



Memorandum

To: City of Alameda

From: CDM Smith

Date: October 11, 2021

Subject: Conceptual Design of Encinal/Sherman/Central Roundabout

Per the direction of the Alameda City Council at the April 20, 2021 meeting, this memorandum presents the results of additional investigations and design activities focused on improving the functionality of the proposed roundabout at the Encinal Ave./Sherman St./Central Ave. intersection. Multiple configurations were developed and evaluated, each of which would require the acquisition of right-of-way (ROW) space to provide the improved function of a northbound through movement on Sherman St. Due to the costs and amount of time required for such acquisitions, these alternative are not feasible within the current project's scope and schedule in consideration of the federal grant funding requirements. Implementation of any alternative requiring ROW acquisition would need to be completed as a separate future project.

Based on the results of extensive evaluations, including review and input from multiple independent national level roundabout experts, the "Slip Lane" configuration, as described in detail below, is the design team's recommendation as the best option for this difficult location.

Background

At the April 20th meeting, City Council approved a concept that includes a right turn slip lane from northbound Sherman St. to east-bound Encinal Ave. Due to the limited ROW space, a roundabout that provides for a northbound through movement on Sherman St. was considered infeasible at the time; however, City Council directed the project team to investigate ROW acquisitions that could potentially allow for the Sherman St. northbound through movement.

This memorandum first provides a brief overview of the existing conditions and safety concerns at this intersection, then discusses the design objectives and presents the alternative roundabout configurations and the pros and cons of each.

Existing Conditions

The existing condition features a complex five-legged intersection with four travel lanes on Central Avenue (west of the intersection) and Encinal Avenue (east of the intersection), Sherman St. as a residential collector street, and two travel lanes with designated bike lanes on Central Ave. east of the intersection (Figure 1). The intersection is signalized with split phasing to accommodate and control this unique configuration. Safety issues include missing pedestrian and bicycle crossings, no bicycle facilities, a large intersection area with significant undelineated space, and high travel speeds along with travel

time delays at the traffic signal. Central Avenue west of Sherman St. and Encinal Avenue east of Sherman St. are part of State Route 61 at this location and are under Caltrans jurisdiction.

