



City of Santa Barbara California

PLANNING COMMISSION STAFF REPORT

REPORT DATE: February 26, 2015
AGENDA DATE: March 5, 2015
SUBJECT: Status Report on South Coast 101 HOV Lanes Project, Union Pacific Bridge Replacement, and Olive Mill Roundabout
TO: Planning Commission
FROM: Planning Division, (805) 564-5470, extension 4550
 Renee Brooke, AICP, Senior Planner *RLB*
 Rob Dayton, Principal Transportation Planner *RD*
 Daniel Gullett, Project Planner *DG*

I. PURPOSE

The purpose of this hearing is to provide a status report to the Planning Commission on the South Coast 101 High Occupancy Vehicle Lanes Project (HOV Project), the preliminary engineering for replacement of the Union Pacific Bridge at Cabrillo Blvd., and the intersection control evaluation of Olive Mill and Coast Village Road.

II. SOUTH COAST 101 HOV LANES PROJECT

Caltrans proposes to modify Highway 101 to provide a part-time, continuous access High Occupancy Vehicle lane in each direction on Highway 101 extending from Carpinteria Creek in the City of Carpinteria to Cabrillo Blvd. in the City of Santa Barbara. The project begins 0.22 miles south of the Bailard Ave. overcrossing in the City of Carpinteria and extends to the Sycamore Creek bridge in the City of Santa Barbara. The portion of the project within the City of Santa Barbara's jurisdiction is between the Sycamore Creek bridge and Olive Mill Road bridge.

At its board meeting on January 16, 2014, the Santa Barbara County Association of Governments (SBCAG) created three parallel projects in addition to the HOV Project including: the Union Pacific Bridge replacement at Cabrillo Boulevard, an intersection improvement project at Olive Mill/Coast Village Road/Highway 101 Ramps, and improvements to the San Ysidro Interchange. Additionally, the SBCAG Board directed that a consultant be hired to advise on the design and construction of the HOV Project. The Final Environmental Impact Report (EIR) for the HOV Project was certified by the Caltrans District 5 Director on August 28, 2014. Two legal challenges to the EIR certification were filed and the challenges will be heard in Santa Barbara County Superior Court.

SBCAG has retained Tony Harris of Point C Consulting as SBCAG's 101 Corridor Advisor. In December 2014, Tony Harris provided initial recommendations to the SBCAG Board for continued progress into the design phase of the HOV project. The recommendations, accepted

by the SBCAG Board, outlined a strategy to advance the project design to better define the project design for communicating with local agencies when it came to permitting construction segments, and make the project more competitive for funding and to assess alternative delivery methods. Mr. Harris indicated that advancing the project design to the 35% point would occur over the next 12 to 18 months and the work effort should be shared by SBCAG and Caltrans. SBCAG is expected to hire consultants to design the north end of the project and Caltrans would prepare the design for the south end of the project. Mr. Harris' team is developing the scope of services that will be used by SBCAG staff to prepare requests for proposals to hire design consultants and provide support services related to public outreach, coastal permitting, and hydraulic analysis for the various creeks. SBCAG staff anticipates bringing the various Requests for Proposals to the SBCAG Board in March 2015.

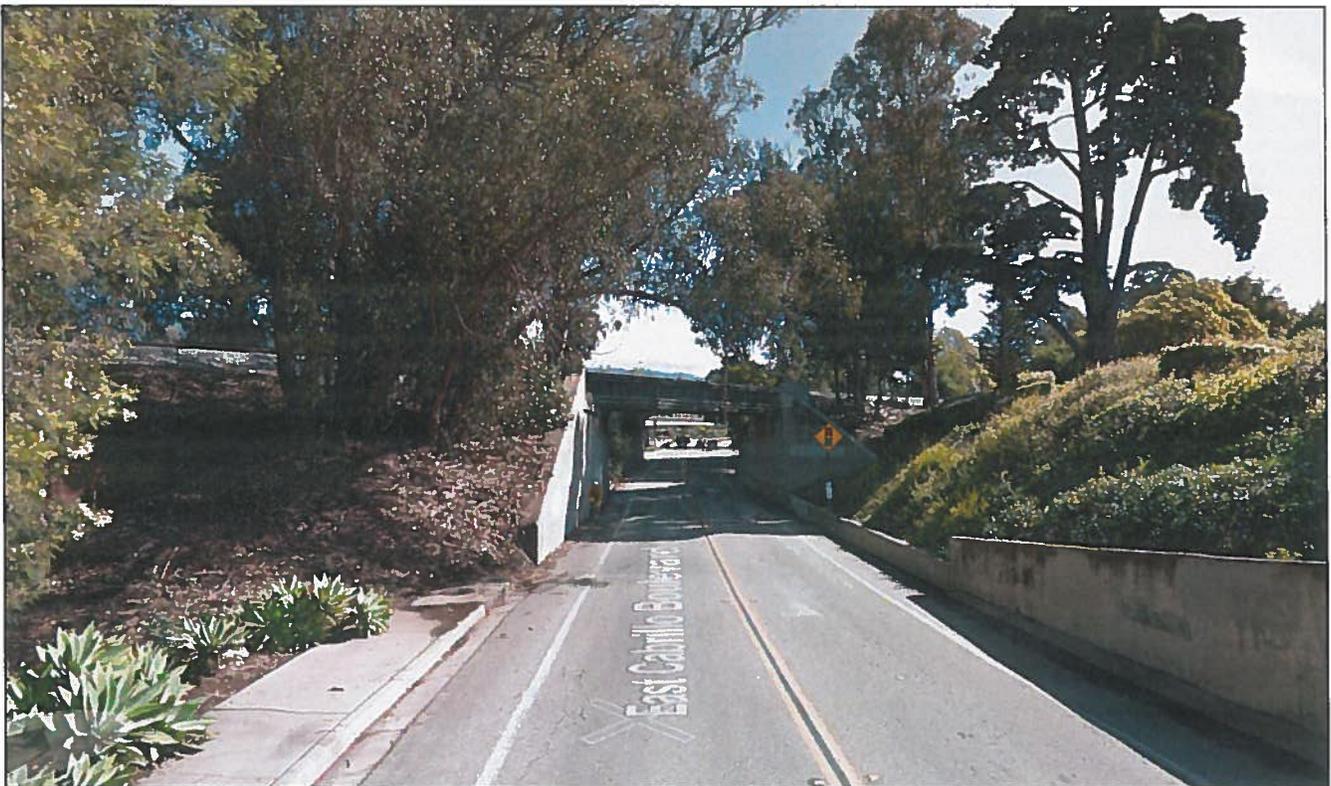


Figure 1: View of the Union Pacific Bridge from E. Cabrillo Blvd.

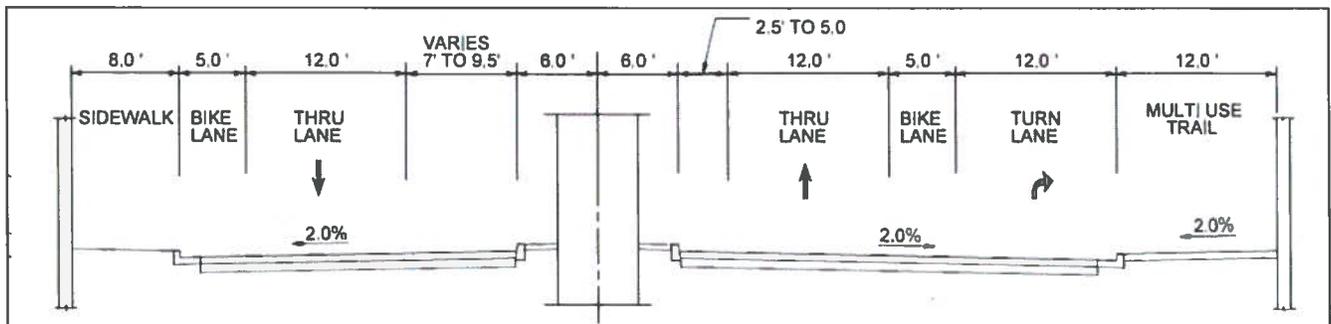


Figure 2: Proposed Bridge Cross Section

III. Union Pacific Bridge Replacement

The Highway 101 Operational Improvements Project (Milpas to Hot Springs) included construction of a new multipurpose beachway extending to either side of the Union Pacific Bridge and a new tunnel to provide a pedestrian and bicycle connection from Coast Village Road to the existing beachway along Cabrillo Boulevard. The beachway extension and tunnel were incorporated into the project to provide consistency with policies requiring multimodal public coastal access across Highway 101. Despite SBCAG's efforts, Union Pacific was ultimately unwilling to allow the tunnel due to structural concerns.

The pending South Coast 101 High Occupancy Vehicle Lanes Project (HOV Project) overlaps the Milpas to Hot Springs Project at the Cabrillo Boulevard interchange and would result in full reconstruction and reconfiguration of the interchange in a tight diamond configuration, superceding the Milpas to Hot Springs approval at the interchange. The HOV Project does not address the missing multimodal linkage along Cabrillo Boulevard or propose any changes to the Union Pacific Bridge. Replacement of the Union Pacific Bridge would provide required pedestrian and cyclist access through the interchange, and allow for a superior intersection design for motorists by providing a dedicated turn lane for the new southbound Highway 101 on ramp that would significantly improve traffic flow.

With the attached Memorandum of Understanding (Exhibit B), SBCAG agreed to provide funding to the City for preliminary engineering design for a replacement Union Pacific Bridge, recognizing that the best long-term improvement to Cabrillo Boulevard includes bridge replacement. On May 6, 2013, the City retained HDR Engineering, Inc. (HDR) for the preliminary engineering design for the bridge replacement. In coordination with Caltrans staff, and in anticipation of a tight diamond configuration for the Cabrillo Boulevard interchange with the HOV Project, the replacement bridge was designed to accommodate two 12-foot-wide travel lanes, a 12-foot-wide right turn lane for the southbound freeway on ramp, a 12-foot-wide multipurpose trail, two five-foot-wide bike lanes on Cabrillo Boulevard, and two tracks for Union Pacific.

The City submitted the concept design to Union Pacific in March 2014 and received a response in November 2014. The City had requested design exceptions to have a 15.5 foot vertical clearance under the bridge rather than the standard 16.5 foot clearance and to use a shoofly to the north as a permanent track alignment. Union Pacific denied those two design exception requests. SBCAG and Caltrans also provided comments on the bridge replacement design. The HDR Engineering Final Summary Report from December 2014 is attached as Exhibit C.

Staff will return to the Planning Commission for a concept review of the bridge replacement after addressing comments from the agencies and receiving written approval on the design from Union Pacific. Staff anticipates that the concept review will be held about a year from now. SBCAG staff identified \$2.5 million of funding available, which can be used for the next phase of environmental and engineering for the bridge replacement.

The Cabrillo Boulevard interchange and the vicinity of the Union Pacific Bridge are addressed specifically in the Local Coastal Plan in the following policies:

LCP Policy 10.3. Any proposed changes to the Cabrillo Blvd. /Hot Springs Road/Coast Village Road interchange shall recognize the historical significance of the Cabrillo Boulevard area and shall avoid to the greatest degree possible changes in the appearance, context, or function of Cabrillo Boulevard and the surrounding area.

LCP Policy 10.4. Any proposed changes to the Cabrillo Blvd. /Hot Springs Road/Coast Village Road interchange shall minimize changes to the location, setting or context of the C.C. Park Watering Trough and Fountain.

Other City goals, policies and guidelines related to Union Pacific Bridge replacement and the Olive Mill Roundabout are attached as Exhibit D. Although the Santa Barbara Highway 101 Coastal Parkway Design Guidelines strictly apply to improvements within the Caltrans right of way in the City's Coastal Zone, they should be considered with the review of both the Union Pacific Bridge replacement and the Olive Mill Roundabout.



Figure 3: Olive Mill/Coast Village Road Intersection

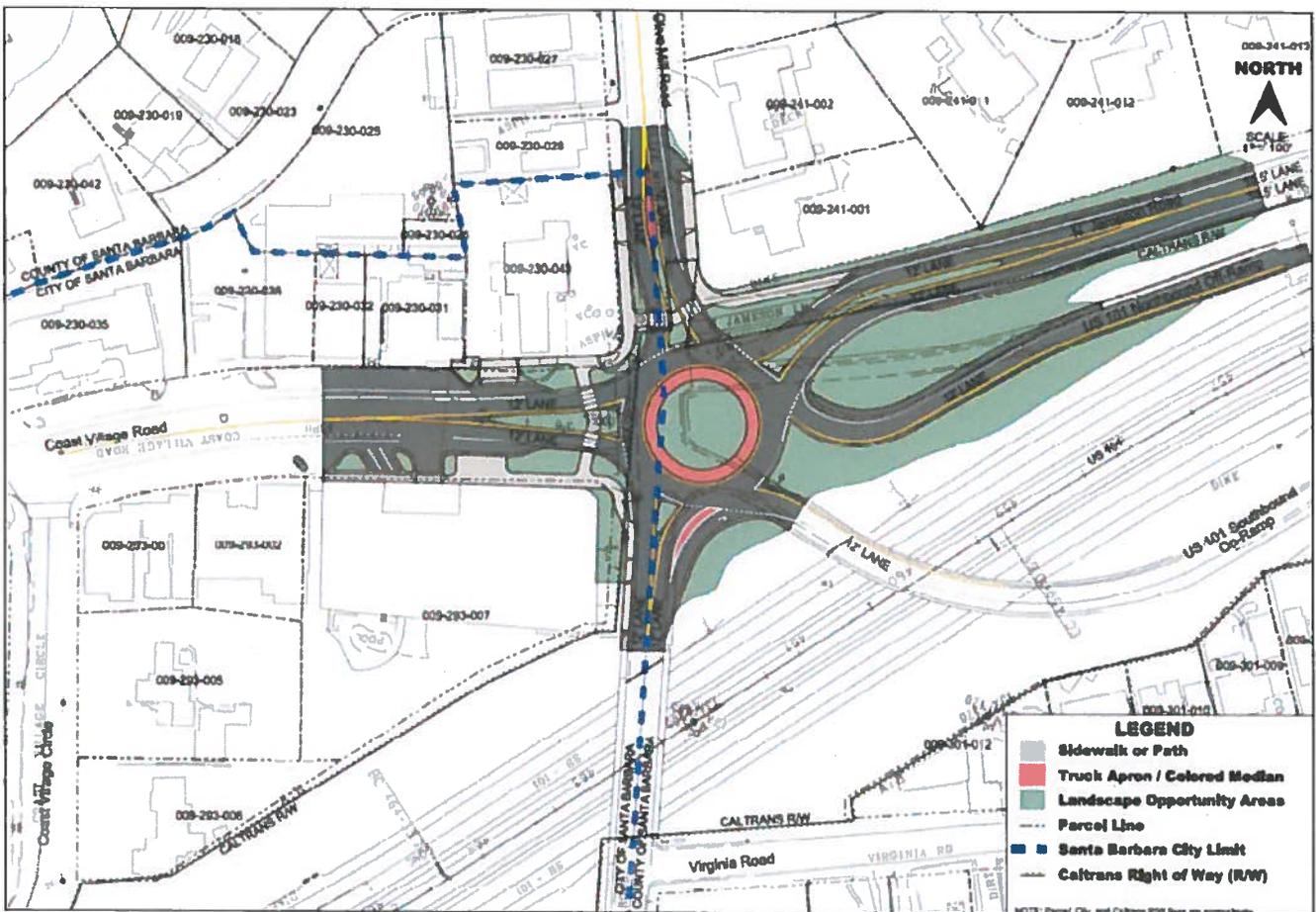


Figure 4: Olive Mill Roundabout Concept Design

IV. OLIVE MILL ROUNDABOUT

The City retained Kittelson & Associates, Inc. (KAI) to evaluate intersection alternatives and operations at the Coast Village Road/Olive Mill Road/North Jameson Road/ 101 Northbound off ramp/ 101 Southbound on ramp intersection. The KAI evaluation (attached as Exhibit E) finds that queue lengths with existing stop control on the 101 Northbound off ramp would exceed available storage and spillback onto the freeway mainline in 2022 following the completion of the Highway 101 HOV Project (estimated to occur in 2020 for traffic calculation purposes). The KAI evaluation concluded that a roundabout at this interchange would provide superior operations over stop-controlled or signal-controlled alternatives and provided a concept roundabout design, which would not require any right of way acquisition.

