The First Modern Roundabout Plan in San Leandro, California

(MacArthur Blvd / Superior Ave Roundabout Project)

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ABSTRACT

The intersection of MacArthur Boulevard/Superior Avenue/Foothill Boulevard in San Leandro, California, is currently controlled by stop signs; traffic from Foothill Boulevard of the City of Oakland and Superior Avenue has to stop while traffic along MacArthur Boulevard does not. High speed I-580 off-ramp traffic approaching the intersection has caused collisions involving vehicles hitting a townhouse building. Due to traffic conditions, Foothill Boulevard and Superior Avenue traffic experience significant wait times during commute hours. The collision rate is over three times higher than the statewide average.

Through a 2005 Metropolitan Transportation Commission (MTC) Traffic Engineering Technical Assistance Program (TETAP), San Leandro collaborated with California Department of Transportation (Caltrans) and the Oakland to conduct a Roundabout Feasibility Study.

Studies showed that a roundabout would yield the most improvement in traffic flow compared to other options that were analyzed, including the installation of traffic signals. This will be the first roundabout to be installed in San Leandro. BKF Engineers was hired to design the project. BKF also completed the conceptual plan for the roundabout in 2019.

City conducted community outreach meetings to educate the citizens of the roundabout concept and get their feedbacks. City and consultants have integrated citizens' comments by adding bicycle and pedestrian accessibility into the roundabout design.

Due to limited right-of-way, City has collaborated with Caltrans and Oakland to acquire additional space for the project. A draft three party-agreement is in the progress. The design will be completed in 2019, and the roundabout construction is anticipated in two to three years.

1. INTRODUCTION

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1.1 BACKGROUND

San Leandro is located in San Francisco's East Bay area. The City is noted for its shoreline area, fine schools, and affordable housing. The City has a population of 84,950, and contains approximately fifteen square miles.

The City of San Leandro (City) requested a Traffic Engineering Technical Assistance Program (TETAP) project for the 2005 Funding Cycle form the Metropolitan Transportation Commission (MTC). City seek a feasibility study of a roundabout at the MacArthur Boulevard/Superior Avenue/Foothill Boulevard intersection to improve the intersection traffic safety and operations

The intersection showed some unique traffic and roadway characteristics that have caused traffic safety concerns for years.

- Traffic exiting from I-580 westbound Foothill Boulevard off-ramp joining with one-way northbound MacArthur Boulevard traffic is heading directly to the intersection if the traffic doest not take the Foothill Boulevard. The traffic is allowed to make U turns (to continue onto MacArthur Boulevard southbound) but not left turns onto Superior. The high speed exiting traffic is inconsistent with traffic coming from all other approaches.
- Movements of eastbound Superior Ave and southwestbound Foothill Blvd are offset. Right-of-way can be confused when traffic on MacArthur Boulevard is heavy. The problem would exasperate when the driver's sightline on either side street is blocked by vehicles parking on MacArthur Blvd.
- The southbound MacArthur Boulevard movement splits into two movements immediately south of Superior. Motorists who are not familiar with the area are easily to get lost at the intersection.
- Five reported collisions occurred at the intersection between June 1, 20001 and May 31, 2004. Three of them were resulted from right-of-way violations and improper turn.
- San Leandro has been working with both Caltrans and Oakland to explore the possibility of improving the intersection for years. Unfortunately, there has been no funding sources for the intersection. Then on-going Phase-1 MacArthur Streetscape project in early 2000's would not have enough budget to address the traffic improvements at the intersection.

The 2006 TETAP Report prepared by Dowling Associates analyzed four alternatives as listed below:

- No Project Alternative
- Alternative 1 – Minimal Changes
- Alternative 2 – Modern Roundabout
- Alternative 3 – Signalized Intersection

The TETAP report eventually recommended construct Alternative 2, the modern roundabout. The safety benefits of a modern roundabout at most locations were often sufficient justification for constructing one. At this location, the collision rate was well higher than the statewide average for similar intersections, so there was an opportunity for significant improvement in this area. The site offers enough physical space to construct a roundabout. The construction cost would be probably slightly less than that of a traffic signal, and, without signal equipment, the ongoing maintenance costs would be less than for a signalized intersection.

In 2008, some preliminary geometric design and cost estimates were prepared. However, the project was put on hold due to inadequate resources.

