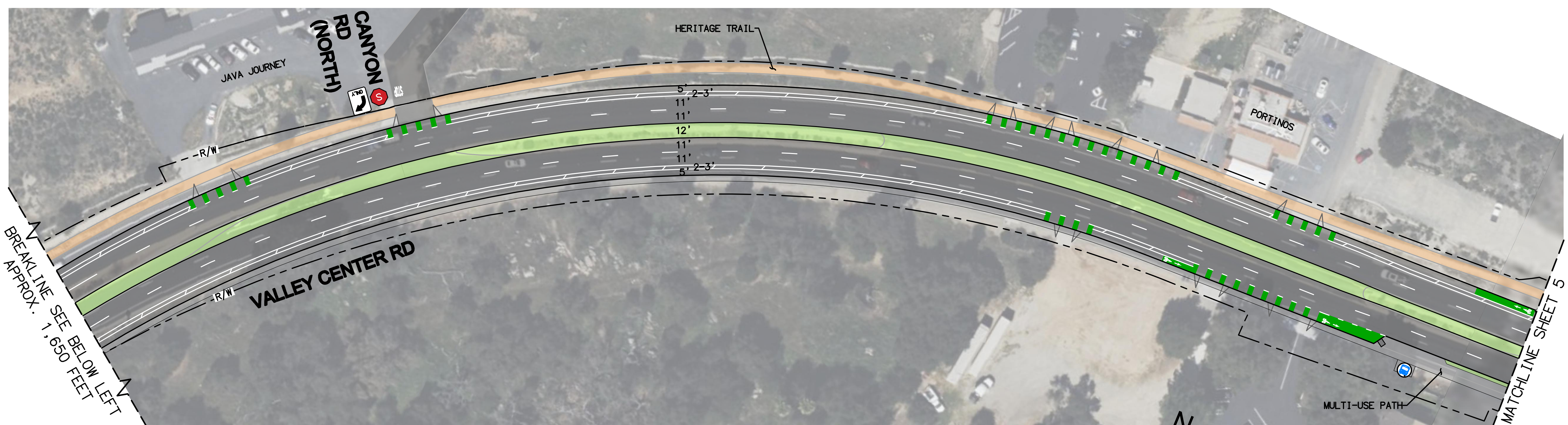

LEGEND

- SIDEWALK
- RAISED MEDIAN
- HERITAGE TRAIL
- BIKE LANE TRANSITION AREA
- BIKE LANE CONFLICT AREA
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- 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

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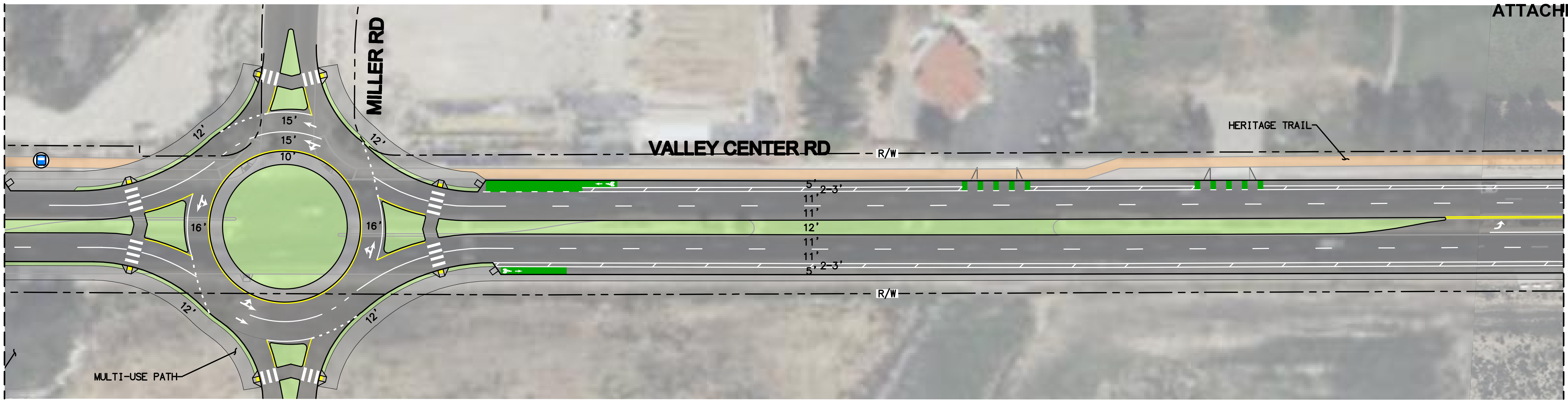