Olive Mill Road defines the eastern boundary of the City and the majority of the proposed roundabout design is in the County's jurisdiction. Staff anticipates holding a joint City Planning Commission/Montecito Planning Commission concept review hearing of the roundabout project in coming months after all comments from the County and Caltrans are received and the report is finalized.

V. RECOMMENDATION

Staff recommends that the Planning Commission receive a status report on the South Coast 101 High Occupancy Vehicle Lanes Project (HOV Project), the preliminary engineering for replacement of the Union Pacific Bridge at Cabrillo Blvd., and the intersection control evaluation of Olive Mill and Coast Village Road.

Exhibits:

- A. Status Report on South Coast 101 HOV Lanes Project & Parallel Projects from SBCAG Staff, dated February 24, 2015
- B. MOU between the City of Santa Barbara and SBCAG for Union Pacific Bridge engineering design, dated April 29, 2013
- C. Cabrillo Boulevard Railroad Bridge Replacement Project Final Summary Report, dated December 2014
- D. Related City goals, policies, and guidelines
- E. Olive Mill Road/ Coast Village Road/ US 101 Interchange Intersection Control Evaluation Screening, dated January 2015



Project Memorandum

REPORT DATE: February 25, 2015

AGENDA DATE: March 5, 2015

SUBJECT: Status Report on South Coast 101 HOV Lanes Project & Parallel Projects

TO: City of Santa Barbara Planning Commission

FROM: SBCAG Staff 805-961-8900
Steve VanDenburgh, Deputy Director svandenburgh@sbcag.org
Fred Luna, Transportation Engineer fluna@sbcag.org

Attached, please find an overview and summary of the status of the US 101 High Occupancy Vehicle (HOV) lane widening project and associated "parallel" projects in south Santa Barbara County. SBCAG staff looks forward to the opportunity of presenting the information in Powerpoint format at the Planning Commission meeting and answering questions from commissioners. We expect to be joined at the meeting to aid us in making the presentation and answering questions by SBCAG's US 101 corridor advisor, Mr. Tony Harris of PointC Consulting, as well as representatives from Caltrans.

Please feel free to contact SBCAG staff leading up to the meeting if you have any questions about the attached summary or our presentation to the commission.

US 101 HOV Widening Project Status Report

Congestion on the US 101 is a daily problem for the region's residents, workers and visitors. Widening the 101 freeway south of Santa Barbara is critical to the long term health of the local economy. Traffic volume is overwhelming the existing capacity of the US 101 during weekday and weekend peak periods. US 101 within the project limits typically operates with congested flow (Level of Service F) conditions during weekday and weekend peak periods. These conditions typically occur for two to four hours daily in each direction and result in significant travel delay. Without improvements congested conditions are expected to increase to ten hours a day by 2040.

Nearly 15,000 commuters drive from their homes in Ventura County to their jobs in south Santa Barbara County. The high cost of housing in south Santa Barbara County has forced lower and middle class families to move to Ventura County and north Santa Barbara County and created thousands of commuters on the freeway. If US 101 congestion continues to increase local businesses will lose the employees they need to keep operating. The local economy will suffer if local businesses close because they can't retain and recruit employees. The local and regional economy will suffer if tourists choose not to visit the Central Coast, and agricultural and high tech products can't get to markets on time and local residents are stuck in traffic.

Seven years ago, 79% of Santa Barbara County voters made widening US 101 from 4 to 6 lanes the number one regional transportation priority and taxed themselves to pay for it. Every local government in Santa Barbara has made widening US 101 the highest regional transportation priority.

The widening is being implemented in four phases, as described below.

Phase I – Milpas St. to Hot Springs/Cabrillo

In 1993, when Caltrans originally proposed widening US 101 to three lanes from Santa Barbara to the Ventura County line, the plan was met with significant community opposition. At that time, traffic congestion on US 101 was largely confined to Sunday evenings when Southern Californians returned home from vacations on the Central Coast. Local residents were very concerned about the aesthetic impact of Caltrans' proposed design and wanted SBCAG to consider alternatives to widening the freeway. Consequently, during 1993, the SBCAG Board voted to request Caltrans stop work on its plan to widen the 101 freeway.

Traffic congestion gradually continued to increase. In 1996 the SBCAG Board appointed a citizen-led "101 Task Force" to consider smaller scale transportation improvements that could, in combination, possibly prevent the need for future freeway widening. Working with the transportation consulting firm, Parsons Brinkerhoff, the "101 Task Force" identified 11 operational improvement projects on or near US 101, to address the growing traffic congestion problem on the 101. The largest of these projects was the Milpas-to-Hot Springs Operational Improvements. Thus, the first phase of what is now the US 101 HOV widening project was originally conceived as part of the suite of operational improvements to the 101 corridor that were intended to avoid the need to widen the freeway.

The Milpas-to-Hot Springs Operational Improvements Project included widening the Milpas Street US 101 Bridge in the southbound direction to accommodate a new continuous lane over the bridge to Hot Springs/Cabrillo. In the northbound direction, the project included two new auxiliary lanes from Hot Springs to Salinas and from Salinas to Milpas. The original project did not include widening the Milpas Street Bridge in the northbound direction to accommodate a new lane. When the Environmental Impact Report for the project was open for public comment, the City of Santa

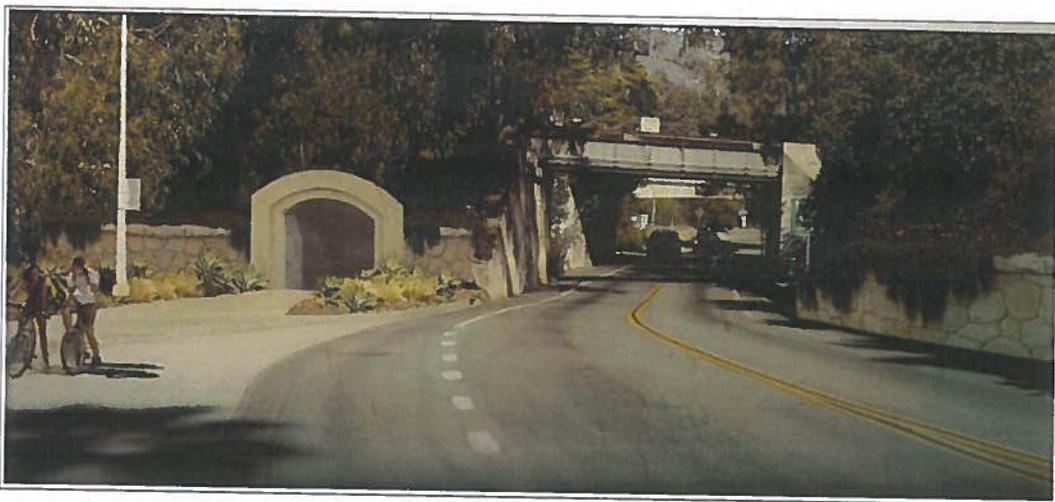
Barbara requested the project include a new lane over the Milpas Street Bridge, but the auxiliary lanes from Hot Springs to Salinas remained part of the final EIR for the project. Once construction began on the project in 2008, members of the Montecito Association requested the auxiliary lane be converted to a continuous northbound through lane. A supplemental environmental impact report was prepared and the coastal development permit from the City of Santa Barbara was modified to include this new element of the project.

In addition to the new US 101 lanes, the Milpas-to-Hot Springs project provided a significant number of local circulation improvements including:

- Third southbound US 101 lane added between Milpas Street and .5 miles past Cabrillo Boulevard
- Third northbound US 101 lane added between Cabrillo Boulevard and Milpas Street
- US 101 bridge replacement and widening at Milpas Street
- Sycamore Creek Bridge replacement and widening
- Cacique Street connected under US 101 between Milpas Street and Alisos Street
- Roundabout added at the intersection of Cabrillo Boulevard, Hot Springs Road, Coast Village Road, and Old Coast Highway for local circulation improvements
- Improved pedestrian and bicycle access under US 101 and along Old Coast Highway

The \$57 million construction and landscaping project was funded by Proposition 1B, and with \$13 million Measure D dollars, and state and federal gas taxes. Construction began in July 2008 and was completed in April 2012

The project issued a coastal development permit by the City of Santa Barbara included the construction by Caltrans of a multipurpose pedestrian and bicycle path along Cabrillo Boulevard between Los Patos Drive and Coast Village Road, via a tunnel, such as that in the illustration below. The pedestrian and bicycle tunnel was estimated by SBCAG to cost between \$3-5 million. SBCAG took the lead on hiring a consultant to design the pedestrian and bicycle tunnel and sought approval from Union Pacific Railroad (UPRR) while Caltrans focused on completing the Milpas-to-Hot Springs improvements described above.



SBCAG spent nearly 5 years and over \$300,000 working with UPRR to find a tunnel design that was acceptable to the railroad. Unfortunately, UPRR ultimately decided it could not support

construction of a tunnel under the tracks because of concern about its proximity to the foundation of the railroad's more than 100 year old bridge. UPRR expressed concern that construction of the tunnel might weaken the foundation of the bridge or cause the tracks to subside. UPRR instead suggested it could potentially support a new project that would replace the existing bridge with a longer structure to better accommodate pedestrians and bicycles. SBCAG worked on a number of bridge replacement options with its consultant team and presented those to UPRR. The estimated project cost had grown from \$3 million to \$5 million for a pedestrian tunnel to over \$10 million to \$15 million for construction of a new railroad bridge. SBCAG had accumulated approximately \$2.6 million in funding for the tunnel.

As the cost to replace the UPRR bridge far exceeded the original cost of the pedestrian tunnel and was out of scale to the original \$57 million cost of the entire Milpas-to-Hot Springs project, SBCAG also began to work with the City of Santa Barbara in 2011 on an alternative design that would create a separated and elevated multi-purpose pathway adjacent to the existing road under the existing bridge avoiding impacting UPRR's right of way (see picture below). A project of this scale could be funded with the \$2.6 million that had been accumulated to date for the tunnel. The pathway would be presented to the Planning Commission as the best near term solution aside from the (infeasible) tunnel option, and could, with a permit amendment by the Planning



Commission, and a finding of Caltrans of being in substantial conformance, be a substitute to the tunnel for the Milpas-to-Hot Springs project. The separated pathway project would be considered temporary because the City made it known that it desired a replacement of the UPRR bridge as part of the US 101 HOV project to include bicycle and pedestrian facilities under the bridge built to modern design standards. Since the start of work on the HOV project in the Santa Barbara area was

estimated to be anywhere from 5 to 10 years in the future, staff from both agencies believed that a temporary project implemented in the near term would have years of value and benefit to the community. The staffs from both agencies believed that the funding for the tunnel should be redirected to an elevated sidewalk, with the concurrence of their respective policy bodies.

The City of Santa Barbara Planning Commission made a site visit to the project area to consider this alternative. Commissioners expressed support for the design in concept and supported the idea of doing something in the interim to improve the bicycle\pedestrian situation until the HOV project came along. The City staff proposed to take over the design and construction of the elevated sidewalk using the tunnel funds.

The South Coast Subregional Planning Committee of the SBCAG Board discussed the proposed interim improvement and the transfer to the City of lead agency responsibilities and tunnel funding in July 2012. Concerns were expressed by SBCAG members on the committee and City staff present that the elevated sidewalk and reduced roadway lane widths were not consistent with modern design standards. The committee questioned the value of such an investment and expressed concerns about SBCAG's liability. The matter was not voted on by the committee.

The City of Santa Barbara continued to urge Caltrans and SBCAG to include reconstruction of the UPRR Cabrillo Bridge as part of the 101 HOV Widening Project to address pedestrian and bicycle access at this narrow point on Cabrillo. Development of Caltrans' draft Environmental Impact Report for the 101 HOV Project was well underway and stopping progress on the EIR to include this local circulation improvement was beyond the scope of the project and would have resulted in significant project delays. As an alternative, the SBCAG Board voted in January 2014 to urge Caltrans to continue forward with the draft EIR for the 101 HOV Project without including the UPRR Bridge, the Olive Mill Road Roundabout or Improvements to the San Ysidro Interchange as part of the EIR but to move those projects forward on separate but parallel tracks.

In 2014, the City of Santa Barbara and SBCAG signed an MOU whereby SBCAG agreed to provide part of the \$2.6 M in tunnel funding to the City for development of a feasibility study for reconstruction of the UPRR Bridge. The purpose of the (on-going) study is to fully vet a bridge replacement project before the coastal permitting stage for the HOV project, so as to determine if project alternatives can be identified that could receive the approval of UPRR and the support of the Planning Commission. It would also give the community an opportunity to fully appreciate the scope and scale of the reconstruction of Cabrillo Boulevard that would be needed to achieve bicycle and pedestrian facilities to modern design standards. The two agencies agreed that the City was in the best position to hire consultants to develop a bridge reconstruction plan and present it to UPRR and the Planning Commission. The railroad has responded to the City's proposal and the City will be submitting a revised design to the railroad in the near future. The most recent estimated cost of constructing the new railroad bridge is \$28-\$30 million.

