

FOUR CORNERS INTERSECTION

REDESIGN UPDATES

December 2022

FEHR  PEERS

Project Context

Why are we studying this intersection?



Topography and roadway alignment create sightline issues



The intersection is a key route to West Marin and has high traffic volumes on weekends and sunny days



Most visitors are not familiar with the area and can be confused by the current striping



Previous restriping work has not achieved desired improvements in traffic flow

What are we doing today?

Provide project updates and discuss design alternatives

- Existing conditions and design considerations
- Evaluated Design Alternatives:
 - Two Way Stop Control
 - All-way Stop Control
 - Traffic Signal
 - Roundabout



Existing Conditions

Two way stop controlled (no stop for northbound and southbound traffic on Panoramic)

Roadway grade on southbound, eastbound, and westbound approaches



Existing Conditions

- Northbound Panoramic: misaligned lanes appear to create confusion for drivers
- Southbound Panoramic: vehicles encroach on far-side hatching, higher-than-posted travel speeds
- Eastbound Muir Woods: vertical depression impacts sightline across intersection



Northbound approach (Panoramic Highway)



Westbound approach (Muir Woods Road)

Design Considerations

Maintain Operations

Minimize delays that may result from the design



Sight Lines

Ensure drivers can see other vehicles, cyclists, pedestrians



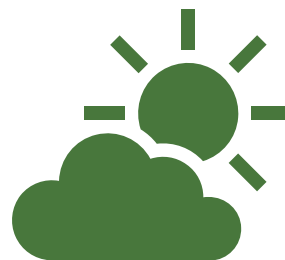
Speed

Slow speeds by designing for the posted speed limit



Clarity

Reduce confusion by improving alignment and striping



Safety

Improve the safety for all road users



ALTERNATIVES

Alternatives Evaluated

Not Pursued after Evaluation

All Way Stop Control

Determined AWSC would not be effective due to higher speeds on Panoramic Hwy, volumes on Muir Woods Road and Sequoia Valley road, and road geometry

Signalized Intersection

Conducted a signal warrant analysis based on California standards and determined that the intersection does not meet the warrants for a traffic signal