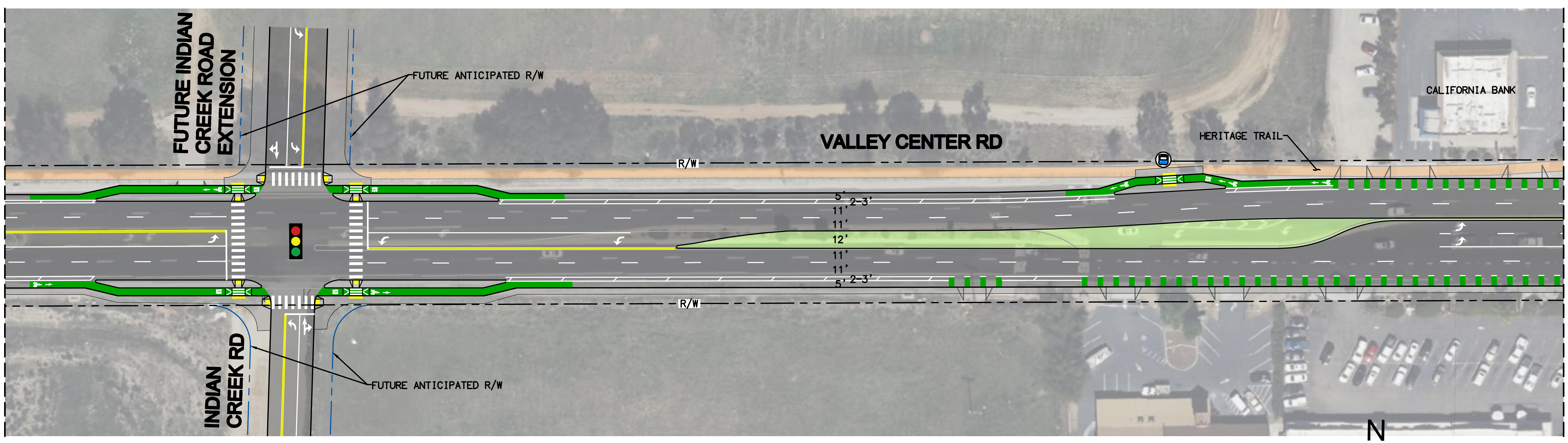

LEGEND

- 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'