Phase II – Carpinteria to Mussel Shoals in Ventura County

Caltrans and its SBCAG and Ventura County partners are currently constructing a six-mile carpool lane in each direction for vehicles with two or more passengers during peak weekday congestion periods, along US 101 from Mobil Pier Road in Ventura County to Casitas Pass Road in Santa Barbara County. Additional improvements include: a pedestrian undercrossing in La Conchita, concrete barriers, a new southbound class I bike lane, median landscaping, reconstruction of existing drainage, closing existing median openings and installing Intelligent Transportation System elements such as underground vehicle detectors and Close Circuit TV cameras.

The \$102 million project will alleviate congestion, encourage carpooling and improve air quality. The project began construction in the spring of 2012. The new southbound lane was opened in the Fall of 2014 and the entire project is estimated to be completed later this month in March 2015.

Phase III – U.S. 101 HOV Project (Linden Ave/Casitas Pass Interchanges)

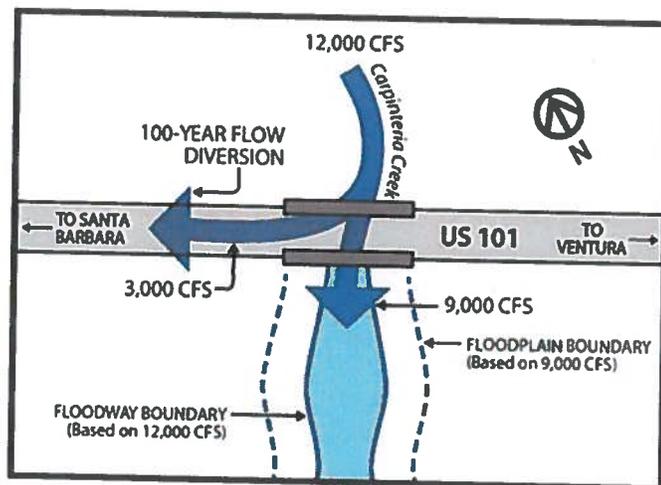
This \$100 million project to reconstruct both the Linden Avenue/101 and Casitas Pass/101 bridges is fully funded. Replacement of the two low vertical clearance bridges and widening of the 101 bridge over Carpinteria Creek will prepare for the widening of the 101 freeway.

The major elements of the Linden Avenue/Casitas Pass Interchange project include:

- Reconstruction of the U.S. 101 overcrossing and ramps at Casitas Pass (see Figure 1)
- Reconstruction of the U.S. 101 overcrossing and ramps at Linden Avenue
- Reconstruction of the U.S. 101 bridges over Carpinteria Creek
- Extension of Via Real frontage road between Bailard Avenue and Casitas Pass Road, and between Casitas Pass Road and Linden Avenue (see Figure 1)
- Class I bikeway improvements along Carpinteria Creek
- Sound walls in various locations

Environmental studies for the project were completed by Caltrans in 2010. Caltrans has completed detailed design and significant progress has also been made on the required coastal development permit. Project partners and Coastal Commission staff have met regularly to work through the needed Local Coastal Plan amendments permit issues. The project is currently scheduled for construction in 2016 and the work would take four years to complete. This timeline has been delayed by approximately

one year. The primary reason for this delay is related to resolving an issue with the Federal Emergency Management Agency (FEMA) regarding the hydraulic analysis for Carpinteria Creek. Based on previous guidance from FEMA, at the outset of detailed design, Caltrans designed the US 101 bridges over Carpinteria Creek to restore the historic "100 year" storm event creek flows and eliminate any diversion of flows to the west (see graphic showing diversion of flows). This bridge design allowed for construction of the new HOV lane over Carpinteria Creek and also would remove hundreds of homes from the floodplain north of US 101. Unfortunately, FEMA indicated in late October 2013 to both City of Carpinteria and Caltrans that it had changed its perspective regarding the restoration of the historic flood pattern on Carpinteria Creek and would not support the original design because it would increase flood water downstream of the 101 freeway.



Since January 2014, the project team has been meeting with FEMA representatives in Region IX to investigate possible solutions to meet FEMA's new design requirements. The project team's top priority, is to convince FEMA that current mapping for Carpinteria Creek should be revised to accurately reflect the current risks associated with flooding during the 100-year storm event. There exists a tremendous amount of new technical data to support corrections being made to the floodplain mapping, including new and improved hydraulic modeling methods, updated and improved topography and downstream improvements.

An informal letter has been sent by the City of Carpinteria, as the floodplain manager for Carpinteria Creek, requesting FEMA to update the mapping. Member of Congress Lois Capp's staff have met with FEMA Headquarters staff to discuss the status of the project. This month, FEMA sent a response letter to the City of Carpinteria inviting submission of a formal Letter of Map Revision (LOMR) as proposed by the project team. The Carpinteria City Council will consider this request in the next few months and if they agree to submit the LOMR to FEMA, a response to the application could be received in 2015. The Linden/Casitas Project team will continue to move ahead with the permitting process at the City of Carpinteria to try to keep the project on schedule to begin construction in 2016.

Phase IV – Hot Springs/Cabrillo to Carpinteria

This phase of the HOV project would add one high occupancy vehicle (HOV) lane in each direction on US 101 from 0.44 mile south of Carpinteria Creek in the City of Carpinteria to Sycamore Creek in the City of Santa Barbara. The project is 10.9 miles in length.

Caltrans District 5 is the lead agency for the environmental phase of the project. SBCAG is the primary project sponsor. Project partners include the City of Santa Barbara, County of Santa Barbara, City of Carpinteria, SBCAG and Caltrans. The estimated \$425 million cost of the project is proposed to be funded from three primary sources; \$140 million in Measure A regional sales tax funds, \$135 million from SBCAG's share of state gas tax funds, and \$150 million from other state and federal funding sources.

A no-build alternative and three build alternatives were evaluated in the environmental document. Like the carpool lanes in Phase II, the added lanes are expected to be designated as part-time HOV lanes, meaning they will operate as general-purpose lanes during off-peak periods of weekdays and on weekends. Project improvements for all build alternatives are anticipated to be confined primarily to the existing State Highway right-of-way.

The project's Draft Environmental Impact Report was closed to public comment in July 2012. The document was originally scheduled for Caltrans certification in late 2012 and was finally released and certified in September 2014. The design and permitting work is expected to extend through 2017. The project is planned for construction from 2017 to 2027. The 11 mile project will probably be divided into 4-5 phases and will require Coastal Development Permits from the City of Carpinteria, the City of Santa Barbara and the County of Santa Barbara.

Two lawsuits were subsequently filed contesting the adequacy of the environmental document. SBCAG and Caltrans are continuing to move forward on design of the project, but the petitioners in the lawsuits could ask for an injunction to stop additional work. If an injunction is granted or the EIR lawsuit challenges are successful, the HOV project could be significantly delayed. Every month of delay costs an estimated \$500,000 to \$1,000,000 in inflated construction costs. The project is now two years behind the original schedule.

SBCAG has hired a consultant, Mr. Tony Harris of PointC consulting, as an advisor to the SBCAG board and its executive staff. Among the tasks in Mr. Harris' scope of work are identifying additional funding sources to deliver the project, and investigating design efficiencies to lower project costs, reduce construction impacts and speed delivery of the improvements. Mr. Harris has been meeting with local elected officials and community organizations to develop a series of recommendations to the SBCAG Board for consideration. Mr. Harris has already made a presentation on his first set of design-related recommendations to the SBCAG Board in January and will be making his second set of more specific design-related recommendations at the March SBCAG Board meeting. Mr. Harris is scheduled to attend the Planning Commission meeting and share his recommendations and strategy for the design of Phase IV.

Parallel Local Projects in 101 Corridor

In addition to the four phases of the US 101 Widening Project, there are a number of parallel local transportation improvement projects also under development in the 101 corridor. Local permitting agencies and the California Coastal Commission have indicated these projects will be considered as conditions of approval for the various phases of the 101 widening project's coastal development permits. The projects are being developed separately, but in coordination with the 101 widening project.

Rincon Bike Trail

The Rincon Bike Trail project will eliminate a gap in the California Coastal Trail by constructing a 10-foot wide and 4,500-foot long shared-use trail from Carpinteria Avenue to Rincon Beach County Park in Santa Barbara County near the Ventura County line. The trail begins in the City of Carpinteria, extends into Caltrans right of way, requires a bridge crossing over the Union Pacific RR tracks and ultimately ends at the Rincon Beach County Park.

The trail is proposed along the ocean side of US 101. A non-motorized link to beaches and surfing destinations would be created by the project. This project has been identified as one of the coastal access enhancement projects that will be implemented to "balance" the impacts to wetlands and agriculture in the coastal zone caused by Phase III of the US 101 HOV project, the Linden Avenue\Casitas Pass Road interchanges project, in the City of Carpinteria. This project is estimated to cost up to \$8 million (capital and support) over and above the Phase III project costs. The City of Carpinteria is currently the lead agency for environmental studies of the Rincon project using state grants and Measure A Bicycle, Pedestrian and Safe Routes to School funding. The project is nearing completion of a CEQA document and SBCAG applied for construction grant funding from the State of California's Active Transportation Program (ATP) but was not awarded funding. SBCAG is currently discussing submitting a joint Cycle II ATP application with the Ventura County Transportation Commission for this project.

Santa Claus Lane Bike path

The Santa Claus Lane Class I bike path project will eliminate a gap in the California Coastal Trail and connect Santa Claus Lane in the unincorporated area to Carpinteria Avenue in the City of Carpinteria on the southbound side of U.S. 101. This project also has been identified as one of the coastal access enhancement projects that will be implemented to "balance" the impacts to wetlands and agriculture in the coastal zone caused by the Linden Avenue\Casitas Pass Road interchange project in the City of Carpinteria. Currently, approximately \$300,000 has been programmed to fund the environmental studies and preliminary engineering that is underway. The funding comes from Measure A South Coast Bicycle and Pedestrian grant funds, sponsored by the City of Carpinteria and County, and unspent Regional Surface Transportation Program funds allocated to the project about 6 years ago. The project is estimated to cost \$5 to \$7 million (capital

and support). SBCAG is currently the lead agency for this project in developing the environmental document and preliminary engineering. SBCAG submitted an application to fund construction the project from the state's Active Transportation Program (ATP) during the first cycle of funding but was not awarded a state grant.

Cabrillo Pedestrian Improvements

As described above, this project would replace the UPRR bridge at Cabrillo Blvd. in Santa Barbara to provide standard width shoulders and sidewalks for bicycles and pedestrians traveling from the inland side of US 101 to the ocean side of US 101 under the bridge. A feasibility study is currently being conducted by the city of Santa Barbara to replace the bridge. The study has been submitted to UPRR for review and acceptance of the bridge replacement strategy. The pedestrian and bicycle features of this project are estimated to cost around \$5 million. Funding of over \$2.6 million in Highway Safety Improvement Program (HSIP) and Transportation Enhancement funding has been accumulated by SBCAG for this project. SBCAG submitted an application for state Active Transportation Program grant funds for the \$5 million of bike/pedestrian eligible improvements but was not awarded funding.

Olive Mill Road Roundabout

The City of Santa Barbara has hired a consultant to evaluate roundabout alternatives at the intersection of the northbound and southbound US 101 off and on-ramps, Olive Mill Road, Coast Village Road and North Jameson Road.

San Ysidro Interchange

The County of Santa Barbara hired a consultant (the same one working on the Olive Mill Roundabout) to develop preliminary roundabout designs to relieve traffic congestion and improve operations at the San Ysidro Interchange. Four options were presented to the Montecito Planning Commission in the fall of 2014. A number of the proposed designs would require right of way from the proposed Miramar Hotel. The Montecito Planning Commission approved the Miramar Hotel project in January of this year without including any requirement to accommodate construction of the proposed roundabouts. SBCAG and County staff will be meeting to discuss next steps for this project in the near future.

MEMORANDUM OF UNDERSTANDING
Between the Santa Barbara County Association of Governments
and the City of Santa Barbara

This memorandum of understanding between the Santa Barbara County Association of Governments (SBCAG) and the City of Santa Barbara (CITY) is entered into with the authorization of the Board of Directors of the SBCAG and the City Council of CITY and herein referred to collectively as PARTIES.

WHEREAS, SBCAG and CITY desire to make cost effective improvements along Cabrillo Boulevard under U.S. 101 and the Union Pacific Railroad (UPRR) bridge to safely connect bicycle and pedestrian paths at Los Patos Drive and Coast Village Road\Old Coast Highway (PROJECT); and

WHEREAS, an engineering study by SBCAG in conjunction with the U.S. 101 Milpas\Cabrillo-Hot Springs project was unsuccessful in securing the approval of UPRR for a bike\pedestrian tunnel PROJECT under their tracks; and

WHEREAS, subsequent efforts by SBCAG and CITY to design an interim PROJECT of raised sidewalk improvements on the shoulder of Cabrillo Boulevard raised safety and cost\benefit concerns and did not garner policy support at SBCAG; and

WHEREAS, SBCAG and CITY have concluded that the best long term PROJECT is a replacement of the UPRR bridge over Cabrillo Boulevard to provide improved roadway and shoulder width for vehicles and to accommodate bicycle and pedestrian facilities; and

WHEREAS, the CITY had previously provided funding for SBCAG's engineering efforts for the tunnel and interim sidewalk iterations of PROJECT; and

WHEREAS, a balance of unspent funds remains on account with SBCAG; and

WHEREAS, SBCAG and CITY believe that the CITY is best equipped to conduct preliminary engineering of the PROJECT specifically to include UPRR bridge replacement alternatives; and

WHEREAS, CITY has negotiated a scope of services with an engineering consultant to perform preliminary engineering for PROJECT with alternatives to replace the UPRR bridge;

NOW THEREFORE, the PARTIES do mutually agree as follows:

1. The purposes of conducting preliminary engineering are (1) to complete preliminary design and cost estimates for feasible alternatives for PROJECT, (2) for CITY to gain acceptance in writing from UPRR of a bridge replacement PROJECT prior to Coastal Development Permit application being submitted by Caltrans to CITY for the U.S. 101 HOV project and (3) to inform SBCAG, Caltrans and CITY of the extent to which PROJECT can be coordinated with the U.S 101 HOV project.
2. SBCAG will return to the CITY funds in the amount of \$99,105 which represents the full extent of the unspent funds remaining from CITY'S contribution to prior iterations of PROJECT.
3. CITY shall retain the services of a qualified consulting firm to conduct the preliminary engineering work necessary for the PROJECT, develop cost estimates for the alternatives, and present the PROJECT alternatives to UPRR and Caltrans for input, review and acceptance.