Alternatives Recommended for Conceptual Design

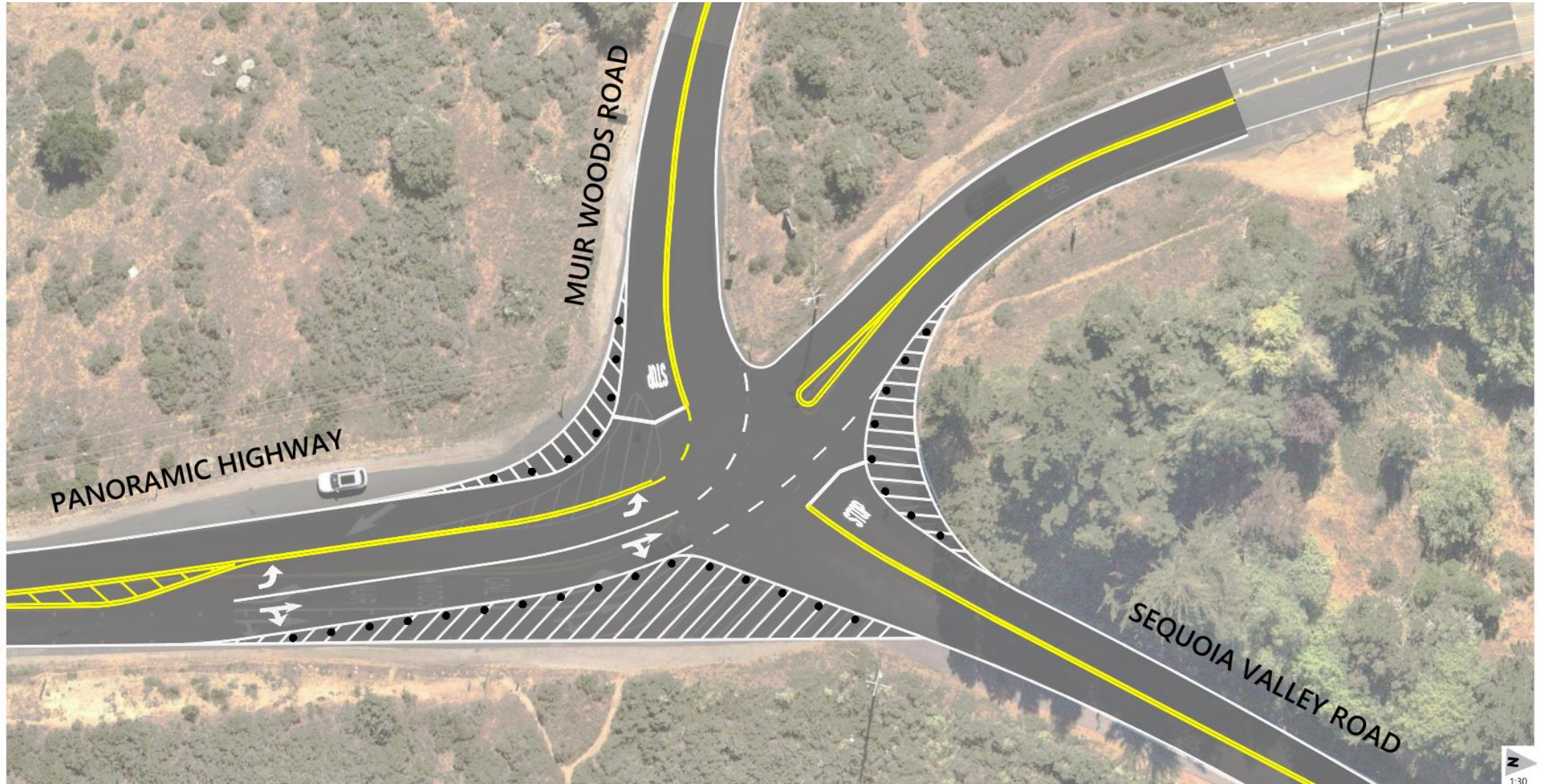
Two Way Stop Control

Realign striping to increase the clarity and safety of the intersection while maintaining the existing operations

Roundabout

Evaluate the feasibility of installing a roundabout

Two Way Stop Control



Two Way Stop Control


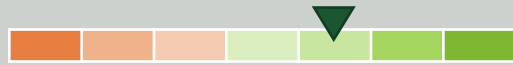





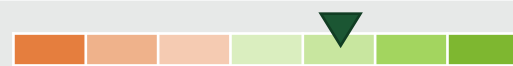



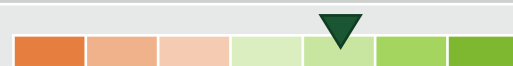



Current Conditions



TWSC Alternative

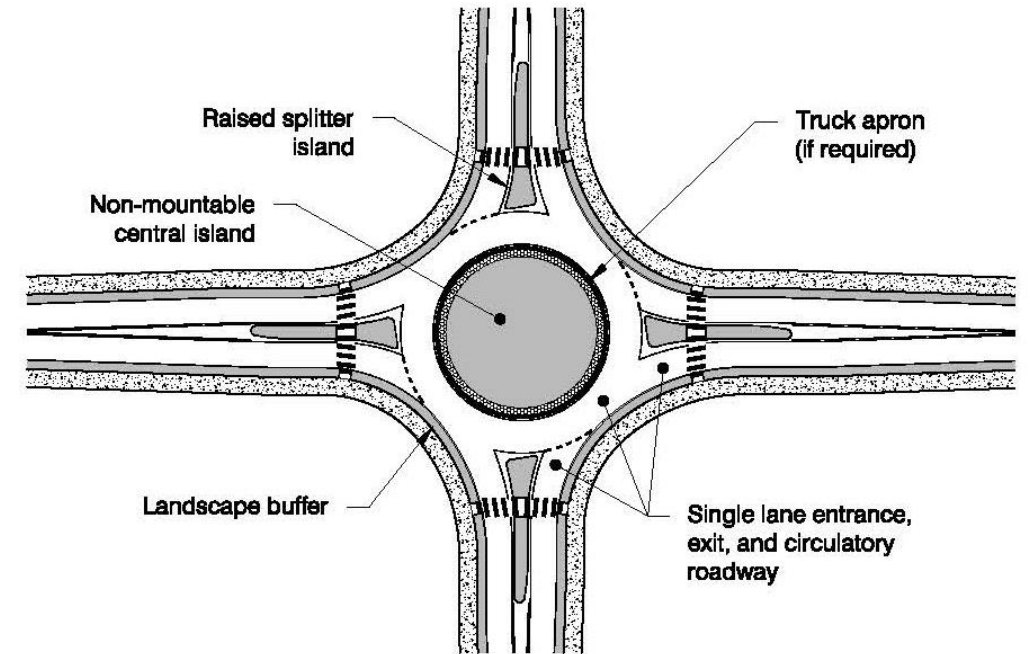
Two Way Stop Control Performance Compared to Baseline

	Delay	 <p>Significantly Worse No Change Significantly Better</p>
	Queue	
	Volume vs. Capacity	
	Pedestrian and Bicycle Comfort	
	Transit Accommodation	
	Safety Improvement	
	Construction Cost	<p>\$\$\$</p>

Why are we considering a roundabout?