In 2014, the project was restarted by City staff, and staff discussed the project with the City of Oakland and the California Department of Transportation (Caltrans) again. Caltrans requested an updated traffic study for updating outdated traffic data.

DKS Associates was retained by the City to eventually finish the traffic study by August 2015.

In 2016 City hired BKF to design the roundabout project. The purpose of the contract was to develop construction-ready plans, specifications and estimates (PS&E) for the roundabout project.

In 2017, City also retained W-Trans to conduct supplemental traffic analysis to support the proposed roundabout project. The purpose of the project was to evaluate the level of service and queuing for each of roundabout concept plans and to provide support on related roundabout issues.

During the design phase, City collaborate with BKF in conducting two public meetings to introduce the proposed roundabout project to citizens and obtaining their comments. City staff also seek feedbacks from Mayor and a couple of City Councilmembers through the Facility and Transportation Committee meetings. Mayor asked City staff to design a roundabout that could also accommodate bicycle and pedestrian traffic at the intersection.

To meet additional design requirements of bicycle and pedestrian modes, City has been in the process of negotiating with Caltrans and the City of Oakland to obtain additional right-of-way for the project.

2. DKS MacArthur Blvd / Superior Ave Roundabout Traffic Study

2.1 DKS Traffic Report Summaries

This report provides a general description of the transportation facilities in the Project vicinity and summarizes intersection level of service performance for Existing Condition, Existing Plus Project Condition (both Single Lane Roundabout and Signal Alternatives), Cumulative year 2040 (no Project), and Cumulative year 2040 plus Alternatives). Project Conditions (both Single Lane Roundabout and Signal Intersection operations were evaluated at the study intersection during the weekday AM (7:00 – 9:00 AM) and weekday PM (4:00 – 6:00 PM) peak periods for the following scenarios:

- Scenario 1: **Existing Condition**. Existing peak-hour volumes, lane geometry, and traffic control (i.e., side street stop controlled).

- Scenario 2: **Existing Plus Project Condition**. Existing volumes plus Project related changes to intersection geometry. This includes two separate alternatives; Single Lane Roundabout as well as a signalized traffic signal.

- Scenario 3: **Cumulative Year 2040, Baseline (No Project) Condition**. Existing peak-hour volumes plus forecasted growth derived from the Alameda County Countywide Travel Demand Model.

- Scenario 4: **Cumulative Year 2040 with Project Condition**. Cumulative Year 2040 Baseline Condition volumes plus Project related changes to intersection geometry. This includes two separate alternatives; Single Lane Roundabout as well as well as a signalized traffic signal.

2.2 DKS Traffic Report Conclusion

DKS evaluate three alternatives, including Alternative 0 (No Project); Alternative 1 (Traffic Signal); and Alternative 2 (Modern Single Lane Roundabout).

The study intersection satisfies three out of nine possible traffic signal warrants; the Four-Hour, Peak Hour and Roadway Network are satisfied. The satisfaction of a traffic signal warrant or warrants does not require the installation of a traffic control signal.

The intersection level of service analysis confirmed that either Alternative 1 or 2 would operate at Satisfactory levels of service under the existing plus project conditions as well as under expected cumulative (year 2040) conditions.

Either alternative 1 or 2 would enhance auto and pedestrian safety when compared with the no build alternative. Either alternative would also improve auto circulation by introducing previously unavailable turning movements.

Alternative 1 would not significantly change the number of available parking spaces at the study intersection. However, Alternative 2 would result in a net loss of six parking spaces along MacArthur Blvd.

A review of the concept plans for Alternative 2 shows that the preliminary design meets FHWA recommendations for stopping sight distance, fastest path speed curves, pedestrian and bicycle intersection, inscribed circle diameter, and design vehicle swept path. The review also confirmed the following elements would need further refinement during the design and construction phase of the project.