N

Valley Center Road Corridor Concept Plan

SHEET 5 OF 6

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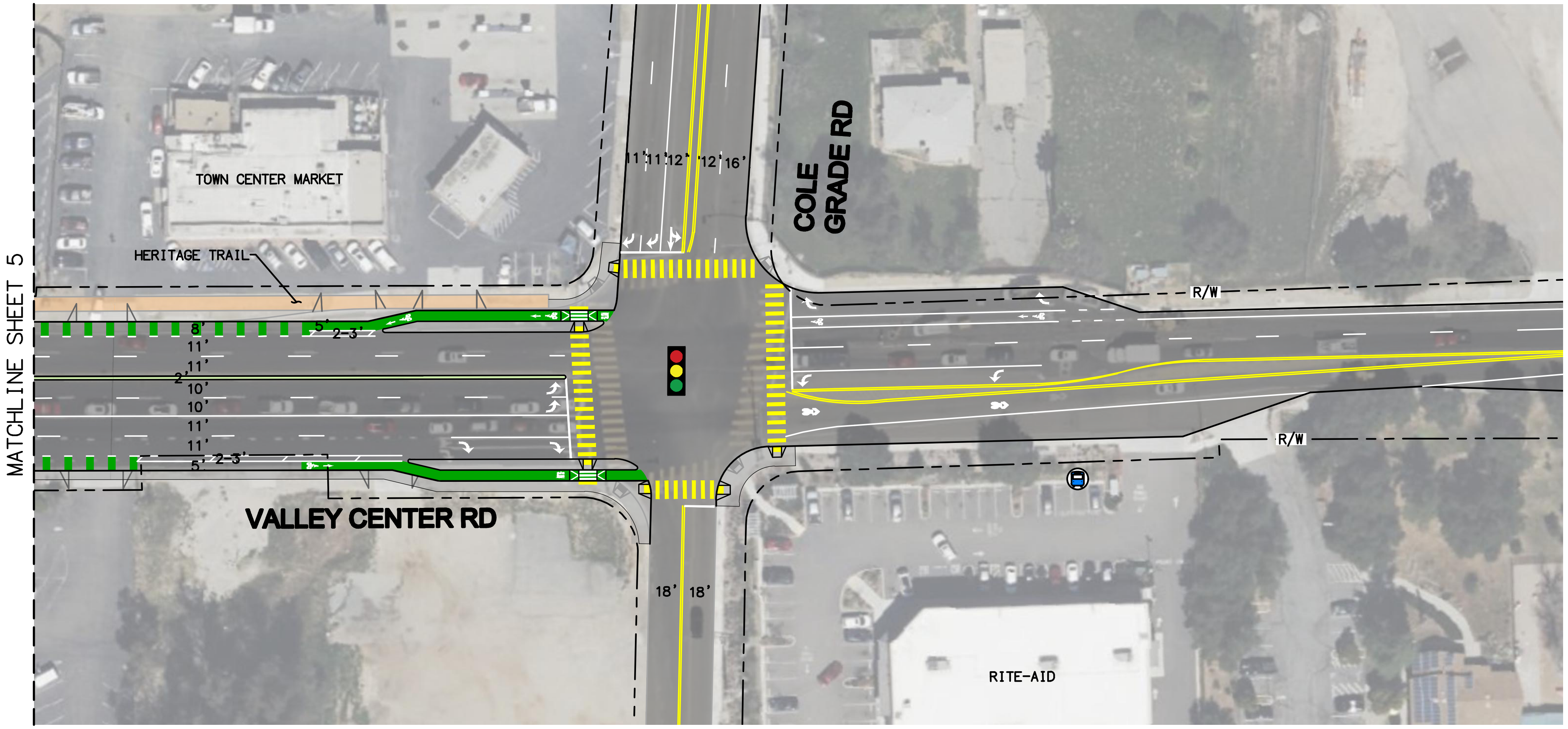

LEGEND

- 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

N

80 40 0

SCALE: 1"=80'