How they work:

- Circular intersection with yield control, splitter islands on approaches, and roadway curvature that reduces vehicle speeds
- Different than a neighborhood traffic circle, which are used to calm traffic on local/residential streets
- Naturally slows vehicle speeds while still efficiently moving traffic through the intersection



NCHRP Report 672



Bend, Oregon



Coralville, Iowa

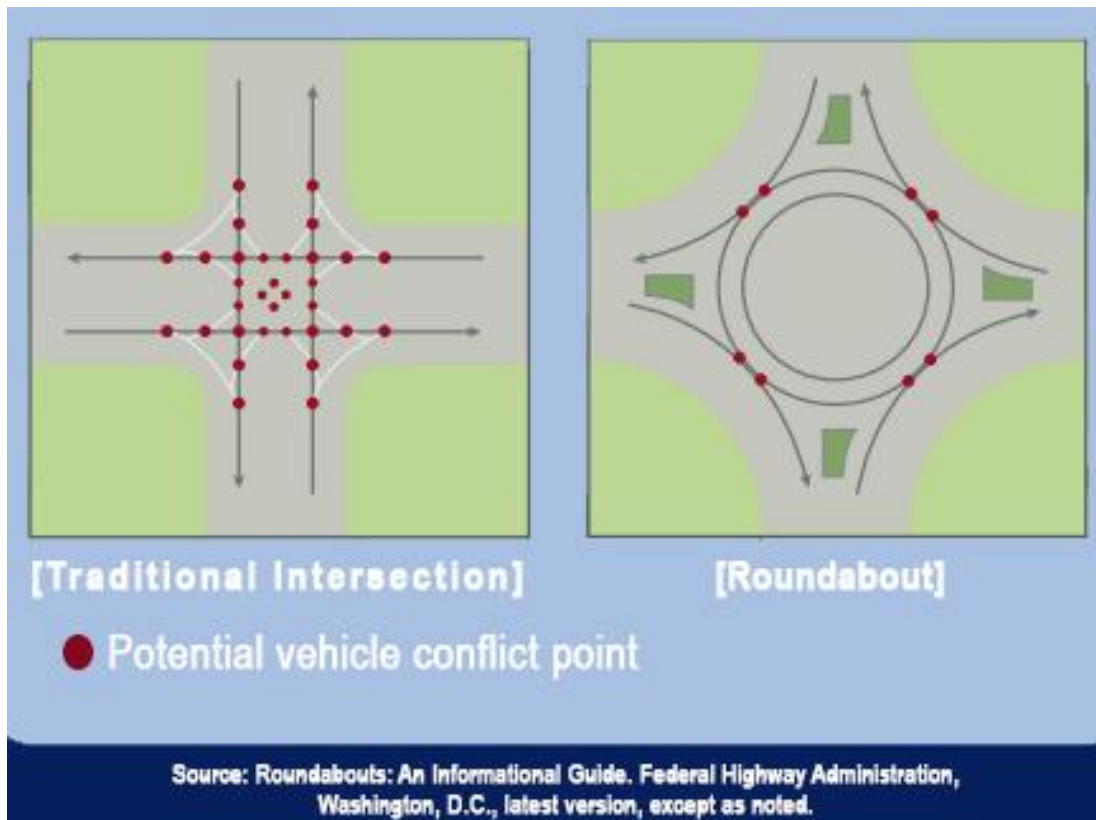


Truckee, California



Ladera Ranch, California

Why are we considering a roundabout?



Benefits:

- Reduces the number of potential conflict points by 75%
 - 90% reduction in fatalities
 - 76% reduction in injuries
 - 35% reduction in all crashes
- Encourages drivers to slow down when entering the intersection
- Efficient traffic flow, typically decreases delay
- Reduces pollution by requiring fewer stops and hard accelerations

Roundabout FAQs

How will this work for large vehicles?

- Roundabouts are designed using a “design vehicle” to ensure large vehicles can navigate them
- Truck aprons provide extra space for trucks that cannot make the turn in the driving lane



Roundabout FAQs

National guidance views **roundabouts as complementary to emergency response** helping to save lives

How will this impact emergency vehicles, like fire trucks?

- Truck aprons and design vehicles ensure that emergency vehicles can navigate the roundabout
- Roundabouts reduce stop and go nature of an intersection, which increases the efficiency of the intersection for first responders

What is a Roundabout?
A roundabout is a type of circular intersection, but is quite unlike a neighborhood traffic circle or large rotary. Roundabouts have been proven safer and more efficient than other types of circular intersections.