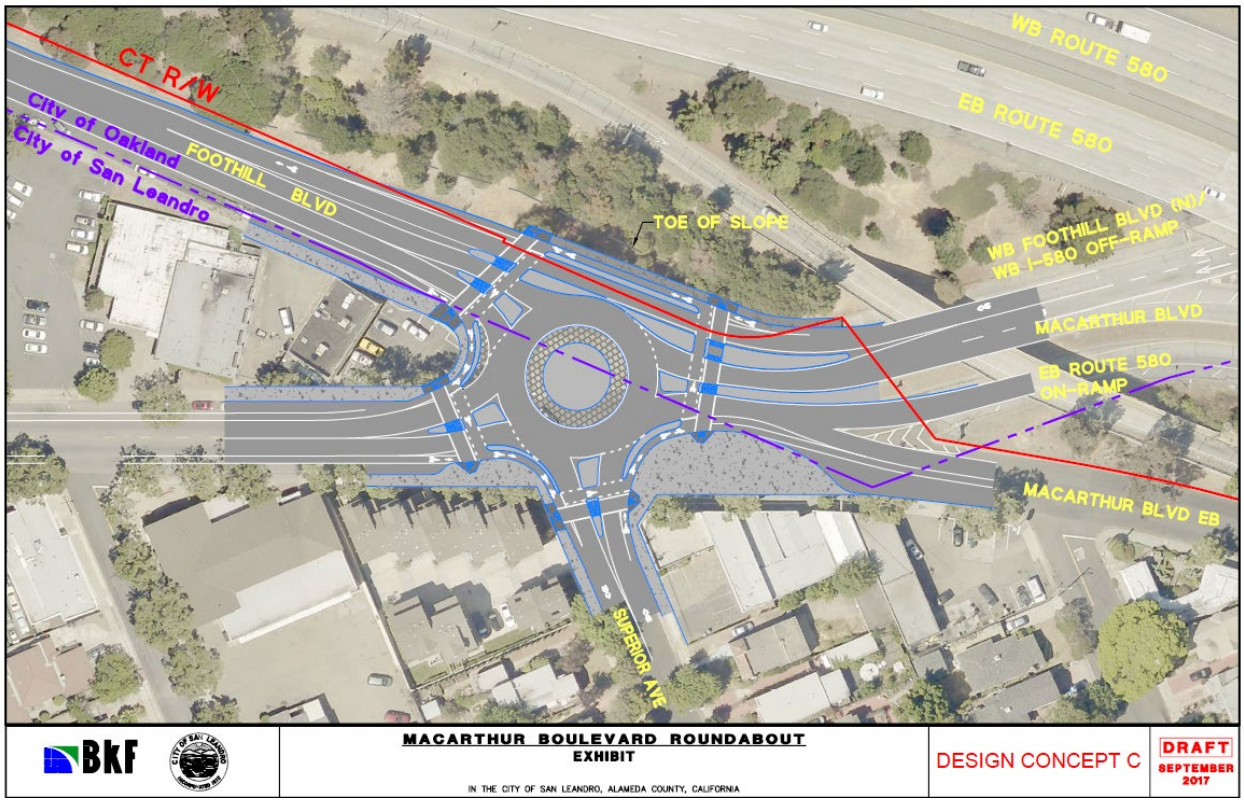
- A landscaped buffer with a width of two to five feet should be added to sidewalks during the final design and construction phase. This buffer would enhance safety by further separating pedestrians and traffic on the circulating roadway. This also creates an opportunity for aesthetic enhancements to be included with the project.
- The entry and exit widths vary from 12 to 18 feet whereas the FHWA recommends a minimum width of 15 feet.
- The swept path analysis confirmed that the WB-62 design vehicle cannot execute a right-turn from Foothill Blvd to westbound MacArthur Blvd without leaving the roadway surface and driving onto the median island. To mitigate this condition, DKS recommends signage along Foothill Blvd instructing truck operators that right turns onto MacArthur Blvd are prohibited.

3. W-Trans Further Traffic Evaluation

3.1 W-Trans Traffic Evaluation Descriptions

W-Trans prepared a traffic analysis to evaluate the developed roundabout alternative at the intersection of MacArthur Boulevard/Superior Avenue/Foothill Boulevard located on the border of the Cities of San Leandro and Oakland. This analysis continued the evaluation previously documented in the MacArthur Blvd/Superior Ave Roundabout Traffic Analysis, dated August 21, 2015 by DKS Associates and the Supplemental Traffic Analysis by W-Trans, dated September 1, 2017. The purpose of the task was to evaluate the latest design alternative (known as Concept C) for queuing and average vehicle delay.

At the time when the MacArthur Blvd/Superior Ave Roundabout Traffic Analysis was studied in 2015, there was only one roundabout concept being considered. The concept studied in the 2015 report was very similar to the Concept A that was evaluated in a memorandum. In the time between August 2015 and September 2017, another concept had been developed and has been identified as Concept B. Through community outreach, a third alternative was developed that was known as Concept C. This latest alternative was very similar geometrically to Concept A with the addition of dedicated bicycle paths and crosswalks. A copy of the preliminary layout drawing for Concept C is provided in here.