Valley Center Road Corridor Concept Plan

SHEET 6 OF 6

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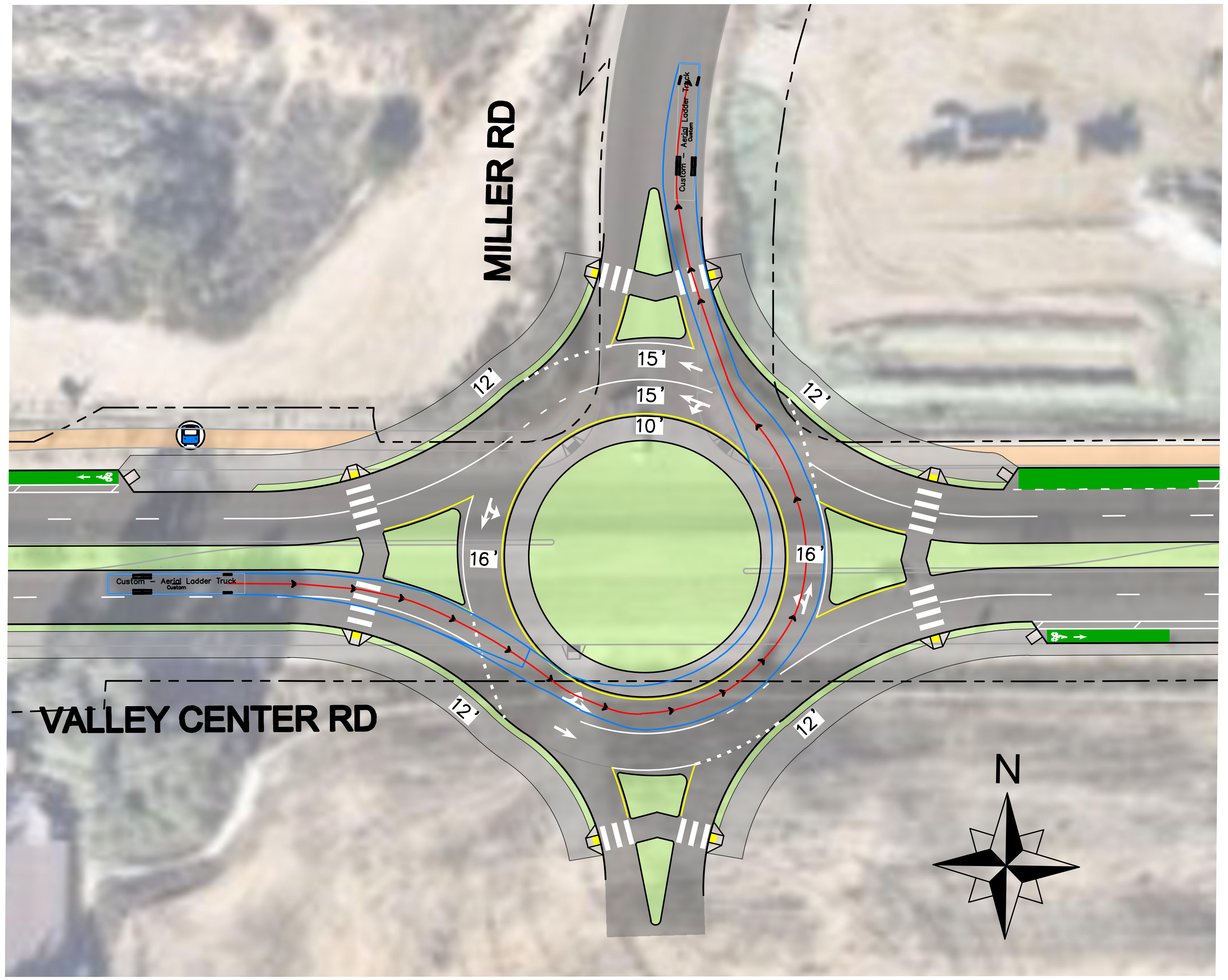
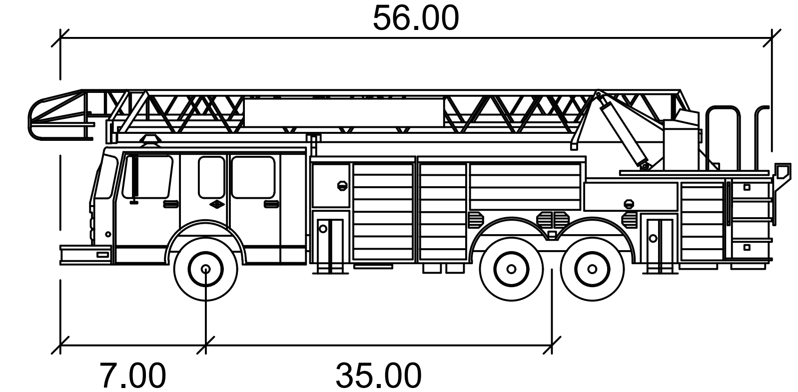