Educational Resources
Wisconsin Guidance on Reacting to Emergency Vehicles in Roundabouts
<https://wisconsin.dot.gov/Documents/safety/safety-eng/roundabouts/be-emergencyveh.pdf>
Minnesota DOT Roundabout Animation
www.dot.state.mn.us/roundabouts/emergency.html
Washington State DOT Videos on Roundabouts and How to Drive Them
<https://www.youtube.com/watch?v=P3k65u5S-EE>
<http://www.youtube.com/watch?v=MywmtskFfil>
British Columbia MOT Video on Navigating a Roundabout with Emergency Vehicles
<https://www.youtube.com/watch?v=TK9n1uV68LE>

Strengthening Partnerships
Incorporating EMS into Strategic Highway Safety Plans
<http://safety.fhwa.dot.gov/hsp/hsp/ems/connection/>

For More Information
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To learn more about roundabouts, please visit:
safety.fhwa.dot.gov
Publication number FHWA-SA-14-098 Updated July 2020

Safe Roads for a Safer Future
Investment in roadway safety saves lives

On average, roundabouts reduce severe crashes – those resulting in injury or loss of life – by 78-82%

Highway Safety Manual American Association of State Highway and Transportation Officials, Washington, DC, 2010.



Federal Highway Administration: Roundabouts & First Responders

Roundabout FAQs

Can the roundabout be smaller?

- It's important to maintain a large central island to establish sufficient deflection around the circle to slow vehicles

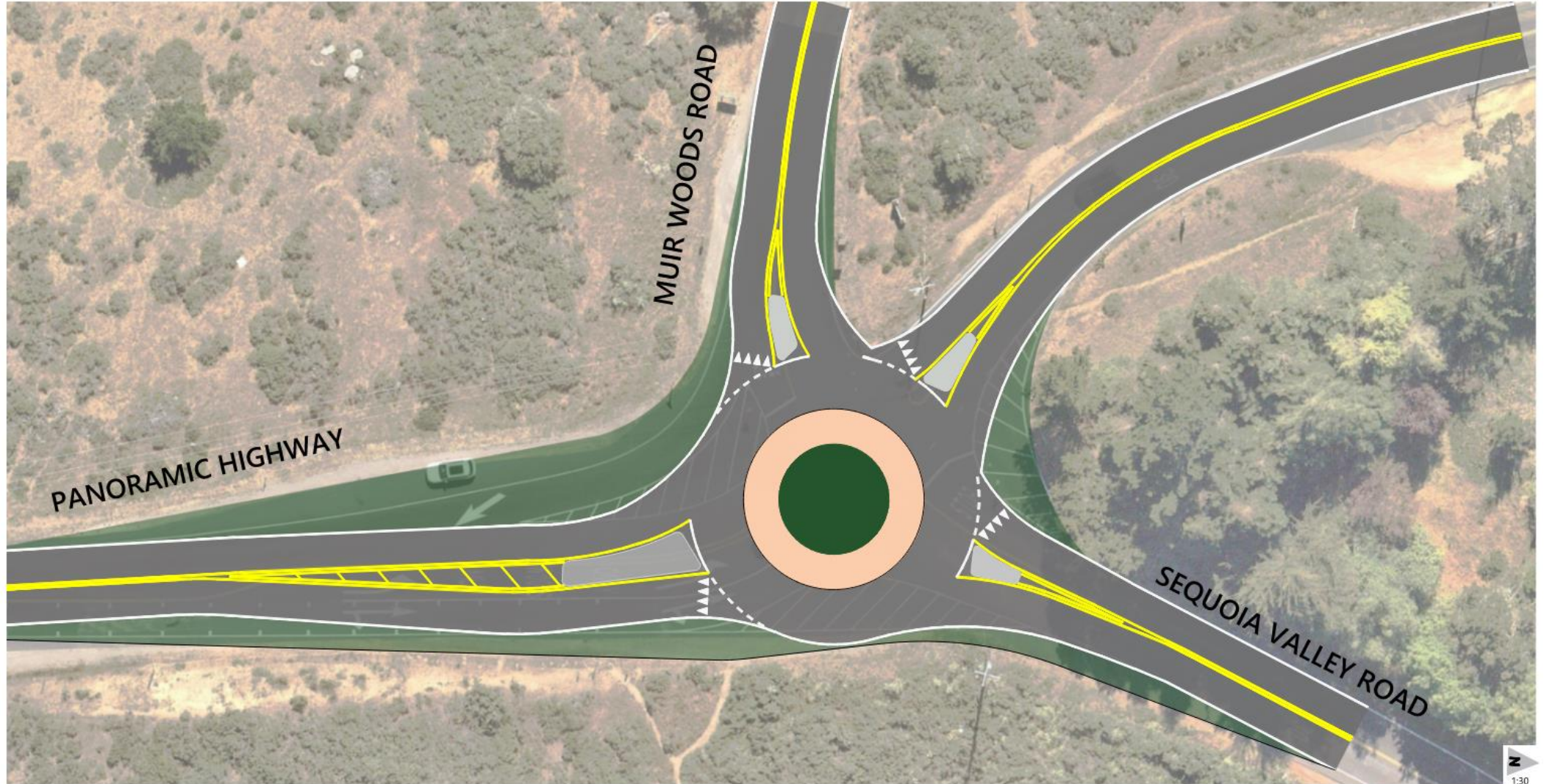
How will this impact bikes and pedestrians?