3.2 W-Trans Traffic Evaluation Summary

Analysis Summary

- Intersection levels of services for both the a.m. and p.m. peak hours was LOS B (or better) for the 2014, 2017 and 2040 analysis years.

- 95th percentile queue lengths along Superior Avenue and Foothill Boulevard would be less than 60 feet for the a.m. and p.m. peak hours during the 2014, 2017 and 2040 analysis years. The longest 95th percentile queue of 239 feet would occur in the year 2040 analysis during the p.m. peak hour at the eastbound approach from MacArthur Boulevard.

4. BKF Develops Construction-Ready Plans

4.1 BKF Project Descriptions

The purpose of this contract was to allow BKF to develop construction-ready plans, specifications and estimates (PS&E) for the roundabout conceptual plan. This project task is still in progress because negotiations with City of Oakland and Caltrans to obtain additional right-of-way for the project is still in progress.

5. Negotiations in Progress with Oakland and Caltrans

5.1 Ongoing Project Collaborations with Oakland and Caltrans

To meet additional design requirements of bicycle and pedestrian modes, City has been in the process of negotiations with Caltrans and the City of Oakland to obtain additional right-of-way for the project.

Per the latest discussions with Caltrans, the project will follow Caltran's Permit Engineering Evaluation Report (PEER) approval process. The additional right-of-way needed from the State will be purchased by the City of San Leandro and will be relinquished to the City of Oakland. Since San Leandro is not adjacent to the portion of State right-of-way to be acquired, Caltrans wants the new retaining wall to be within Caltrans right-of-way. The retaining wall will hold dirt from a freeway embankment. However, Caltrans also wishes the City of Oakland to maintain the wall because the land to the south of the retaining wall is supposed to be designated to the City of Oakland.

Based on a separate discussion with the City of Oakland staff in November 2018, an MOU may be established between San Leandro and Oakland for this project. The contractor will also need to obtain a permit from the City of Oakland prior to start of construction.

6. Project Cost and the Timeline

6-1 Project Cost Estimates and Timeline

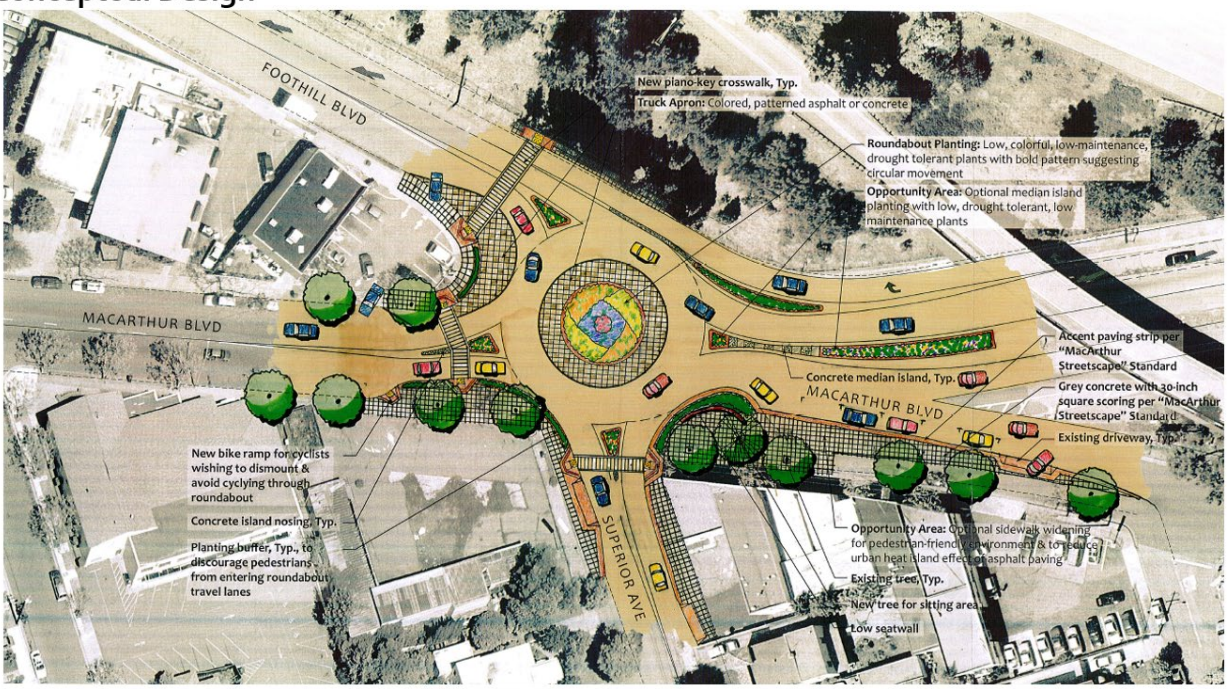
The total project will cost about $1.4 million dollars in which about $1 million is designated for the construction phase. Depending on the time required for the ongoing negotiation process with City of Oakland and Caltrans, City staff estimates the design of first modern roundabout at the MacArthur Blvd / Superior Ave will be completed in the late 2019 and additional two to three years from now for completing the construction.