SCALE: 1"=60'
60 30 0

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)

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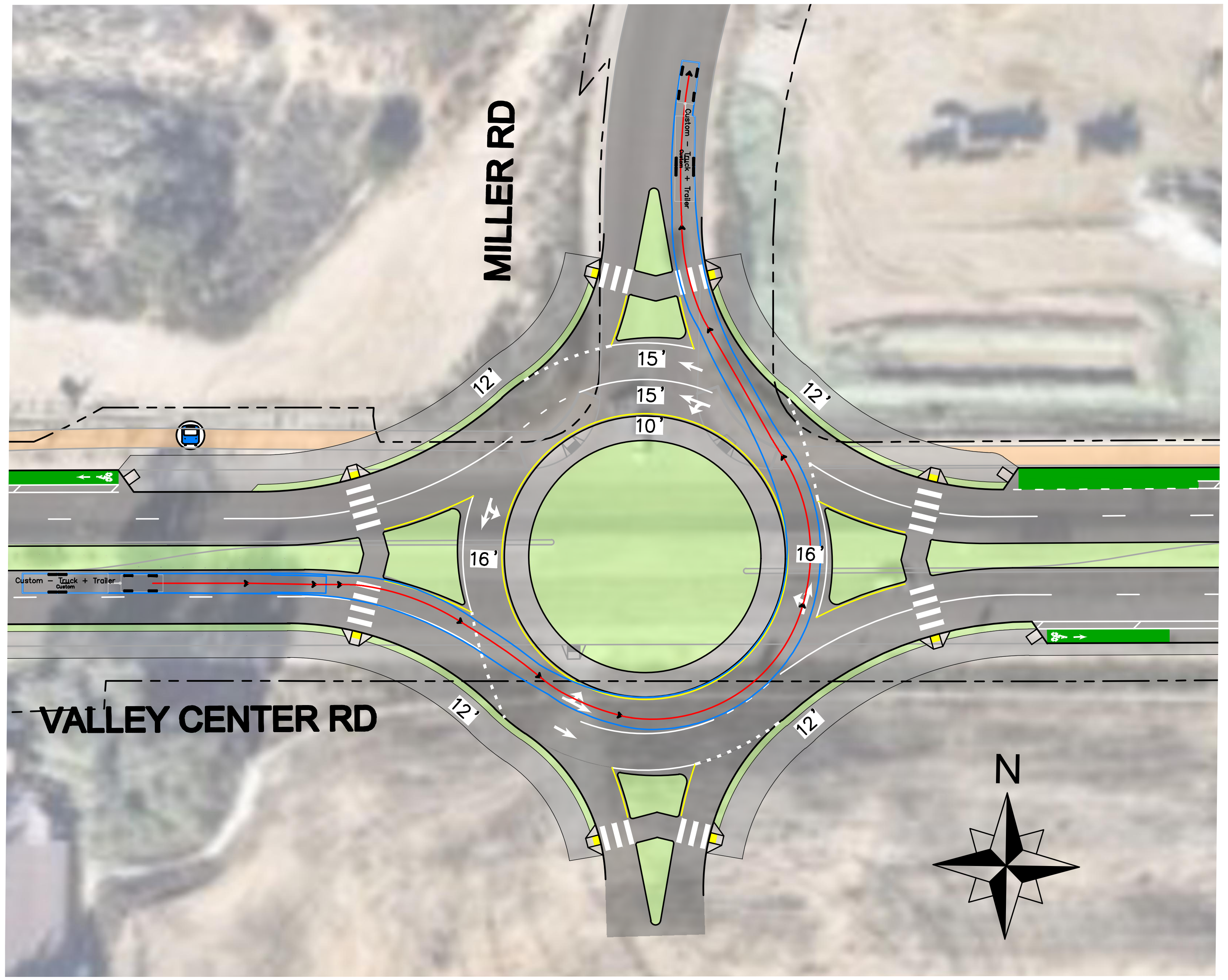
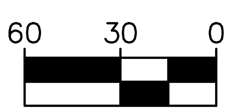
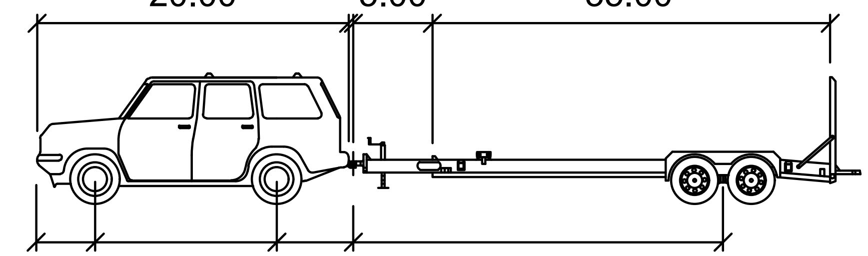