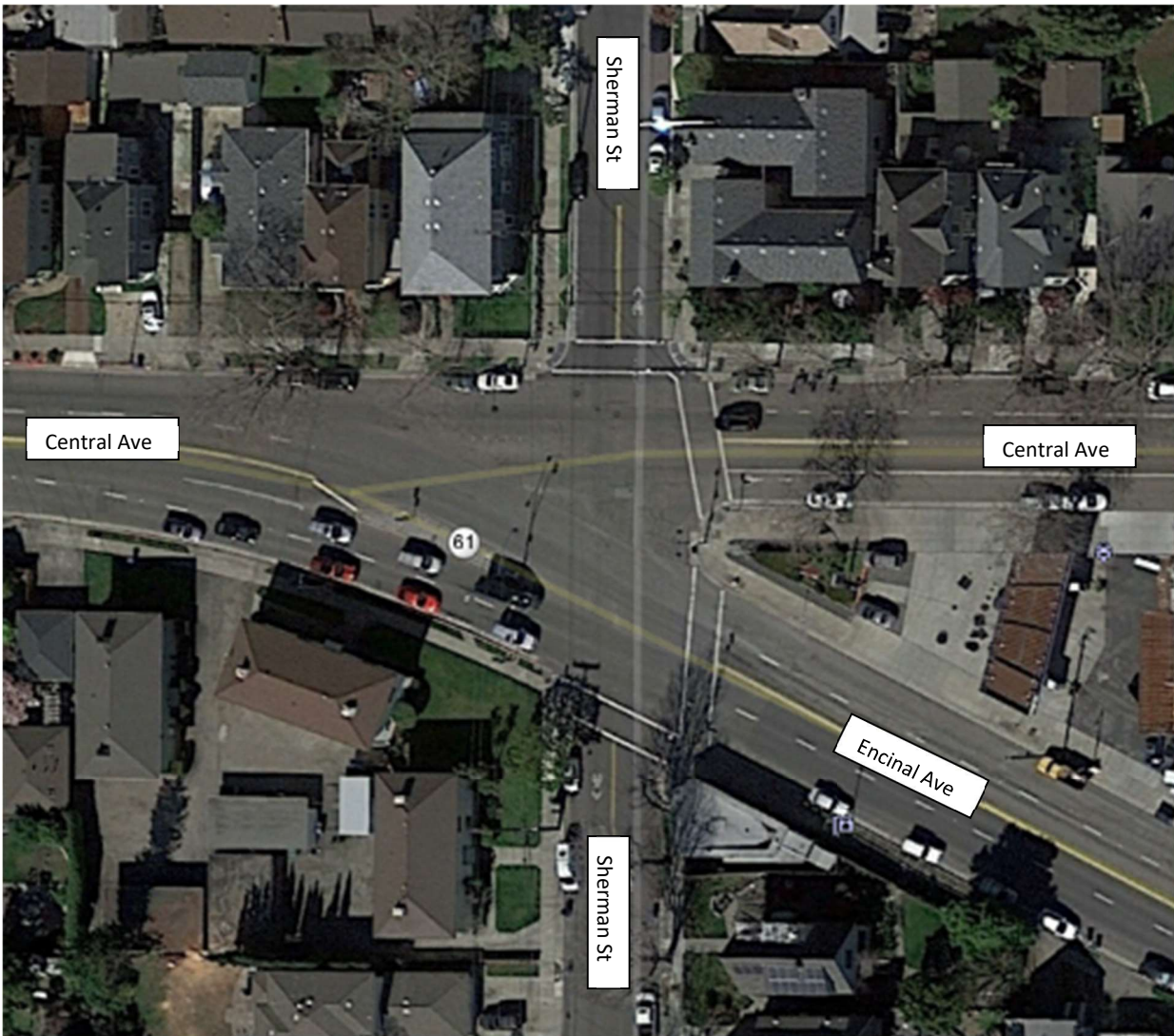


Figure 1: Existing conditions at the Central Ave./Encinal Ave./Sherman St. intersection

Pre-covid traffic counts from 2018 were used to develop the traffic volumes in the AM and PM peak hours for the intersection which occur at 7:30 AM to 8:30 AM and 5 PM to 6 PM, respectively. Historical traffic count data from two separate years were compared to derive growth rates, which were then applied to the 2018 data to estimate 2020 volumes. The resulting 2020 traffic volumes for all turning and through movements at the intersection are shown in Figure 2 below.

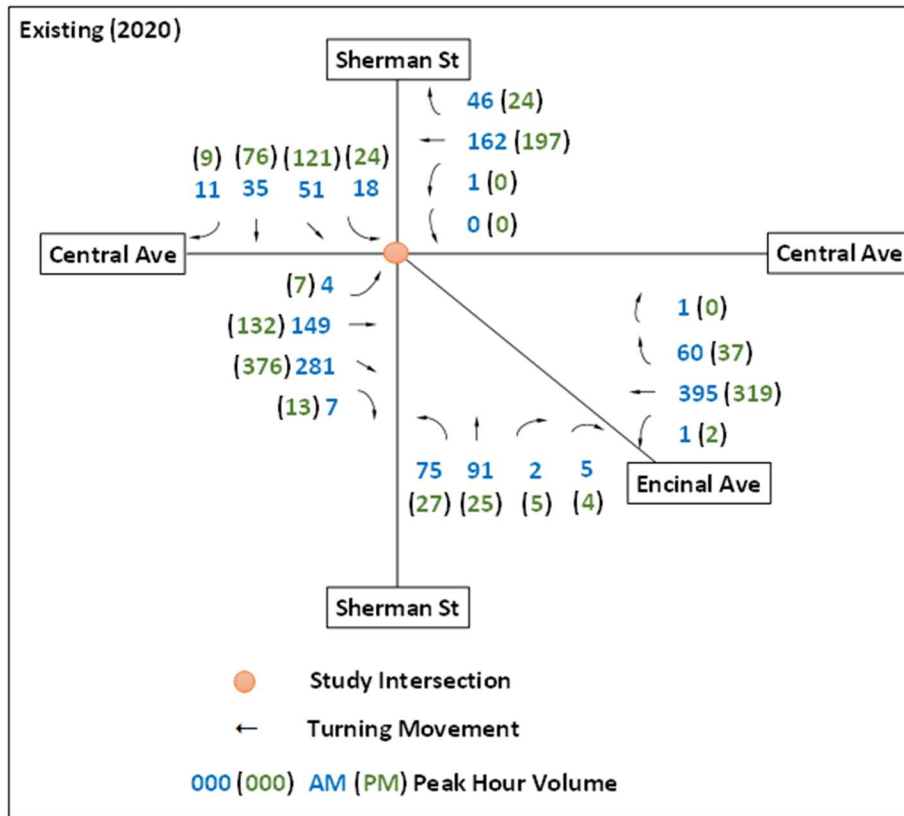


Figure 2 – 2020 AM and PM Peak Hour Traffic Volumes

Pedestrians crossing on the crosswalks and bicycles traveling on each approach were also counted as part of the 2018 counts for the intersection. The pedestrian and bicycle volumes in the AM peak hour (7:30 AM to 8:30 AM) and PM peak hour (5 PM to 6 PM) for the intersection are shown in Tables 1 and 2.