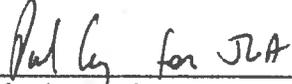
4. CITY shall assemble a project development team and conduct meetings of the team for the duration of preliminary engineering that shall include at a minimum, representatives of CITY, SBCAG and Caltrans.
5. CITY shall present results from the preliminary engineering of PROJECT to the CITY Planning Commission for concept review on the environmental and coastal resource impacts of PROJECT, the feasibility of PROJECT's preliminary design, comments or acceptance by UPRR and Caltrans; and the PROJECT's applicability to fulfill the related Coastal Development Permit condition placed on the Milpas to Hot Springs project.
6. CITY and SBCAG agree to the provisions outlined in Exhibit A.

Amendments to this memorandum of understanding shall require approval by the SBCAG Board of Directors and the Santa Barbara City Council.

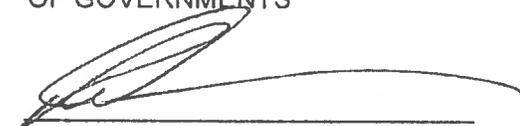
Made and entered into on this 29th, April 2013.

CITY OF SANTA BARBARA
a Municipal Corporation

SANTA BARBARA COUNTY ASSOCIATION
OF GOVERNMENTS



Mr. James Armstrong
City Administrator



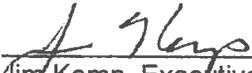
Mr. Roger Aceves
Chair

ATTEST:

ATTEST:



Gwen Peirce, CMC
Santa Barbara City Clerk



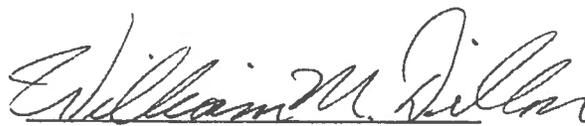
Jim Kemp, Executive Officer
Clerk of the Board

APPROVED AS TO FORM:
Stephen P. Wiley
Santa Barbara City Attorney

APPROVED AS TO FORM:
Dennis Marshall
County Counsel



T. O. Strenger



William M. Dillon,
Senior Deputy County Counsel

Exhibit A
INDEMNIFICATION AND NON-PARTNERSHIP

MUTUAL INDEMNIFICATION

CITY shall defend, indemnify and save harmless the SBCAG, its officers, agents and employees from any and all claims, demands, damages, costs, expenses (including attorney's fees), judgments or liabilities arising out of this Agreement or occasioned by the performance or attempted performance of the provisions hereof; including, but not limited to, any act or omission to act on the part of the CITY or his agents or employees or other independent contractors directly responsible to him; except those claims, demands, damages, costs, expenses (including attorney's fees), judgments or liabilities resulting from the sole negligence or willful misconduct of the SBCAG.

CITY shall notify the SBCAG immediately in the event of any accident or injury arising out of or in connection with this MOU.

SBCAG shall defend, indemnify and save harmless the CITY, its officers, agents and employees from any and all claims, demands, damages, costs, expenses (including attorney's fees), judgments or liabilities arising out of this Agreement or occasioned by the performance or attempted performance of the provisions hereof; including, but not limited to, any act or omission to act on the part of the SBCAG or his agents or employees or other independent contractors directly responsible to him; except those claims, demands, damages, costs, expenses (including attorney's fees), judgments or liabilities resulting from the sole negligence or willful misconduct of the CITY.

SBCAG shall notify the CITY immediately in the event of any accident or injury arising out of or in connection with this MOU.

NON-PARTNERSHIP

This MOU is not intended by the PARTIES to constitute or create a joint venture, pooling arrangement, or formal business organization of any kind. The rights and obligations of the PARTIES shall be only those expressly set forth herein.



CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT



CABRILLO BOULEVARD RAILROAD BRIDGE REPLACEMENT PROJECT

Santa Barbara, California
DRAFT

PROJECT FINAL SUMMARY REPORT

December 2014

Prepared for:

City of Santa Barbara
Public Works Department
630 Garden Street
Santa Barbara, CA 93102

Prepared by:

HDR Engineering, Inc.
2280 Market Street, Suite 100
Riverside, CA 92501

hdrinc.com

3230 El Camino Real, Suite 200, Irvine, CA 92602
T: 714.730.2300 F: 714.730.2301

EXHIBIT C



Project Final Summary Report

DOCUMENT AUTHORS

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- Document Quality Control Reviewer:
 - Gerard Reminiskey, HDR Engineering, Inc.

DOCUMENT DISTRIBUTION

- Brian D'Amour, P.E., Supervisor Civil Engineer
- Pat Kelly, P.E., Assistant Public Works Director/City Engineer
- Rob Klovsy, P.E., HDR Engineering, Inc.
- HDR Project Design Team



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SUMMARY

This document provides a final summary report for the proposed replacement of the Union Pacific Railroad (UPRR) Bridge over Cabrillo Boulevard in the City of Santa Barbara to accommodate the widening of Cabrillo Boulevard.

INTRODUCTION

The Santa Barbara County Association of Government (SBCAG), Caltrans, and the City of Santa Barbara are partners in implementing the Highway 101 Operational Improvements Project that extends from Milpas Street to Cabrillo Boulevard-Hot Springs Road. In addition to the planned improvements to Highway 101 - which include new structures, improved interchanges, and added lanes - the original project description included improved pedestrian and bicycle traffic access on Cabrillo Boulevard beneath the UPRR Bridge. The pedestrian and bicycle features were included in the permitted improvements under the City of Santa Barbara's Coastal Development Permit process, namely to provide improvement along Cabrillo Boulevard to connect the waterfront to Coast Village Road. However, this part of the project is not yet complete since the UPRR did not approve plans to provide for these facilities. Due to scheduling issues, it was necessary that the Highway 101 Operational Improvements Project be moved forward before the issues with UPRR could be resolved.

HDR Engineering, Inc. (HDR) was hired by the City to complete preliminary engineering designs and cost estimates for the completion of the originally proposed pedestrian and bicycle facilities, the required replacement of the UPRR Bridge, and other related infrastructure improvements. The ultimate goal of the work was to design cost effective improvements along Cabrillo Boulevard under U.S. 101 and the UPRR Bridge, which would safely connect bicycle and pedestrian paths between Los Patos Drive and Coast Village Road/Old Coast Highway.



PROJECT AND WORK DESCRIPTIONS

Engineering work included the development of a preferred shoofly track alignment that would allow the UPRR to maintain rail traffic while the existing bridge was replaced and lengthened. A new roadway cross section was also designed which would widen Cabrillo Boulevard to accommodate two 12-ft wide traffic lanes, two 5-ft wide bike lanes, a 12-ft wide multiple purpose trail, a 12-ft wide right hand turn lane, and 2-ft buffers.

Additionally, a new roadway profile design was developed to lower the road and improve vertical clearances at the bridge. Without the lowering improvements, HDR concluded a design exception from UPRR would be needed, as only 15'-6" could be achieved versus the 16'-6" standard. Since the clearance produced by the new Highway 101 HOV Project was also less than the 16'-6" requirement, HDR believed it was worth the extra time an effort to approach the UPRR about approving a design variance, especially since underground utility and ground water infiltration challenges could be avoided.

City of Santa Barbara staff planned to meet with the UPRR representative to secure their concurrence of initial project concept, as well as approval of vertical clearance and other design criteria exceptions. Afterwards the City planned to move forward with the submission of a General Order 88-B application to the California Public Utilities Commission for approval and order.

EXISTING RAILROAD BRIDGE

The existing Union Pacific Railroad Bridge is located over Cabrillo Boulevard in the City of Santa Barbara, at MP 369.66 on the UPRR Santa Barbara Subdivision, DOT# 745616H. It is a single 45-ft span structure originally constructed in 1917. The bridge has approximately a 40 degree skew angle to accommodate the alignment of Cabrillo Boulevard.

The vertical clearance under the existing bridge structure is posted at 14'-11". No evidence was observed of trucks hitting the structure. This structure is located next to the Cabrillo Boulevard/Highway 101 Interchange and the geometry of the railroad track and the Cabrillo Boulevard cannot be significantly changed without impacts to both right-of-way and the interchange itself. UPRR's Grade Separation Guidelines specify skew angles no greater than 30 degrees depending on the type of the structure. The abutments currently support only a single track but were built to accommodate two tracks on 13'-6" track centers.

The UPRR right-of-way is 100-ft wide at Cabrillo Boulevard but narrows to 60-ft approximately 200-ft geographically south of the existing bridge. The existing single track is located in the center of the UPRR right-of-way.



INITIAL PROJECT SCOPE AND STATUS

HDR was retained by the City to provide conceptual design level analysis of the railroad bridge replacement and to develop two alternative shoofly track alignments needed to facilitate replacement of the bridge structure. The construction of the shoofly track would be required by UPRR due to the need to continue rail services without interruption. The two shoofly alternative designs and study have since been completed by HDR. The two alternatives, known as the North Shoofly Track Alignment and South Shoofly Track Alignment, are described below. Engineering plans for both shoofly alignment alternatives were submitted to the UPRR for their review and comments.

NORTH SHOOFLY TRACK ALIGNMENT ALTERNATIVE

The North Shoofly Track Alignment Alternative would provide a shoofly alignment along the outside curve north of the existing main line track. This alternative would require the construction of the north half of the proposed bridge structure first. The mainline track would then be moved onto the northern structure to be utilized as a shoofly track while the existing bridge is removed and the southerly half of the bridge is then constructed. It is the City's desire, subject to UPRR's approval, to leave the shoofly track in place as the final mainline track alignment after the completion of the proposed bridge. This would provide the advantage of avoiding the costs for the relocation of the mainline back to the original alignment, and the subsequent removal of the shoofly track. The proposed south half of the bridge would then be used to support a future second track alignment. The new shoofly will stop short of the Los Patos Bridge. It will also require the re-grading of a drainage swale, however most if not all skyline tress between the existing track and the freeway will be left intact.

In order to provide 15'-6" vertical clearance, Cabrillo Boulevard will have to be lowered by approximately 1-ft and potential groundwater issues addressed. Surface storm water runoff may be diverted into the existing storm drain system to the south of the structure.

Initial survey conducted revealed that there are 5 existing fiber cables along the corridor that will require relocation. An easement from Caltrans will be needed along the freeway right-of-way approximately 200-ft east of Cabrillo Boulevard. This will allow for the placement of the shoofly track as this portion of UPRR's right-of-way begins to narrow to 60 feet.

SOUTH SHOOFLY TRACK ALIGNMENT ALTERNATIVE

This South Shoofly Track Alignment Alternative would provide a shoofly alignment along the inside curve south of the existing main line track. This alternative would introduce an additional reversing curve on the west side of the shoofly alignment which does not currently exist. The South Alignment will require an additional 1,900-ft of track compared to the North Alignment, which also requires widening/reconstruction of the Los Patos UPRR Bridge. This is due to the constraint of



pump system may need to be investigated during subsequent phases of the project design.

PROJECT UPDATE – DECEMBER 2014

The City has finally received concurrence from the UPRR to use the North Shoofly Track Alignment Alternative to temporarily support rail operations and traffic during construction. The UPRR has also provided the following comments which need to be addressed and incorporated into the future design submittal packages:

- UPRR has approved a proposed bridge skew angle of 50-degrees.
- UPRR has approved a proposed bridge width of 50-ft, which is less than the overall railroad right-of-way at this location. (The bridge will have to be widened to 60-ft however, to accommodate the additionally requested permanent shifting of the mainline track, as further discussed below.)
- UPRR **did not approve** the shoofly becoming the permanent mainline track alignment. The mainline track (and any future track) will need to be centered within the right-of-way. More specifically, the existing main track should be relocated 10-ft north of the right-of-way centerline, and any future second track 10-ft south of the right-of-way centerline.
- UPRR **did not approve** an underpass vertical clearance of 15'-6", which is less than 16'-6" required in the Railroad Guidelines for Grade Separation for the proposed structure type.

PROJECT FINAL DESIGN SELECTION: NORTH SHOOFLY TRACK ALIGNMENT

The temporary shoofly track will be constructed along the outside curve north of the existing mainline track as illustrated in attached Exhibits 1, 2, and 3. Prior to installing this shoofly, temporary shoring will be placed and construction of the north half of the proposed bridge completed. Once the north half is finished, the mainline track will then be moved onto the completed northern portion of the structure, and be used as a shoofly track while the existing bridge is removed and the southerly half of the new bridge constructed.

Upon completion of the southerly half of the structure, track roadbed will be re-graded and track will be re-profiled on both sides approaching the structure to meet current UPRR design criteria. The permanent mainline track will then be constructed 10-ft north of the centerline of the railroad right-of-way as requested by UPRR, and the shoofly track on the northerly structure removed. (It is important to note that the exhibits as prepared earlier in March, 2014 do not show the main track at 10-ft offset from the centerline of the right-of-way, as recently requested. This change will need to be addressed during the next design phase.)



PROJECT FINAL DESIGN SELECTION: STRUCTURE TYPE AND VERTICAL CLEARANCES

The originally recommended rolled beam superstructure bridge will be advanced into final design. The profile of Cabrillo Boulevard will also be lowered as illustrated in attached Exhibit 4. In order to accommodate a future track at a 10-ft offset south of the centerline of right-of-way, the width of the bridge will be increased from 50-ft to 60-ft.

The minimum vertical clearance between the bottom of the new bridge and the finished roadway surface will be 16'-6", to comply with the request made by UPRR. To meet this required vertical distance of 16'-6", the roadway will be lowered by approximately 2-ft beneath the rail bridge. Drainage will likely be diverted into the existing storm drain system currently located to the south of the structure. However, an in-depth survey should be conducted during the next level of design to ensure the connection can be made and positive drainage achieved. If positive drainage cannot be achieved, a pumping system could be used as an alternative drainage solution.

FASCIA GIRDER OPTION

Concrete fascia girders with patterns can be added to the new bridge superstructure as an option to hide the rolled steel beams and enhance the overall appearance of the structure. This approach has been used successfully by HDR on several past rail bridge projects. For example, attached Exhibit 5 shows the recently completed Magnolia Boulevard grade separation project in the City of Riverside, CA, where this method was used to hide the standard steel rolled beams. Alternatively, attached Exhibit 6 shows what the final structure can look like without the installation of the aesthetic fascia girders. There is an additional cost of approximately \$225,000 for the bridge with fascia girders, versus a bridge without them.