VALLEY CENTER RD – MILLER RD
TURN TEMPLATE



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

Exhibit S-3:

Roundabout Turn Template: CalFire Truck with Trailer for Bulldozer

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

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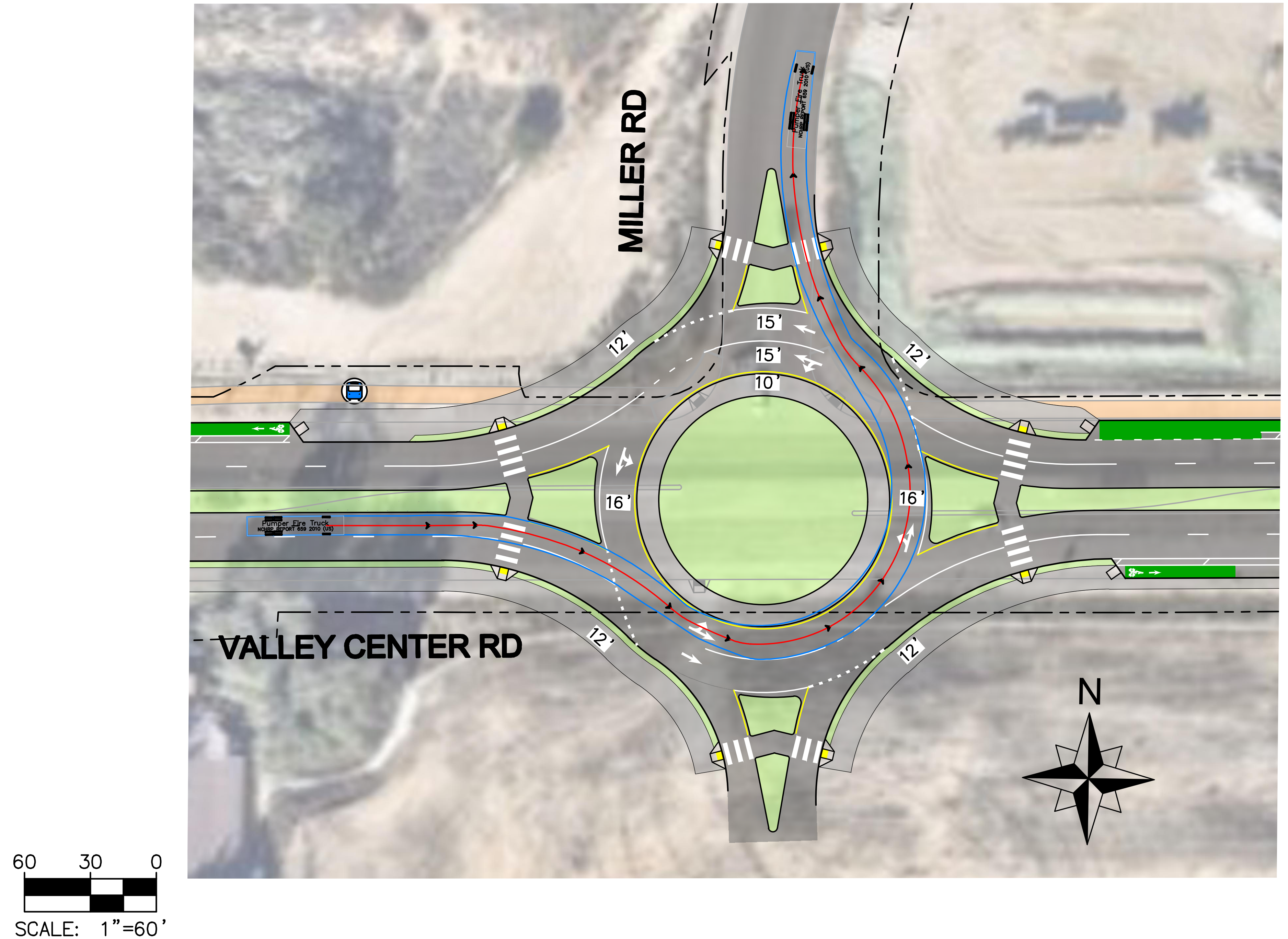
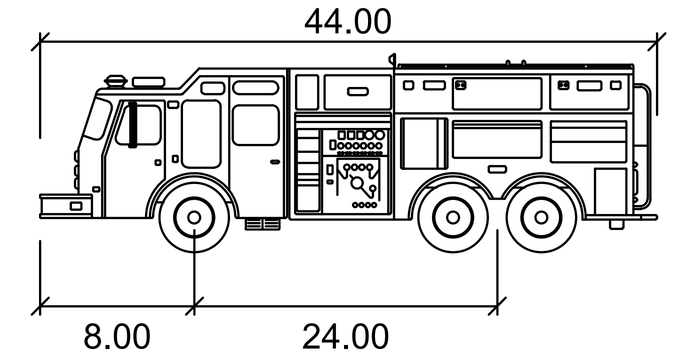
VALLEY CENTER RD – MILLER RD TURN TEMPLATE