Table 1 Pedestrian Volumes by Crosswalk Leg

	North End	Northeast End	Southeast End	South End	West End
AM	13	22	16	11	0
PM	13	11	8	8	0

Table 2 Bicycle Volumes by Approach

	Eastbound (Central Ave)	Westbound (Central Ave)	Northbound (Sherman St)	Southbound (Sherman St)	Northwest bound (Encinal Ave)
AM	5	13	8	5	3
PM	3	2	4	6	1

Proposed Alternatives

To address the safety issues, improve traffic operations, and provide connectivity and accessibility for all users, the project team has proposed installing a roundabout at this location. The National Cooperative Highway Research Program's (NCHRP) Report 672¹ (NCHRP, 2010) was used as the primary design guidance for the roundabout.

The optimal configuration will address a variety of issues and challenges including:

- Improving safety for all users
- Accommodating larger vehicles such as emergency, freight, trash collection and transit vehicles
- Meeting Caltrans design requirements for a state facility
- Improving accessibility for all users
- Minimizing tree removal and parking losses
- Avoiding private property acquisition
- Improving traffic operations

The design team considered a variety of roundabout configurations that attempt to balance various needs as outlined above with safety as the main priority. Since this project is in a confined environment, compromises are necessary to achieve project goals and to maximize safety for all users. For example, shifting the roundabout to maintain full north/south access on Sherman St. creates other issues such as the need for property acquisitions, reduced or shared bike/pedestrian facilities, and/or exceptions to generally accepted design guidance. It is important to note that all of the roundabout alternatives represent a major safety improvement to the existing signalized intersection.

Fully Functional Alternatives

For the purposes of this discussion, the term “fully functional” indicates that the roundabout provides for all turning and through movements for each of the five legs of the intersection. All of the fully functional alternatives that were considered would require the acquisition of additional ROW space.

As shown in Figure 3 below, a fully functional configuration would be possible with two relatively small acquisitions from two privately owned parcels (gas station on the east side and the southwest corner parcel). Nevertheless, this configuration would also create the following safety issues:

- Increased potential for vehicle-to-vehicle conflicts between northbound Sherman St. vehicles entering the roundabout or turning right onto Encinal Ave. and vehicles exiting the roundabout onto Encinal Ave. Vehicles waiting to enter the roundabout from the south leg of Sherman St. may obstruct sight distance for vehicles making the right turn movement from Sherman St. onto Encinal Ave. This issue could be improved with additional ROW acquisition from the parcel on the southeast corner, and would likely also require removal of the building on that parcel.
- Increased potential for vehicle-to-pedestrian/bike conflicts for pedestrians and bikes using the crosswalk on the eastbound lane of Encinal Ave. The crosswalk location is to the south/east of

¹ Transportation Research Board, National Cooperative Highway Research Program's (NCHRP) Report 672. National Academies of Sciences, Engineering, and Medicine. 2010. *Roundabouts: An Informational Guide – Second Edition*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/22914>.

the northbound Sherman St. lanes and the associated splitter island. Vehicles waiting to enter the roundabout or waiting to make the right turn from Sherman St. to Encinal Ave. may obstruct pedestrian sight distance for vehicles exiting the roundabout onto Encinal Ave.

- Slightly increased pedestrian route distances crossing Encinal Ave. and the south leg of Sherman St.
- Higher than desired speed movements through the roundabout include:
 - Westbound Encinal Ave. to northbound Sherman St.
 - Westbound Central Ave. (east leg) to Central Ave. (west leg)
 - Eastbound Central Ave. to Encinal Ave.