CALTRANS' LATEST PLANS

Caltrans has notified the City of Santa Barbara that the on-ramp to Southbound Highway 101 at Cabrillo Blvd may not be needed after all. Thus the right-hand turn lane could be removed from the scope of the proposed improvements. The exhibits as prepared in early March, 2014 did not reflect the elimination of this turn lane, and the design will need to be modified at the next design level. The elimination of the right-hand turn lane from the project would help reduce the overall cost of the project, as the length of the required bridge spans would be shortened.

PRELIMINARY PROJECT COST ESTIMATE

The baseline preliminary engineering estimate for the overall project is **\$28,500,000** as shown in the attached Exhibit 7. The baseline estimate includes the North Shoofly Alignment Alternative, along with the removal of the shoofly at the conclusion of



Project Final Summary Report

construction, the lowering of Cabrillo Boulevard to achieve required vertical clearances, and the construction of a new 2-track wide rail bridge. The estimate however does not include concrete fascia girders or other aesthetic enhancements, and does not fully address the currently unknown utility relocation costs or potential pump station needs. And, the baseline does not account for the potentially significant cost savings if the right-hand turn lane is removed from the scope of the project. Although a 30% contingency has been included in the baseline to offset some of the still unknown costs, the City should still consider increasing this contingency value when submitting project funding requests.

ATTACHMENTS

ENGINEERING PLANS AND EXHIBITS

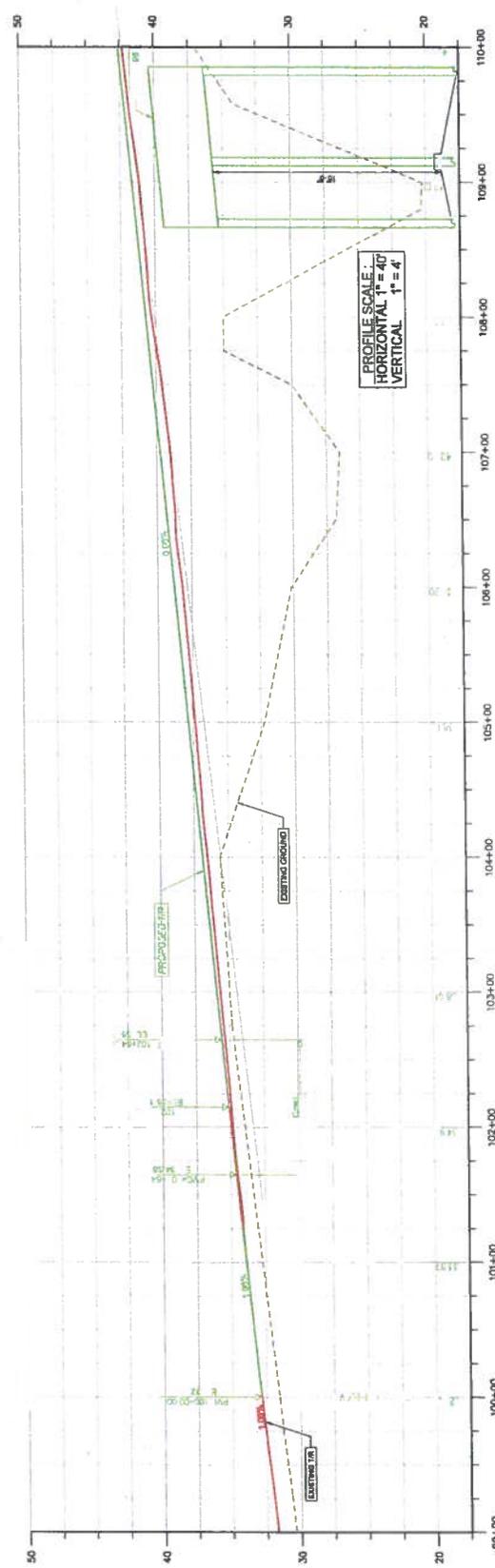
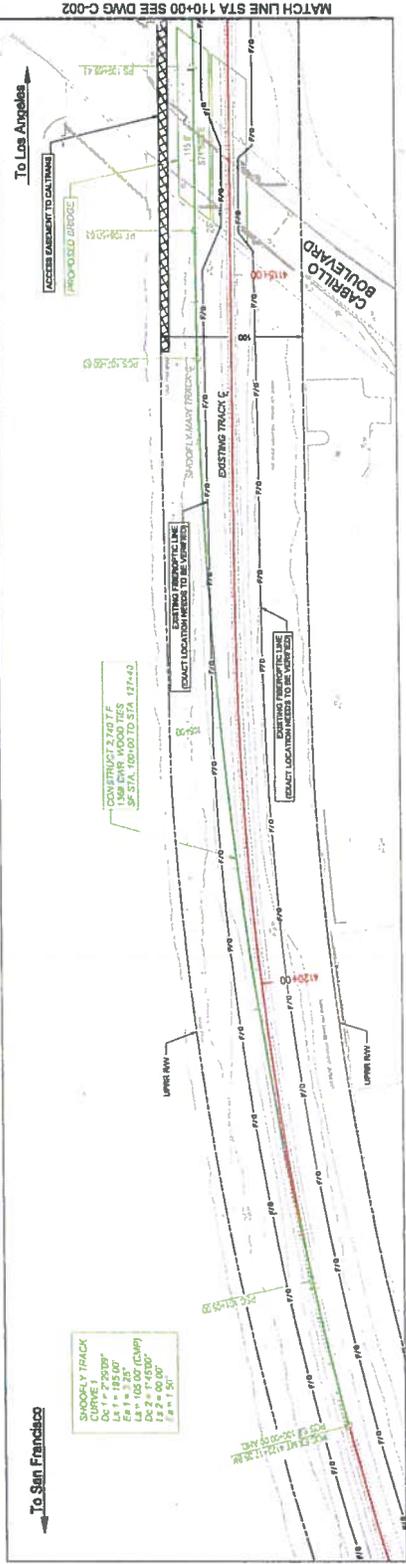
Exhibits 1 thru 3 - North Shoofly Track Alignment and Profile

Exhibit 4 - Cabrillo Blvd Realignment and Profile Lowering

Exhibit 5 - Example of a Rail Bridge with Aesthetic Fascia Girders

Exhibit 6 - Example of a Rail Bridge without Aesthetic Fascia Girders

Exhibit 7 - Preliminary Cost Estimate



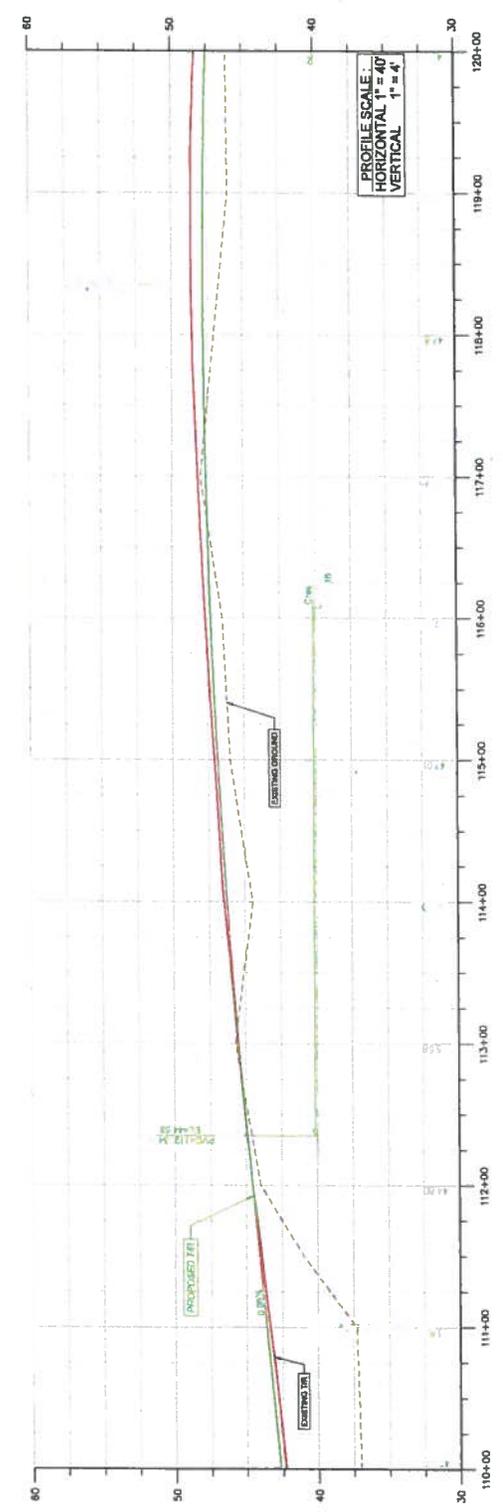
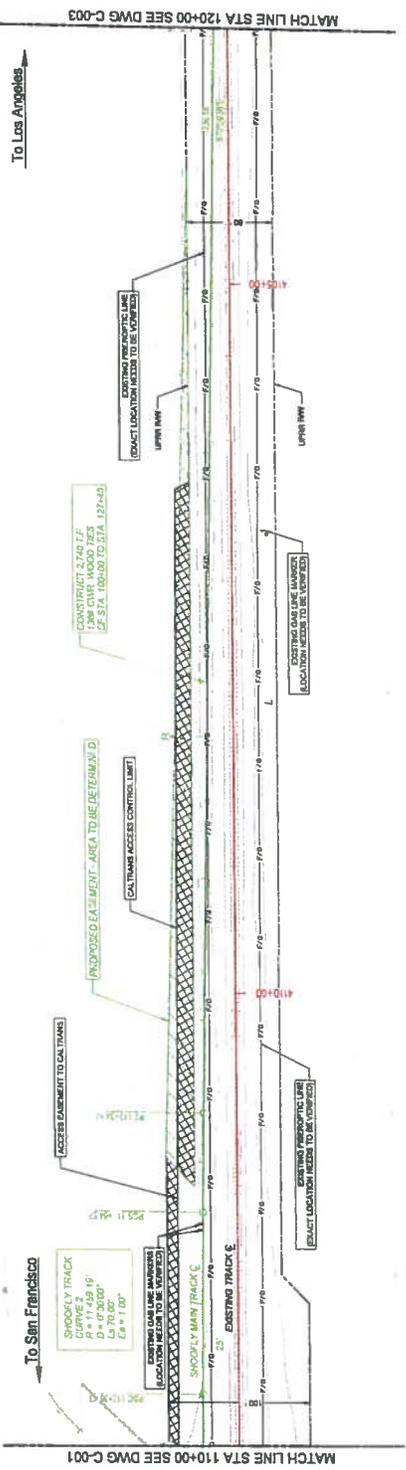
CONCEPTUAL
NOT FOR CONSTRUCTION

UNION PACIFIC RAILROAD
Office of Assistant Vice President
Engineering Design/Construction
CABRILLO BRIDGE REPLACEMENT
SANTA BARBARA, CALIFORNIA
SANTA BARBARA SUBDIVISION, MP 372.08
SHEET NUMBER: C-001
PROJECT NAME: SHOOFLY TRACK PLAN & PROFILE - NORTH ALIGNMENT



HR
1000
2025 B California Street, Suite 200
Santa Barbara, California 93101

DATE: 08/11/2011
DRAWN BY: J. B. BROWN
CHECKED BY: J. B. BROWN
SCALE: 1" = 40'



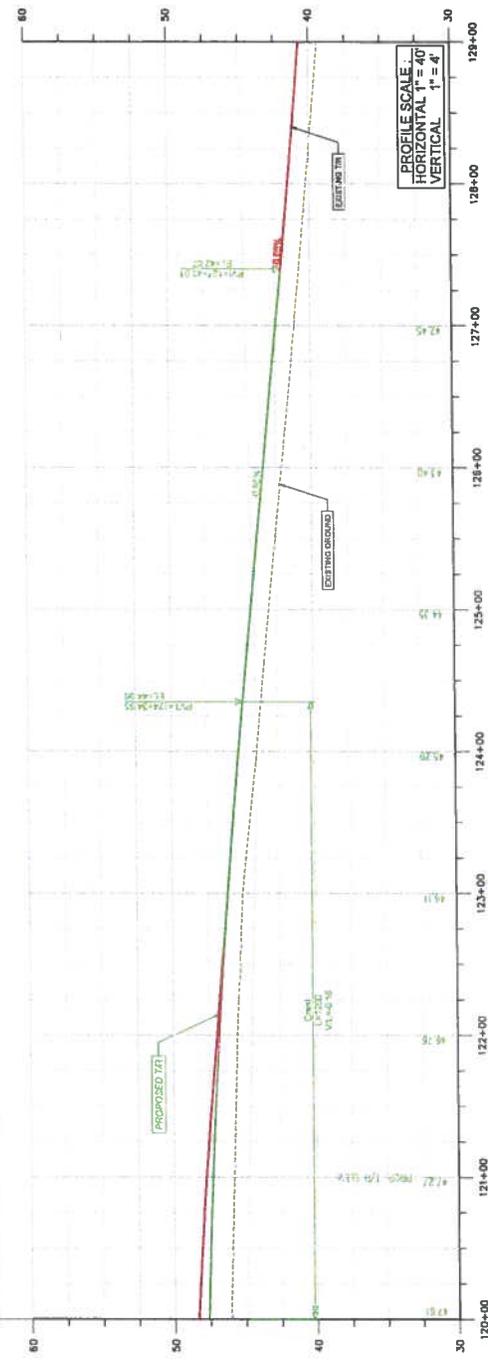
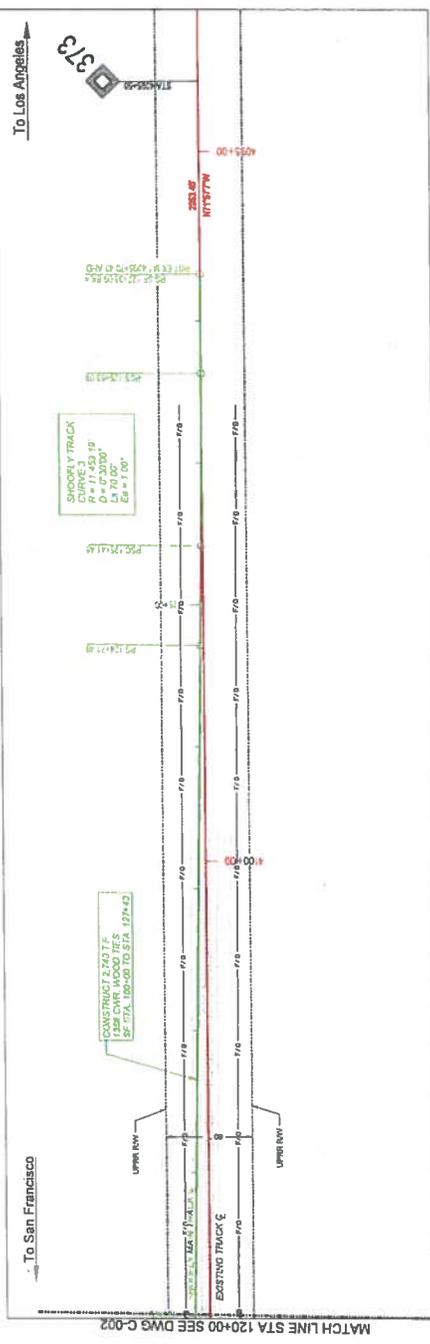
**CONCEPTUAL
NOT FOR CONSTRUCTION**