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	Traffic Signal	7.5 - A	9.0 - A	Traffic Signal	7.5 - A	9.0 - A
2-	Valley Center Road / Mirar De Valle Road	STOP	29.7 - D	**45.2 - E**	Traffic Signal	11.4 - B	13.2 - B
3-	Valley Center Road / Park Circle Way [3]	Traffic Signal	3.4 - A	3.7 - A	Traffic Signal	3.4 A	3.7 A
4-	Valley Center Road / Sunday Drive	STOP	26.7 - D	**51.7 - F**	Traffic Signal	4.2 - A	4.7 - A
5-	Valley Center Road / Old Road	STOP	26.1 - D	30.1 - D	Traffic Signal	5.4 - A	5.6 - A
6-	Valley Center Road / Lilac Road	Traffic Signal	17.5 - B	13.5 - B	Traffic 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	Traffic Signal (condition of private development)	6.4 - A	6.6 - B
9-	Valley Center Road / Cole Grade Road	Traffic Signal	31.3 - C	33.5 - C	Traffic 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.

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	Traffic Signal	7.8 - A	10.0 - A	Traffic Signal	7.8 - A	10.0 - A
2- Valley Center Road / Mirar De Valle Road	STOP	**42.5 - E**	**70.8 - F**	Traffic Signal	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
4- Valley Center Road / Sunday Drive	STOP	32.7 - D	**72.9 - F**	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
6- Valley Center Road / Lilac Road	Traffic Signal	26.7 - C	20.5 - C	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
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
9- Valley Center Road / Cole Grade Road	Traffic Signal	42.2 - C	47.7 - D	Traffic 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.