- Vehicle traffic through the roundabout is slow, allowing cyclists to safely travel in the lane
- Pedestrian safety is also improved with slower vehicle traffic



Source: Virginia Department of Transportation

Roundabout



Roundabout



Current Conditions




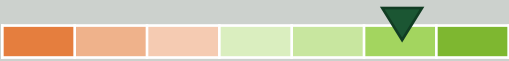

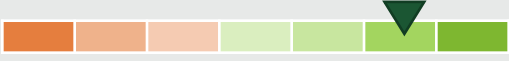

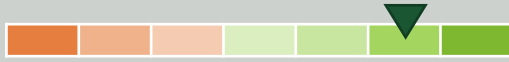

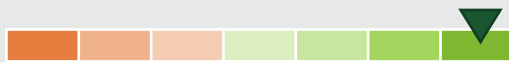



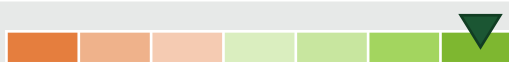

Roundabout Alternative

Roundabout



Roundabout Alternative

Roundabout Performance Compared to Baseline

	Delay	 <p>Significantly Worse No Change Significantly Better</p>
	Queue	
	Volume vs. Capacity	
	Pedestrian and Bicycle Comfort	
	Transit Accommodation	
	Safety Improvement	
	Construction Cost	<p>\$\$\$</p>

Conclusion

- The roundabout greater potential to reduce risk of collisions and slow vehicle speeds while maintaining operations and transit access
- Two way stop control slightly improves safety while maintaining operations and transit access

Short-Term Recommendation:

Consider the two-way stop control improvements as a near-term and lower-cost solution

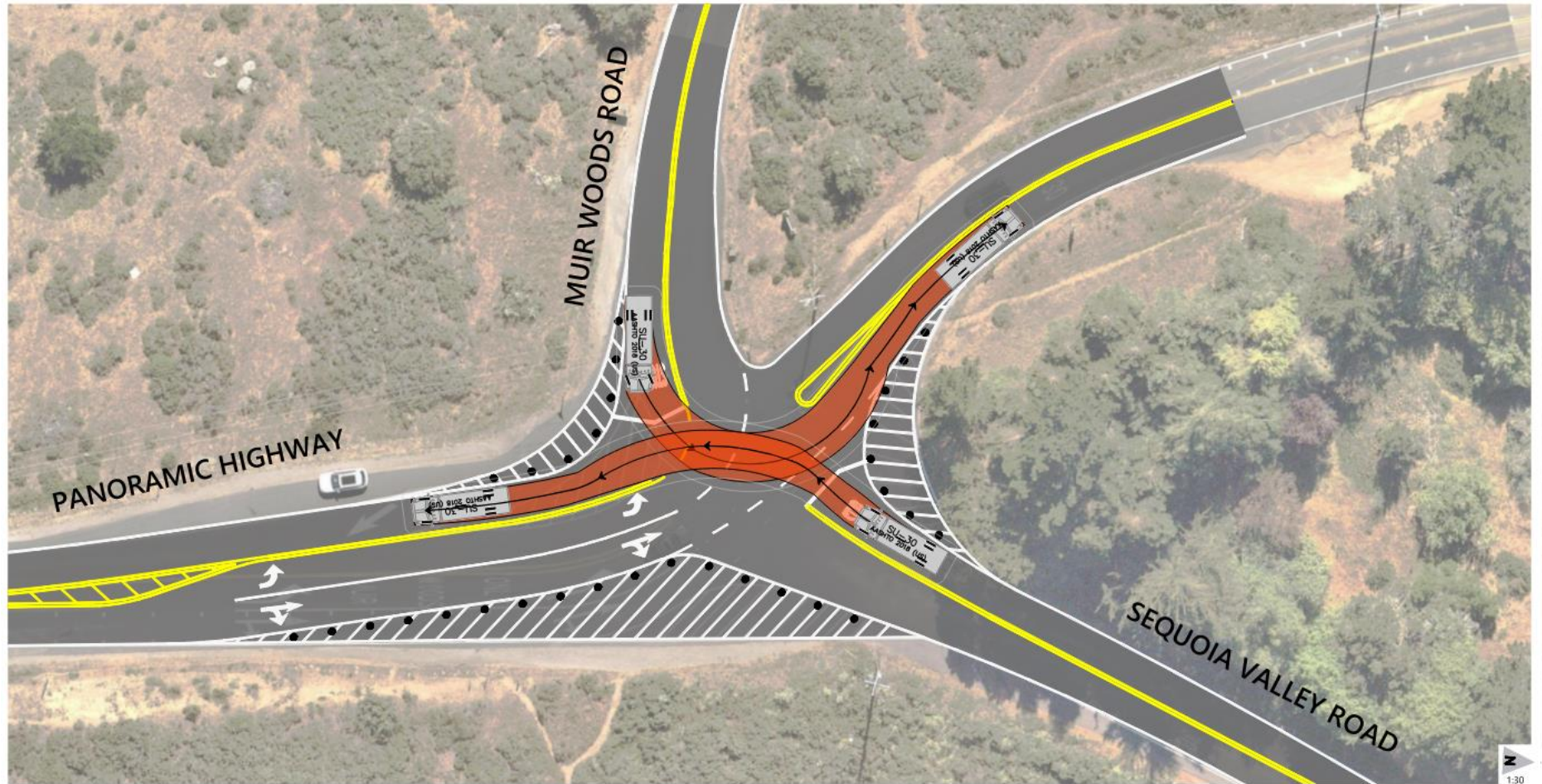
Long-Term Recommendation:

Consider the roundabout as a long-term solution with further analysis, design, and community engagement

Questions/Discussion

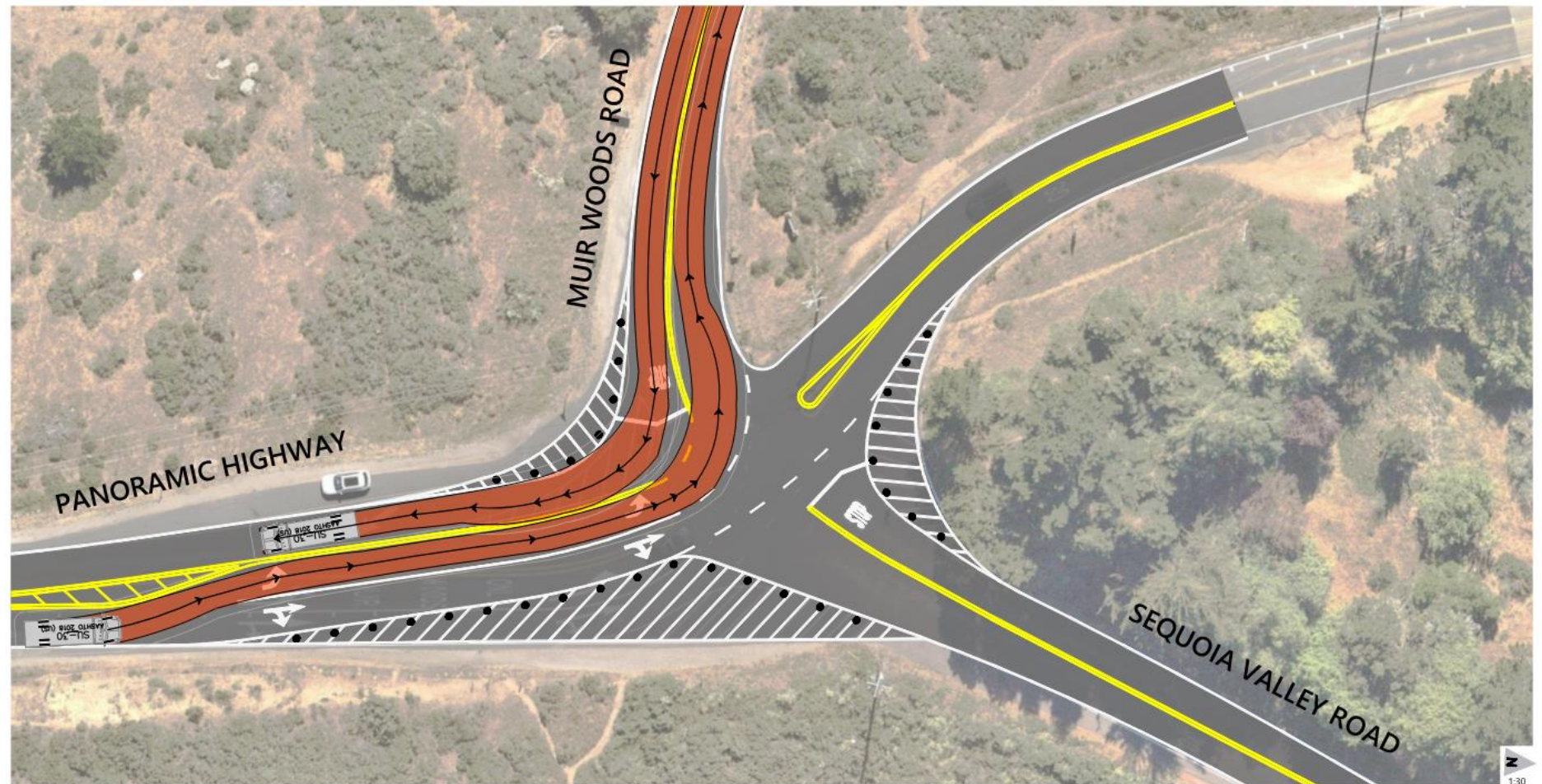
Appendix - Turning Templates