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	CREATED BY:	F. RYAN	
	LOCATION DESCRIPTION:	CABRILLO BRIDGE REPLACEMENT	
	CITY:	SANTA BARBARA SUBDIVISION, MP. 372.86	
	PROJECT NUMBER:	C-002	
	SHEET TITLE:	SHOOPLY TRACK PLAN & PROFILE - NORTH ALIGNMENT	



HDR
 1300 California, Inc.
 2000 B California Road, Suite 200
 Irvine, California 92614

DATE: 01/15/08
 DRAWN BY: J. THOMAS
 CHECKED BY: J. THOMAS



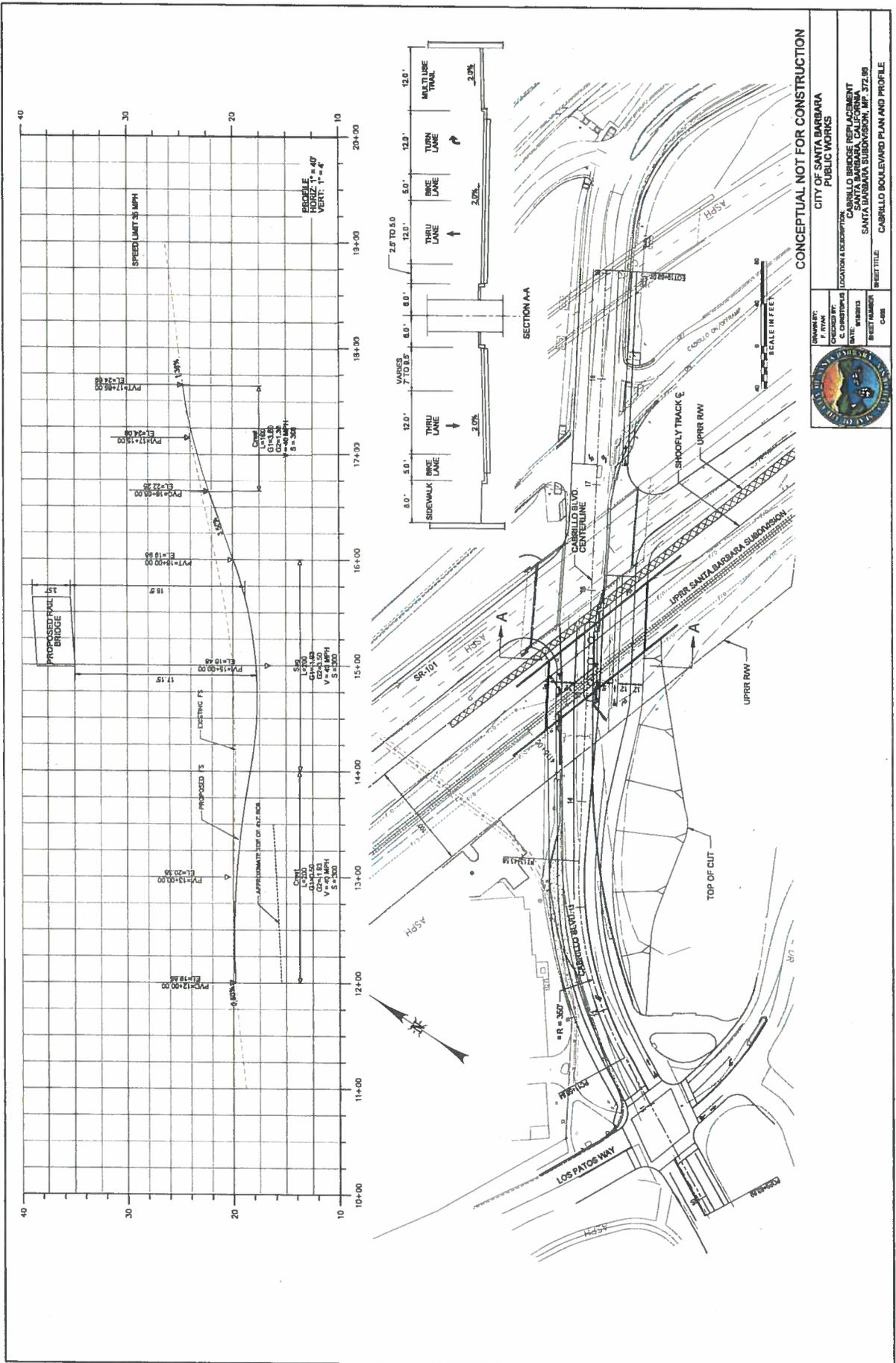
CONCEPTUAL
NOT FOR CONSTRUCTION

	UNION PACIFIC RAILROAD Office of Assistant Vice President Engineering Design/Construction
	LOCATION & DESCRIPTION: CABRILLO BRIDGE REPLACEMENT SANTA BARBARA, CALIFORNIA SANTA BARBARA SUBDIVISION, MP 372.86
DRAWN BY: [Redacted] CHECKED BY: [Redacted] DATE: [Redacted]	SHEET NUMBER: C-003 SHEET TITLE: SHOOFLY TRACK PLAN & PROFILE



HDR
 HDR Engineering, Inc.
 2228 El Camino Real, Suite 200
 Irvine, California 92614

DATE: [Redacted]
 TIME: [Redacted]
 SHEET: [Redacted]
 905884

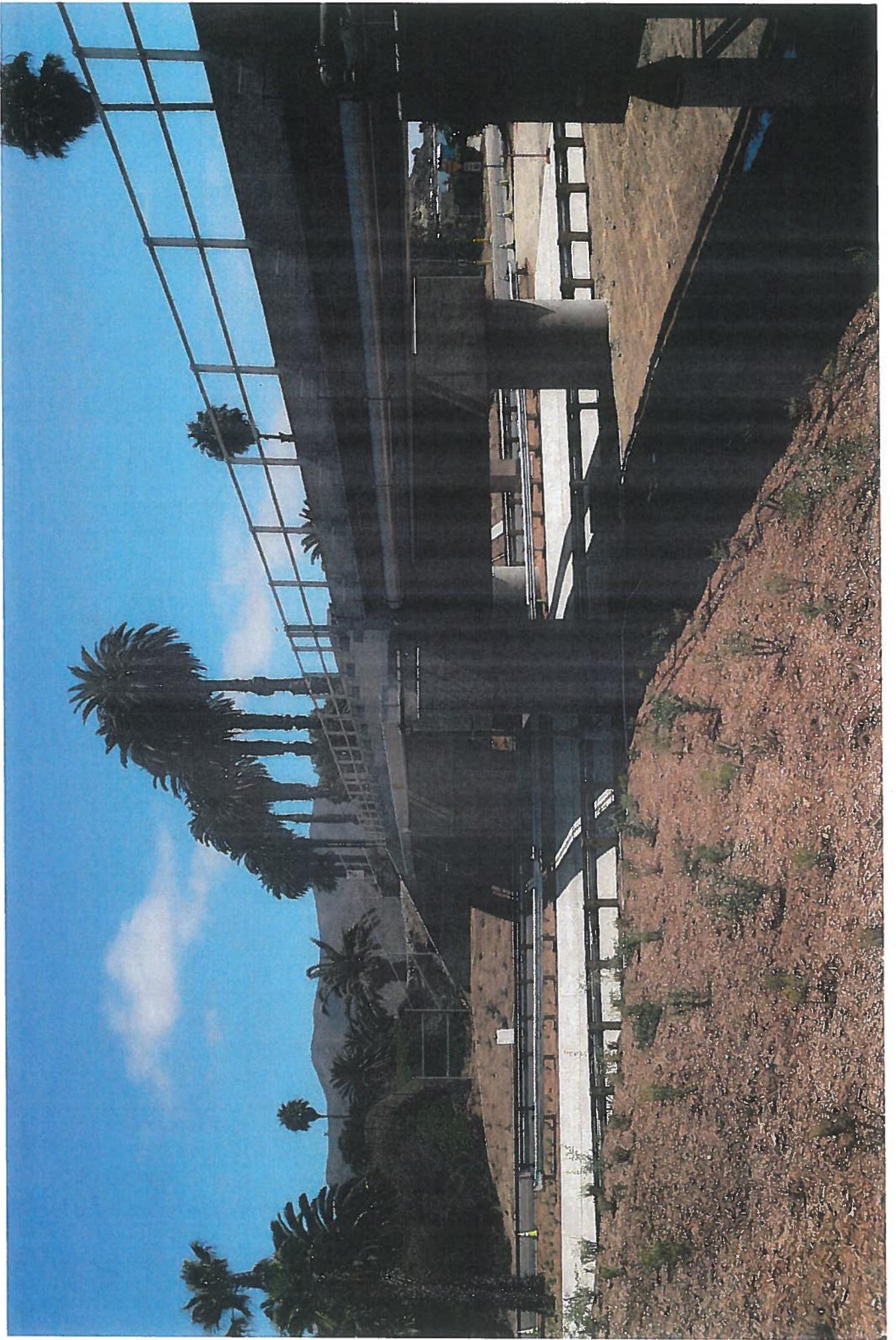


CONCEPTUAL NOT FOR CONSTRUCTION

	CITY OF SANTA BARBARA PUBLIC WORKS
DRAWN BY: F. AYAN	LOCATION DESCRIPTION: CABRILLO BRIDGE REPLACEMENT SANTA BARBARA, CALIFORNIA
CHECKED BY: C. CHRISTENSEN	SANTA BARBARA SUBDIVISION, MP. 372.08
DATE: 01/18/13	SHEET NUMBER: C-008
SHEET TITLE: CABRILLO BOULEVARD PLAN AND PROFILE	

SHEET NO. 01 OF 02
 STATE OF CALIFORNIA
 COUNTY OF SANTA BARBARA





City of Santa Barbara - Cabrillo Blvd Railroad Bridge Replacement Project

- Engineer's Opinion of Probable Conceptual Project Cost -
10% Submittal - Alternative Shoofly North
December 5, 2014



EXHIBIT 7

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost
DESIGN					
	Agency Design Admin. (City of Santa Barbara)	%	3.00	CCE	\$602,500
	Alternative Analysis & Environmental (3% to 5%)	%	4.00	CCE	\$803,400
	Design - Preliminary to 30% (1% to 3%)	%	2.00	CCE	\$401,700
	Design - 30% to 60% and Permits (2% to 3%)	%	3.00	CCE	\$602,500
	Design - 60% to Final PS&E (2% to 4%)	%	3.00	CCE	\$602,500
				Subtotal	\$3,012,600
GENERAL					
	Mobilization	LS	1	\$700,000	\$700,000
	Clearing and Grubbing	LS	1	\$200,000	\$200,000
	Prepare Storm Water Pollution Prevention Plan	LS	1	\$125,000	\$125,000
	Implement Storm Water Pollution Prevention Plan	LS	1	\$100,000	\$100,000
	Storm Water Annual Report	EA	2	\$2,000	\$4,000
	Air Pollution Control	LS	1	\$25,000	\$25,000
	Project Schedule	LS	1	\$20,000	\$20,000
				Subtotal	\$1,174,000
CIVIL					
	AC Pavement (6" thick)	TON	1,513	\$110	\$166,430
	Aggregate Base (6" thick)	CY	773	\$60	\$46,380
	Hardscape	SF	785	\$10	\$7,850
	Decomposed Granite (3" thick)	CY	59	\$60	\$3,540
	Curb and Gutter	LF	1,536	\$25	\$38,400
	Handicap Ramps	EA	8	\$1,500	\$12,000
	Crash attenuators	LS	1	\$35,000	\$35,000
	Street Lighting	LS	1	\$50,000	\$50,000
	Signing and Striping	LS	1	\$10,000	\$10,000
	Landscape	LS	1	\$100,000	\$100,000
	Storm Drain (64" RCP)	LF	300	\$150	\$45,000
	Catch Basin	EA	3	\$7,500	\$22,500
	Earthwork	CY	10,000	\$15	\$150,000
	Remove 8" Water Line	LF	300	\$25	\$7,500
	Construct 8" Water Line	LF	300	\$150	\$45,000
	Power Line Relocation	LS	1	\$100,000	\$100,000
	Modify Traffic Signals	LS	1	\$200,000	\$200,000
	Remove AC Pavement	SF	33,318	\$2	\$66,636
	Remove PCC Pavement	SF	1,387	\$5	\$6,935
	Remove Retaining Wal	LF	329	\$50	\$16,450
	Remove Existing Bridge	LS	1	\$250,000	\$250,000
	Remove Storm Drain System (Pipe, Catch Basin, Manholes)	LS	1	\$20,000	\$20,000
	Remove Street Lighting	EA	3	\$10,000	\$30,000
				Subtotal	\$1,429,621
STRUCTURAL					
	Railroad Bridge (Cabrillo), Including Temporary Shoring	LS	1	\$5,200,000	\$5,200,000
	Retaining Walls	LS	1	\$800,000	\$800,000
				Subtotal	\$6,000,000
UTILITIES					
	Relocate Fiber Optic Lines (MCI, Sprints, AT&T, Level 3 & Quest)	EA	5	\$750,000	\$3,750,000
	Encase High Pressure Gas Line	EA	1	\$50,000	\$50,000
				Subtotal	\$3,800,000
RAILROAD TRACKWORK - SHOOFLY					
	FURNISH AND INSTALL TRACK, 136# RE, WOOD TIES INCLUDING BALLAST & OTM	TF	1,600	\$350	\$560,000
	SHIFT TRACK (WOOD TIES)	TF	1,140	\$75	\$85,500
	TRACK SUBBALLAST	CY	1,725	\$40	\$69,000
	EMBANKMENTS AND OTHER FILLS	CY	4,800	\$20	\$96,000
	EXCAVATION	CY	9,900	\$20	\$198,000
	REMOVE AND SALVAGE WOOD TIES, 136# TRACK	TF	1,600	\$40	\$64,000
				Subtotal	\$ 1,072,500
RAILROAD TRACKWORK - RESTORE TO ORIGINAL ALIGNMENT					
	FURNISH AND INSTALL TRACK, 136# RE, WOOD TIES INCLUDING BALLAST & OTM	TF	1,600	\$350	\$560,000
	SHIFT TRACK (WOOD TIES)	TF	1,140	\$75	\$85,500
	TRACK SUBBALLAST	CY	1,725	\$40	\$69,000
	EMBANKMENTS AND OTHER FILLS	CY	1,200	\$20	\$24,000
	EXCAVATION	CY	4,500	\$20	\$90,000
	REMOVE AND SALVAGE WOOD TIES, 136# TRACK	TF	1,600	\$40	\$64,000
				Subtotal	\$ 892,500
RAILROAD SIGNAL WORK - Shoofly					
	MISCELLANEOUS SIGNAL WORK (REMOVAL, RECONNECTIONS AND MODIFICATION)	LS	1	\$50,000	\$50,000
				Subtotal	\$50,000
RAILROAD SIGNAL WORK - RESTORE TO ORIGINAL ALIGNMENT					
	MISCELLANEOUS SIGNAL WORK (REMOVAL, RECONNECTIONS AND MODIFICATION)	LS	1	\$50,000	\$50,000
				Subtotal	\$50,000