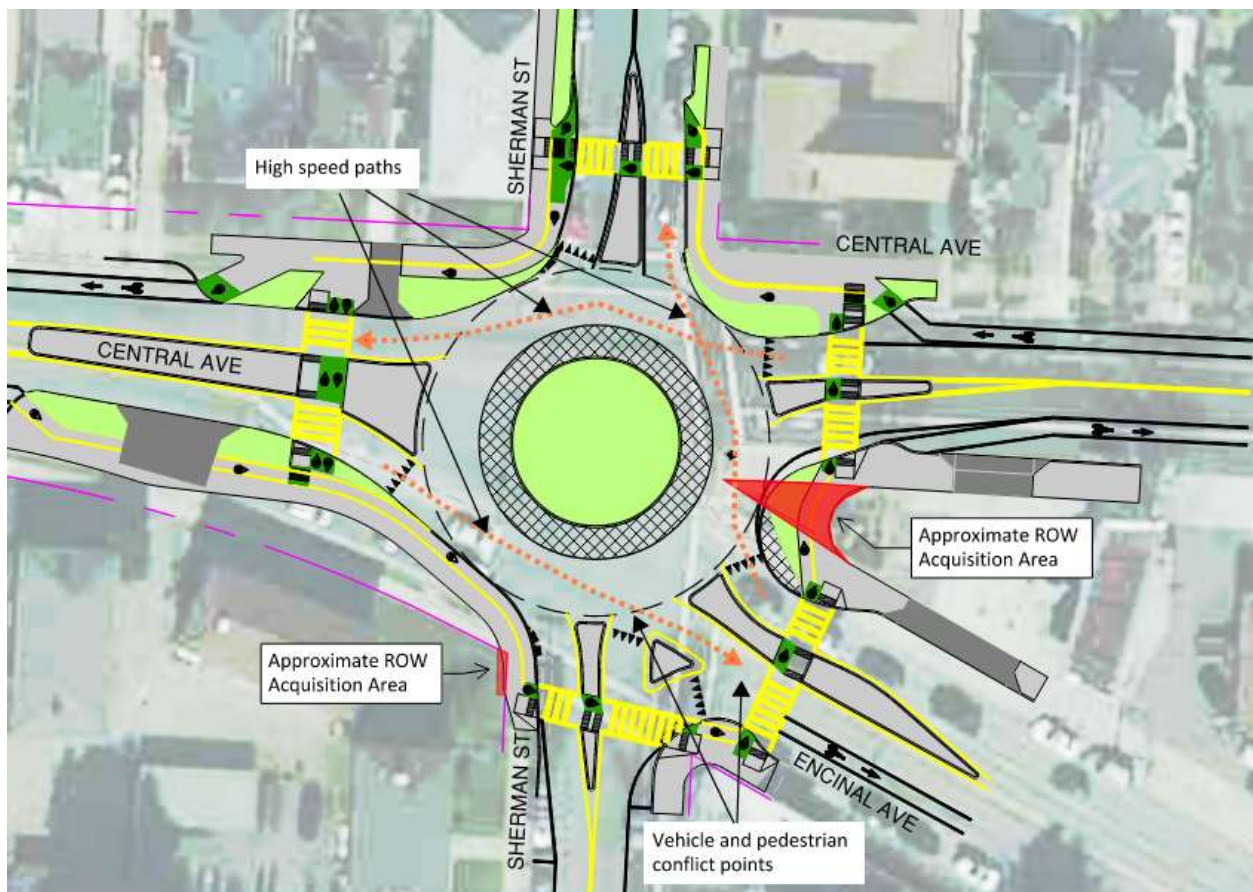


Figure 3: Fully functional roundabout with the least ROW acquisition needs.

Additional alternatives for a fully functional 5-legged roundabout design that meets all of the NCHRP 2010 design criteria and addresses the concerns listed above were also considered. These configurations would require a much more significant realignment of the southern leg of Sherman St. and extensive

ROW acquisition including multiple building structures on either the west or east side of the southern leg of Sherman St. One example, showing the scale of acquisition and reconstruction, is provided in Figure 4 for informational purposes.



Figure 4: Fully functional roundabout meeting all design guidance

Slip Lane Alternative

The approved “Slip Lane” option utilizes a circular roundabout positioned to provide safe crossings, sightlines, and buffers to all road users while avoiding the need to acquire additional ROW space and complying with the generally accepted design guidelines. As shown in Figure 5, the concept includes a right turn from northbound Sherman St. to eastbound Encinal Ave. via a slip-lane, but does not allow for the northbound through movement on Sherman St.



Figure 5: Recommended “Slip Lane” alternative

The Slip Lane alternative provides additional safety measures and is more compliant with the accepted roundabout design guidelines. This alternative provides all of the turning and through movements, except northbound on Sherman St. Due to the surrounding gridded street layout, multiple alternative routes exist which may result in minor travel delays for users travelling this route. Based on the traffic volume data presented in Figure 2, less than 3 cars per minute would be required to divert either east or west during the AM peak hour.

The Slip Lane configuration also has additional benefits over the fully functional alternative including:

- Reduced complexity with a more traditional roundabout design is consistent with driver expectancy and reduces vehicle-to-vehicle and vehicle-to-ped/bike conflicts.

- Shorter pedestrian and bicyclist route distances
- Improved pedestrian and bicyclist safety – locating the slip lane to the south/east of the Encinal Ave. crosswalk allows vehicles to use the slip lane without obstructing pedestrian sight distance for vehicles exiting the roundabout onto eastbound Encinal Ave.
- Improved parking capacity
- Does not require ROW acquisition

Conclusion

The roundabout configurations that provide the full functionality of all through and turning movements are not considered feasible under the current cost and schedule constraints associated with the project funding sources. The additional ROW acquisitions required for these configurations would result in schedule delays and the loss of federal grant funding for this project. They also are less compliant with generally accepted design guidance for roundabouts.

The Slip Lane alternative provides additional safety benefits and, therefore, is recommended by the design team. Furthermore, the Slip Lane alternative would allow the City to proceed with the federally funded Central Avenue Safety Improvement project without risk of losing funding due to the required right-of-way acquisitions, which could take years to complete.