REFERENCES

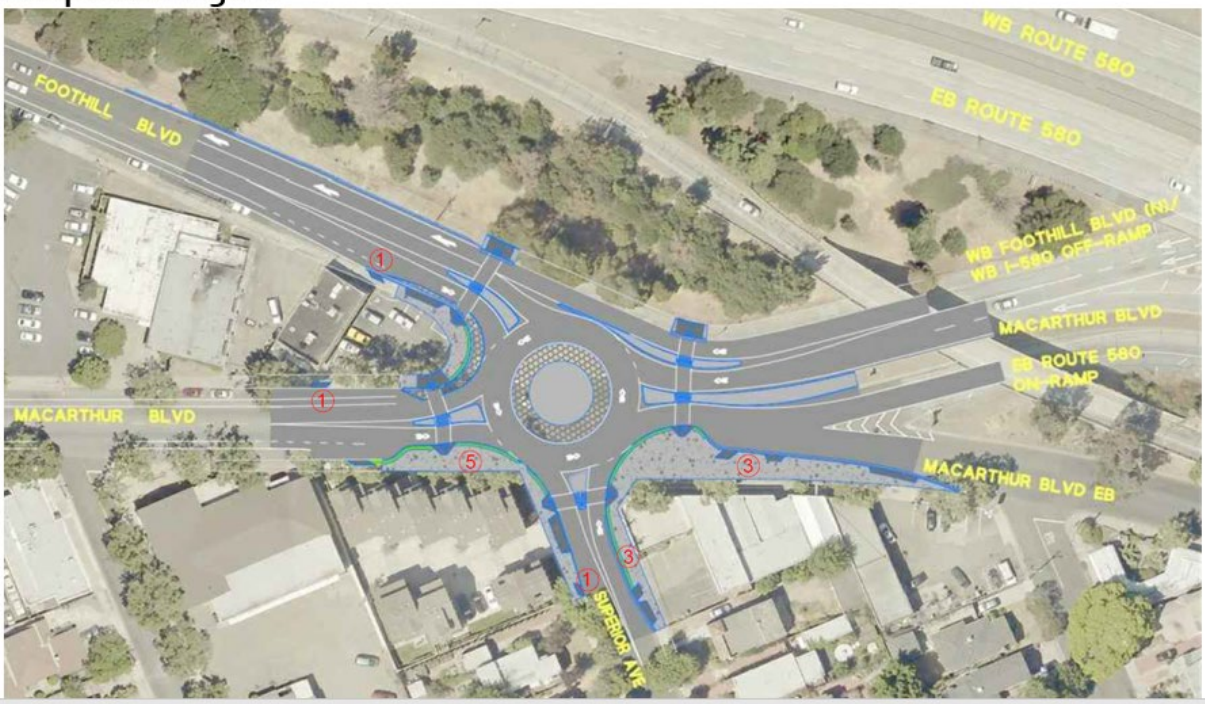
1. Dowling Associates, "Final Plan Report for: MacArthur / Superior / Foothill Intersection TETAP Project, February 14, 2006.
2. DKS Associates, "MacArthur Blvd / Superior Ave Roundabout Traffic Analysis," August 21, 2015.
3. W-Trans, "MacArthur Blvd/Superior Ave-Foothill Blvd Roundabout – Supplemental Traffic Analysis Concept C," July 20, 2018

Additional Plans for References:

Conceptual Design



Conceptual Design A



Conceptual Design B