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost
RAILROAD FLAGGING					
	RAILROAD FLAGMAN	MAN-DAY	400	\$1,200	\$480,000
				Subtotal	\$480,000
SUBTOTAL, RAILROAD WORK PERFORMED =					\$2,545,000
OTHER PROJECT COSTS					
	PERMANENT EASEMENT FROM CALTRANS	SF	2,020	\$20	\$40,400
	RIGHT OF WAY	SF	18,482	\$25	\$462,050
				Subtotal	\$502,450
ENGINEER'S ESTIMATE OF PROBABLE TOTAL PROJECT COST, WITHOUT CONTINGENCY =					\$15,451,071
30% COST CONTINGENCY =					\$4,635,321
Total Construction Cost =					\$20,086,392
ANCILLARY/CONSTRUCTION COSTS					
	Agency Construction Admin.	%	2	CCE	\$401,700
	Design Support During Constr. (3% to 4%)	%	3	CCE	\$602,500
	Construction Management & Testing	%	10	CCE	\$2,008,600
				Subtotal	\$3,012,800
Total Project Cost (not escalated) =					\$26,111,792
ESCALATION					
	Escalation to Midpoint of Construction (June 2015) @	3%	1.00	YEAR	\$784,000
	Escalation to Midpoint of Construction (June 2016) @	3%	2.00	YEARS	\$1,591,000
	Escalation to Midpoint of Construction (June 2017) @	3%	3.00	YEARS	\$2,422,000
	Escalation to Midpoint of Construction (June 2018) @	3%	4.00	YEARS	\$3,278,000
	Escalation to Midpoint of Construction (June 2019) @	3%	5.00	YEARS	\$4,159,000
Total Project Cost (Escalated to 2017) =					\$28,500,000

- Estimated costs shown does not includes the cost to lowering the utility lines underneath the railroad bridge
- Estimate assumes no hazardous materials, either in structures or underground.

Aesthetic/Visual Resources

Coastal Act 30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

LCP Policy 9.1. The existing views to, from, and along the ocean and scenic coastal areas shall be protected, preserved, and enhanced. This may be accomplished by one or more of the following: (1) Acquisition of land for parks and open space; (2) Requiring view easements or corridors in new developments; (3) Specific development restrictions such as additional height limits, building orientation, and setback requirements for new development; (4) Developing a system to evaluate view impairment of new development in the review process.

LCP Policy 9.10. The City shall work with the County, Caltrans, and the Santa Barbara County Association of Governments (SBCAG) to achieve common goals and interests with regard to community concerns and the design of new highway improvements and landscaping.

LCP Policy 9.11. Improvements proposed for Highway 101 shall minimize the removal of existing landscaping and particularly specimen and/or skyline trees. Where the City finds that vegetation removal is unavoidable, cannot be prevented, and is in the best public interest, replacement plant material shall be incorporated into the project design so as to achieve wherever feasible comparable or better landscape screening in a timely manner.

LCP Policy 9.12. When improvements are proposed to Highway 101 in the Coastal Zone that will result in plant removal, the applicant shall submit a landscape plan prepared by a licensed landscape architect which is consistent with Architectural Board of Review requirements. Landscape plans shall be consistent with Architectural Board of Review guidelines and shall be reviewed and approved by the Architectural Board of Review prior to issuance of a Coastal Development Permit. Conformance with the approved landscape plan shall be a condition of Coastal Development Permit approval.

LCP Policy 9.13. Landscaping shall be used to improve areas where views are currently degraded (e.g., Castillo Street interchange to Hot Springs/Cabrillo interchange).

LCP Policy 9.15. In order to preserve the historic appearance of Highway 101, bridges and other important architectural features along the highway shall be preserved to the maximum extent feasible. Where the City finds that no other feasible alternative exists, replacement structures shall be of similar character, proportion, and appearance as the replaced structure. New structures and improvements shall capture human scale qualities similar to those that have historically contributed to the overall characterization of this highway segment. New elevated structures shall be avoided to the extent feasible; at-grade or below-grade reconstruction should be encouraged in order to avoid visual intrusion, and to provide opportunities for landscaping.

LCP Policy 9.16. The use of sound barriers shall be minimized to the extent feasible. Sound barriers shall be placed in a manner which protects views of the ocean and mountains from Highway 101 and frontage streets where feasible. Where critical views may be impacted, alternatives to barriers (such as soundproofing structures or new sound control technologies) should be considered. Where sound barriers are necessary to reduce highway noise impacts to adjacent land uses, the barriers shall be attractively designed in a consistent manner that is compatible with the surrounding neighborhoods. Landscaping sufficient to fully screen the barrier shall be provided in a timely manner along both sides of the barrier where feasible.

LCP Policy 9.17. Materials, colors, and textures used in new highway structures shall be appropriate to the Santa Barbara region. Concrete, when used in sound barriers, safety barriers, overpasses, ramps, and other highway structures shall be textured and/or colored in such a manner that the appearance of these structures will be compatible with landscaping, surrounding structures, and exposed soil. Use of wooden barriers and structures shall be encouraged where feasible. Use of metal beam guardrails shall be minimized.

LCP Policy 9.18. The amount of lighting provided along the highway shall be the minimum necessary for general safety. Lights shall be designed and placed in a manner that minimizes glare as seen from nearby residences and recreational areas.

101 Design Guidelines: Objectives. Toward the goal of preserving and maintaining the character of this important gateway to the City, the following are the primary objectives of the Highway 101 Coastal Zone Design Guidelines:

- The historic aspects of the original Montecito Parkway based on the Tilton Plan should be maintained (see Appendix 1).
- Existing highway structures and mature plan material shall be preserved and maintained unless demonstrated to be infeasible.
- When changes must be made to highway structures and landscaping, it is essential that the changes reflect the historic character of the highway corridor.
- The City of Santa Barbara, Caltrans and the Santa Barbara Association of Governments (SBCAG) need to work cooperatively to evaluate any alterations to existing structures, beginning at the earliest stages of project identification and design.

101 Design Guidelines: General Grading Guidelines. In general, grading should fit the existing topography of the area. The following guidelines are intended to expand on this basic concept.

- Landforms should take into account the aesthetic objectives of a given area (e.g., preserve existing vegetation, allow access to desirable views). Grading shall be carried out in a manner that maintains or improves aesthetics of each area, softens the appearance of the highway and reduces its massiveness, and provides opportunities for new landscaping or preservation of existing landscaping.
- In general, it is expected that the profile of Highway 101 will not change greatly from its current configuration, however if changes are proposed, new segments of elevated highway should be avoided.
- Grading along the highway corridor should follow the generally level terrain of the Coastal Zone. Scars from embankment and excavation slopes shall be avoided. Slopes shall not be so steep that they preclude growth of vegetation and shall not obstruct areas where long-range views currently exist.

101 Design Guidelines: Specific Grading Guidelines. The following techniques should be employed when grading is proposed in the highway corridor.

- The use of slope rounding, undulations and contour grading is encouraged to emulate the natural topography and create variations in slope.
- Berms may be used to reduce the visual dominance of a wall or sound barrier and to provide an area for landscaping.
- The use of retaining structures is encouraged to preserve existing vegetation that would otherwise be removed (such as when highway improvements would require new cut slopes which necessitate removal of existing vegetation and/or creation of new slopes which would be too steep to revegetate). Retaining walls are also encouraged when they would provide additional planting area on embankment slopes. [See photo 1]
- In general, walls and retaining structures which have spaces that can be planted are encouraged.
- Drainage improvements, both above and below ground, should be designed to allow larger plantings.

101 Design Guidelines: General Landscaping Guidelines. The following guidelines are intended to provide general guidance on various elements to be considered when preparing a landscape plan for the Highway 101 Corridor within the Coastal Zone.

- The primary goals of landscaping are to soften the appearance of structures, to screen undesirable views and to screen and enhance the view of the highway from the City and the City from the Highway. Low landscaping is appropriate where views are important.
- Safety for drivers and maintenance workers is an important consideration for highway landscaping.
- Landscaping must reiterate and reinforce the historic nature of the area. It must be sensitively handled and be in keeping with the human scale of the area.
- If landscaping changes are made, revegetation which, where feasible fully mitigates the visual impact created by removal of the existing vegetation area shall be provided. Accomplishing this may require acquisition of land. When landscaping is removed, sufficient shoulder area should be provided to allow placement of a similar type of replacement landscaping.
- When considering new landscaping, significant existing landscaping shall be identified by the applicant in the landscape plan and if possible, preserved.
- The role of vegetation at interchanges (and particularly at Hot Springs Road/Cabrillo Boulevard) is to limit the scale of the interchange so that the driver has little awareness of the structure. With larger structures, larger landscaping is

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necessary to maintain the existing scale. Vegetation should be continuous along the interchange ramps from the highway corridor to the surface streets.

- An important factor in reducing the scale of structures and the roadway is to use tall trees. Caltrans should work with the City to preserve existing skyline trees and to plant new ones.
- The highway corridor in Montecito, which is outside of the City limits and under County jurisdiction, is characterized by lush, dense vegetation and an extensive tree canopy. The only place within the City with existing dense landscaping and an extensive tree canopy is the Hot Springs Road/Cabrillo Boulevard interchange. Where possible, this character should be further extended into the City limits.
- South of Milpas Street, landscaping shall not be arranged in a manner that creates a linear effect. For example, palms planted in formal straight rows tend to accentuate the corridor-like effect of the highway. Instead, landscaping should be placed in a manner that achieves an informal forested look that deemphasizes the corridor-like appearance of the highway. North of Milpas Street, a more formal landscaping approach may be used.
- The City should encourage planning of new trees in areas visible from Highway 101 but outside the Highway 101 Right-of-Way.
- Applicants should consult City Police and Fire Department staff so that their input can be obtained and their concerns addressed.
- Landscaping does not only refer to plant type and placement. It includes design features and land uses along the freeway in the Coastal Zone. Therefore, the City should discourage accumulation of junk and industrial waste along the freeway and encourage uses and structural designs that enhance the visual experience through the highway corridor.

101 Design Guidelines: Landscaping – Plant Selection. The following provides general guidance and suggestions when considering what types of vegetation to include in a plant palette.

- Emphasis should be placed on using a palette of native and adapted non-native plants, taking into consideration that variety is an important factor.
- A variety of landscape “episodes” using particular landscape palettes is encouraged.
- Eucalyptus (Lemon gums) are clearly successful in the Highway 101 corridor, as are Mexican Fan Palms.
- In general, broadleaf vegetation should be emphasized south of Milpas Street. Palms should be used with restraint in this area and should be arranged informally.
- Santa Barbara is located at the end of the Monterey Cypress Zone. Monterey Cypress does well near the coast and may be an acceptable plant choice.
- Another clearly successful plant is Pittosporum. The scent from the Pittosporum is pleasant in the spring and summer months and is a tough, attractive plant that has done well in the area and should continue to be used throughout the corridor.
- In most situations, native plants should not be used in situations where they normally do not exist. For example, Sycamore trees are appropriate in creeks and riparian areas where they grow naturally but do not perform as well at higher elevations where groundwater is deeper and supplemental watering may be necessary. (However, Sycamores have historically been present near the Hot Springs Road/Cabrillo Boulevard interchange and should be maintained in that location).
- When making plant selections, it should be recognized that Montecito has a different microclimate than the area within the City limits. Some of the plant material which gives Montecito its character can be applied to the City, however some plant choices may not be appropriate.
- Color is an important factor which should be considered when selecting plants. One of the unique qualities of Santa Barbara is that something is always in bloom. There is the seasonal leaf color of sycamores and the bright seasonal color provided by bougainvillea, wisteria and oleanders. Other colorful plants used successfully in the highway corridor are red-flowering eucalyptus, jacarandas, day lilies, oxalis, California poppy and ivy geranium. These plants are hardy and provide episodic color.
- It is important to use both fast and slow growing plants and plants of varying sizes to achieve both immediate and long-term effects.
 - Fast-growing plants are often short-lived. In the past, certain plants were sometimes selected to achieve quick results only to find that in 10 years the plants were inappropriate and had to be replaced.

- How the age question is addressed depends on the plants proposed. For example, replacement with large Sycamores may be appropriate because they are slow-growing, but replacement with large Eucalyptus trees would not be appropriate because they grow quickly.
- Planting specimen-size material can be risky since larger plants sometimes die from the disturbance of having their roots cut. Also, one gallon plants often outperform plants from 24" boxes within just a few years.
- Significant trees proposed for removal should be identified on the landscape plan for consideration by the appropriate City design review board. Significant trees that are removed should be replaced in kind if possible. This could be accomplished in a manner that takes into account both the short and long term view. Plants could be assigned a value when they are removed, using a recognized valuation system, with the replacement program based on the values assigned.
- It is important to minimize pruning needs, since pruning increases maintenance costs and exposes highway workers to hazardous conditions. Therefore, maintenance requirements should be considered when deciding to use fast-growing plants or when choosing to overplant to achieve quick results. Maintenance is most important when plants are young. Trees often need early pruning when they are young in order to establish a good shape.
- Safety is also a consideration in plant selection. For example, plant species which frequently drop branches, fronds or other large debris should not be planted close to travel lanes or other areas where debris would become a hazard to drivers.