TWSC - Truck Left Turns



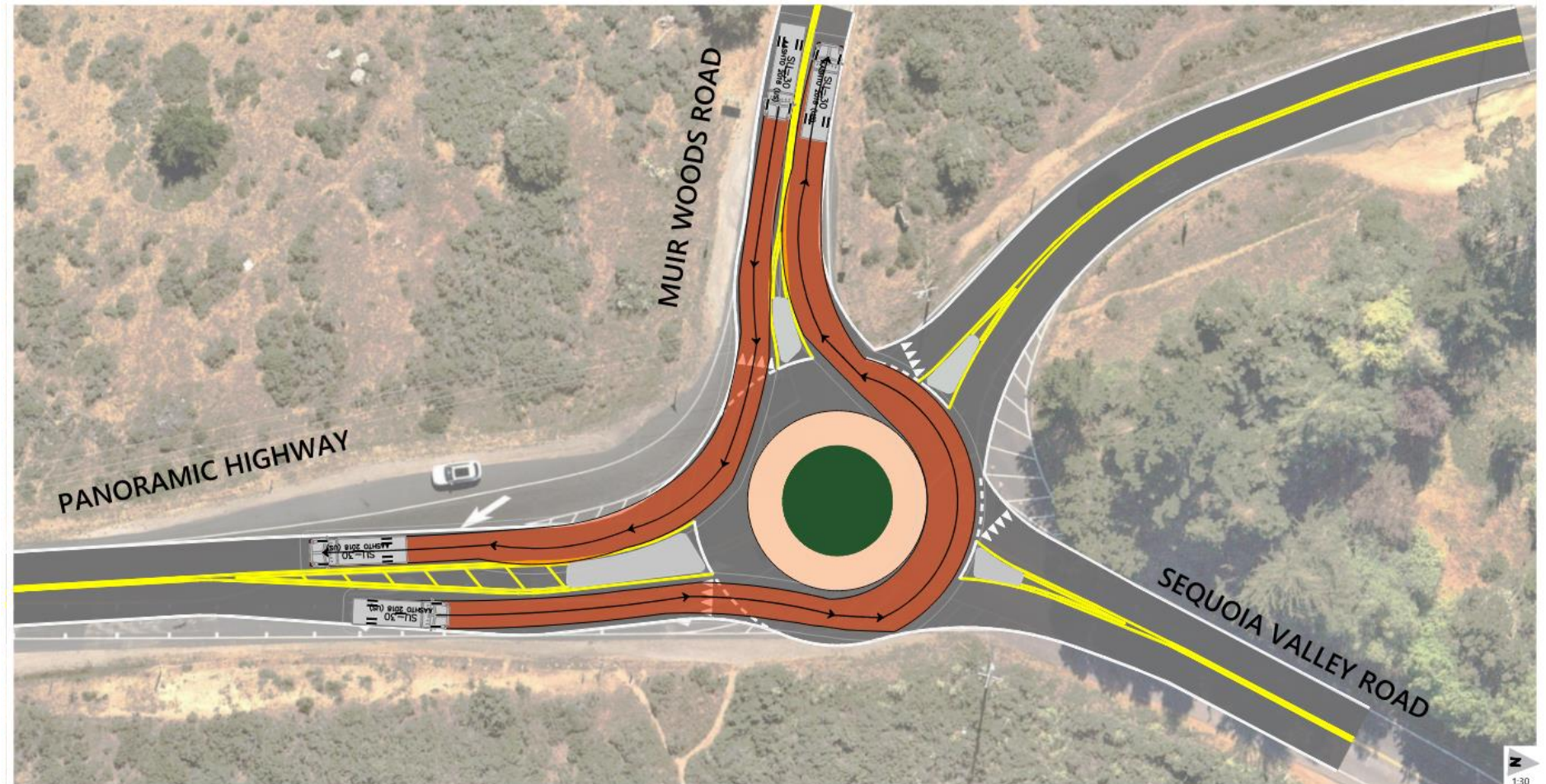
Appendix - Turning Templates

TWSC - Shuttle Access



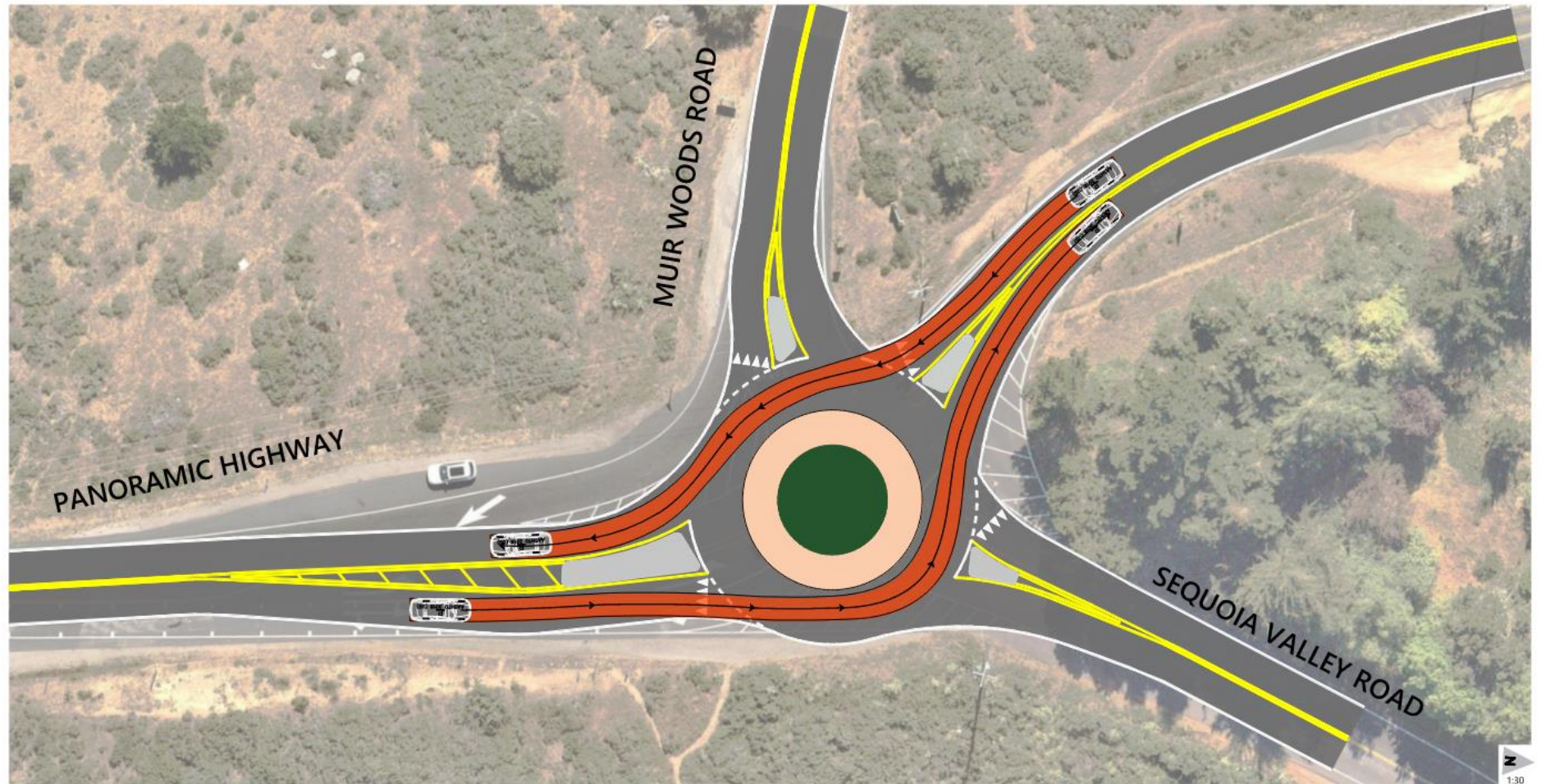
Appendix - Turning Templates

Roundabout - Shuttle Access



Appendix - Turning Templates

Roundabout - Passenger Through Movements



Appendix - Turning Templates

Roundabout – Bus Through Movements