101 Design Guidelines: Landscaping and Views. The relationship between landscaping and long range views is sensitive and a subject of great discussion during development of the design guidelines. The Highway 101 corridor within the Coastal Zone is characterized by both lush landscaping and sweeping long-range views of the mountains, City and the Pacific Ocean. [see photo 13] As a result, both landscaping and views are important throughout this corridor. New and existing landscaping should be planned and maintained in a manner that allows visibility of important views; at the same time, the lush vegetation which is so critical to the character of the area must be maintained. Landscape plans should serve to strike a balance between these two important characteristics.

- Views of Montecito, the City, the Mesa, the Riviera, the Mission area, the Santa Ynez Mountains and the Pacific Ocean must be considered when developing landscape plans.
- Planting along the highway corridor in the industrial area between Milpas Street and Garden Street should be carefully planned so that the plant material used will screen views of the industrial area without obstructing long-range views of the Mesa, City, ocean, and mountains.

101 Design Guidelines: Landscaping – Treatments for Fences and Walls. Walls and fences can create a linear, corridor-like effect, which generally should be minimized. The appropriate use of landscaping can limit this effect.

- Chain link fence are very reflective and support the linear effect. These fences should be dark in color so that the elements will blend in rather than contrast. Plant materials should be used to soften fences and walls but do not need to cover entirely. Vines which completely cover a fence or wall may create a green corridor, which may or may not be a desired effect, depending on the location and the extent of plant growth. In general, a linear effect throughout the highway corridor should be avoided.

101 Design Guidelines: General Guidelines for Structures. The following guidelines are intended to provide general guidance on the various elements to be considered when preparing plans for new or replacement structures for the Highway 101 corridor within the Coastal Zone.

- Every effort should be made to preserve existing highway structures.
- In general, new structures should reflect the historic character of the old structures in terms of materials, color, style, and the existing human scale of the area. Characteristics of human scale include breaking up the mass of structures, the selection of materials and the use of color and texture. Also important is the use of large scale landscaping, wood timber rails and creating continuity between the highway and the vegetation.
- Maintenance is important. Structures should be designed to gain patina and improve in appearance with age.
- When new structures are designed, the relationship of the highway to nearby dwellings and other adjacent land uses should be considered.
- Designs for new structures should take into consideration the aesthetic and functions needs of pedestrians, bicycles and other forms of alternative transportation. Designs should not preclude alternative forms of transportation.

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- The structures at the Hot Springs/Cabrillo Boulevard interchange should be used as examples of what is visually successful.
- Where feasible, utility lines should be placed underground.
- Safety and maintenance concerns are to be considered in the design of structures.

101 Design Guidelines: Bridges, Overpasses and Underpasses. Bridges, overpasses and underpasses are the most visually significant structures within the highway corridor and, as a result require special consideration. The following guidelines provide specific direction for highway projects which would result in new bridges, overpasses or underpasses or for projects which propose changes to existing structures of this type.

- The existing variation in design should be continued in the future. For example, a variety of bridge styles is desired rather than one specific design of theme. Each of the existing bridges is unique because each was built at a different point in time. This is an important quality which should be preserved.
- New bridges in the area of Hot Springs Road and Olive Mill Road should evoke Olmstead's original designs in Montecito and not be contemporary. New structures should create a similar ambiance and, if feasible, could even be exact reproductions. The goal for this area is to maintain its historic character.
- In other areas of the design district (such as Milpas Street and Salinas Street), Santa Barbara's Hispanic tradition should be emphasized.
- New bridges should emulate the human-scale characteristics of the old bridges. Divided lanes, additional support structure and landscaping should be used to break down the scale. Spans should be the smallest scale possible even if this means there are more of them. If possible, walkways should be separated from the roadway. For example, the existing Hot Springs Road/Cabrillo Boulevard interchange is very large, but certain design elements (such as separated bridges and dense landscaping which reduces visibility) keep the scale down. Without these elements, the existing structures would appear larger than they do.
- Proportion of bridge structures is also important, in combination with texture and materials. Generally, traditional bridge forms should be used.
- The massive wooden rails on some of the existing bridges are recurrent throughout the City and are essential elements which should be preserved.
- Concrete should be colored to match natural colors of the area and to create an appearance of warmth. Non-uniform color is acceptable and perhaps even desirable. One approach is to stain concrete to create the appearance of wood rails. Also, bridges can be colored to emulate stone by using Santa Barbara sandstone color and a dark stain to emulate the appearance of wood.
- Sandblasting can be used to obtain a patina instead of using smooth concrete, or a rough sawn texture can be used to emulate wood. If color is applied to bare concrete without texture it will not appear legitimate or true.
- Concrete is highly reflective, and it may be appropriate in some situations to use a blackish color or some other some other dark, receding color to absorb light, reduce glare, create shadows and reduce massing. The color need not be black, but a very dark strong color such as a dark brown or gray. Where visibility for drivers is a concern, reflective material may need to be incorporated into the design of darkened structures.
- An important characteristic is the use of open rails on bridges. With newer bridges, drives are often not aware that they are on a bridge. It may be appropriate to have solid masonry on the bridge itself and an open rail on approaches. This would give drives the sense that they are on a bridge.
- Exposed areas under structures require careful consideration to avoid large expanses of bare concrete.

101 Design Guidelines: Sign Structures. Signs affect the appearance of the highway corridor and should be as unobtrusive as possible while still serving their intended purpose.

- In general, most signs should be mounted on wood posts.
- The scale and design of signs, sign standards and sign lighting should be consistent with the highway and historic district. Signs shall be the smallest practical size given their function.
- The use of large cantilevered signs is discouraged.
- Commercial signs advertising specific businesses shall not be permitted; however appropriate directional signs are encouraged.

- Designs which discourage graffiti are encouraged; however use of razor wire and massive sign enclosures shall be avoided.

101 Design Guidelines: Lighting. Nighttime lighting can dramatically change the appearance of the highway corridor from its daytime character. Light fixtures should be as unobtrusive as possible while providing adequate lighting for safety and security.

- Currently, Caltrans uses the minimum of lighting required, and uses the most lighting at merges and at on-ramps will less lighting at off-ramps. Minimal sign illumination is used. One light for each freeway lane is used under bridges. This approach should continue to be encouraged in the future.
- Shields should be used if lights will shine directly into a neighborhood. Light designs which use a direct beam are preferred so that it is not necessary to shield.
- Light fixtures should be compatible with the El Pueblo Viejo Landmark District. The current fixtures are restrained in design and are acceptable.
- East of Milpas Street, lighting at ramps should be scaled to the semi-rural character of the area.

Land Use Element Goal: Character. Maintain the small town character of Santa Barbara as a unique and desirable place to live, work, and visit.

Land Use Element Goal: Design. Protect and enhance the community's character with appropriately sized and scaled buildings, a walkable town, useable and well-located open space, and abundant, sustainable landscaping.

Circulation Element Policy 9.4. The City shall promote excellent signage and aesthetics.

Circulation Element Policy 10.1. The City shall develop and use a mobility classification and service system that will designate mobility corridors throughout the City based on their purpose and function. The purpose of this classification and service system is to ensure consideration of all forms of travel in the design, development, improvement, and maintenance of all mobility corridors.

Gateway Corridors

Gateway corridors, such as Route 154 at State Street, Cabrillo Boulevard at the Bird Refuge, Carrillo Street at Route 101, and Garden Street at Highway 101, serve as major entry points into the City and should be distinctive. Design criteria for these gateway corridors may include but are not limited to:

- Interesting landscaping or entry structures which become the signature of the City
- Traffic control mechanisms

Environmental Resources Element Policy ER24 - Visual Resources Protection. New development or redevelopment shall preserve or enhance important public views and viewpoints for public enjoyment, where such protection would not preclude reasonable development of a property.

Environmental Resources Element Policy ER25 - Enhance Visual Quality. Not only retain, but improve visual quality of the city wherever practicable.

Conservation Element Goal – Visual Resources. Protect and enhance the scenic character of the City.

Conservation Element Goal – Visual Resources. Maintain the scenic character of the City by preventing unnecessary removal of significant trees and encouraging cultivation of new trees.

Conservation Element Goal – Visual Resources. Protect significant open space areas from the type of development which would degrade the City's visual resources.

Conservation Element Visual Resources Policy 3.0. New development shall not obstruct scenic view corridors, including those of the ocean and lower elevations of the City viewed respectively from the shoreline and upper foothills, and of the upper foothills and mountains viewed respectively from the beach and lower elevations of the City.

Conservation Element Visual Resources Policy 4.0. Trees enhance the general appearance of the City's landscape and should be preserved and protected.

Conservation Element Visual Resources Policy 5.0. Significant open space areas should be protected to preserve the City's visual resources from degradation.

Air Quality

Land Use Element Goal: Public Health. Improve public health through community design and location of resources by promoting physical activity, access to healthy foods and improved air quality.

Environmental Resources Element Policy ER7 - Highway 101 Set-back. New development of residential or other sensitive receptors (excluding minor additions or remodels of existing homes or one unit on vacant property) on lots of record within 250 feet of U.S. Hwy 101 will be prohibited in the interim period until California Air Resources Board (CARB) phased diesel emissions regulations are implemented and/or until the City determines that diesel emission risks can be satisfactorily reduced or that a project's particulate exposure level is sufficiently reduced. The City will monitor the progress of CARB efforts and progress on other potential efforts or measures to address diesel emissions risks.

Environmental Resources Element Policy ER10 - Development Mitigation. Establish ordinance requirements to apply standard air-quality mitigation measures for new development and construction projects. These include measures to minimize construction dust and vehicle emissions; provide landscaping; conserve energy and reduce vehicle trips.

Conservation Element Goal – Air Quality. Protect and Maintain air quality above Federal and State ambient air quality standards.

Conservation Element Goal – Air Quality. Reduce dependence upon the automobile.

Biology/Water Quality

Coastal Act 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Coastal Act 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas. (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

LCP Policy 6.12. The Andree Clark Bird Refuge shall be maintained, enhanced, and restored to a healthy and viable aquatic habitat, and shall be preserved as open space or other public, nondevelopable area.

LCP Policy 6.14. Development adjacent to the Andree Clark Bird Refuge shall be designed and constructed in such a manner as to be compatible in terms of building location, character and intensity. Furthermore, new development in this area shall protect, and, where feasible, enhance the sensitive habitat of the Andree Clark Bird Refuge, specifically addressing issues of drainage, traffic, noise and aesthetics.

Environmental Resources Element Policy ER11 - Native and Other Trees and Landscaping. Protect and maintain native and other urban trees, and landscaped spaces, and promote the use of native or Mediterranean drought-tolerant species in landscaping to save energy and water, incorporate habitat, and provide shade.

Environmental Resources Element Policy ER15 - Creek Resources and Water Quality. Encourage development and infrastructure that is consistent with City policies and programs for comprehensive watershed planning, creeks restoration, water quality protection, open space enhancement, storm water management, and public creek and water awareness programs.

Environmental Resources Element Policy ER16 - Storm Water Management Policies. The City's Storm Water Management Program's policies, standards and other requirements for low impact development to reduce storm water run-off, volumes, rates, and water pollutants are hereby incorporated into the General Plan Environmental Resources Element.

Conservation Element Visual Resources Policy 1.0. Development adjacent to creeks shall not degrade the creeks or their riparian environments.

Circulation/Mobility

Coastal Act 30252. The location and amount of new development should maintain and enhance public access to the coast by (1) facilitating the provision or extension of transit service, (2) providing commercial facilities within or adjoining residential development or in other areas that will minimize the use of coastal access roads, (3) providing nonautomobile circulation within the development, (4) providing adequate parking facilities or providing substitute means of serving the development with public transportation, (5) assuring the potential for public transit for high intensity uses such as high-rise office buildings, and by (6) assuring that the recreational needs of new residents will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and development plans with the provision of onsite recreational facilities to serve the new development.

LCP Policy 3.4. New development in the coastal zone which may result in significant increased recreational demand and associated circulation impacts shall provide mitigation measures as a condition of development including, if appropriate, provision of bikeways and bike facilities, pedestrian walkways, people mover systems, in lieu fees for more comprehensive circulation projects or other appropriate means of compensation.

LCP Policy 3.14. All improvements to Highway 101 shall be designed to provide as appropriate benefits (such as improved public access across and along the highway corridor to the waterfront, beach, and other recreation areas) and limit negative impacts (such as increased visibility of the freeway structure, increased noise or glare, or restricted access) to nearby recreational facilities within the Coastal Zone (e.g., Municipal Tennis Courts, the Child's Estate (Santa Barbara Zoo), Andree Clark Bird Refuge, beaches, harbor, waterfront area).

LCP Policy 11.15. Pedestrian movement and safety should be encouraged and provided for throughout the area.

LCP Policy 11.16. In order to encourage walking as an alternative to travel by automobile, the City shall protect existing pedestrian access to coastal areas from areas north of Highway 101 and strongly encourage the development of new pedestrian accessways.

LCP Policy 11.18. Where feasible, proposed improvements to Highway 101 shall include provisions for functional pedestrian access. The location of pedestrian access should be carefully considered in order to provide a functional, accessible, and comfortable path of travel. Sidewalks and walkways shall be wide enough to comfortably accommodate at least two persons walking side-by-side (a minimum of 4 feet), shall include shade and resting areas, and shall provide adequate protection from nearby automobile and bicycle traffic. Provision of new pedestrian access in the area of Milpas Street from Santa Barbara's East Side to East Beach and the Santa Barbara Zoo shall be the highest priority.

LCP Policy 11.19. All proposed modifications to highway interchanges with City streets shall provide freeway and local street access that is consistent with the City's Coastal Plan policies and zoning regulations, transportation standards and thresholds and the Circulation Element. Modifications should strive toward resolving existing functional and aesthetic concerns.

LCP Policy 11.20. Where feasible and appropriate, proposed improvements to Highway 101 shall incorporate alternative transportation improvements into the project design. These improvements may include provisions for travel by carpool, bicycle, public transit, rail service, or walking (including, but not limited to new pedestrian walkways, bicycle corridors, carpool lanes, park-and-ride lots, bus pockets, stops, and shelters). Projects shall include these features in the project design or shall allow for provision of these improvements in the future.

LCP Policy 11.21. The City shall ensure the identification of feasible methods to provide alternative transportation for the efficient use of the U.S. Highway 101 transportation corridor to accommodate further local, regional, and statewide transportation needs. Prior to the approval of a Coastal Development Permit for major metropolitan transportation investment projects pursuant to Chapter 1 of Title 23 CFR, Part 450, dated October 28, 1993, including the addition, relocation, or

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widening of any lanes, or construction of highway interchanges along U.S. Highway 101, the City Planning Commission, or the City Council on appeal, shall find that either:

1. The project is consistent with those portions of the Santa Barbara Association of Government's (SBCAG) Regional Transportation Plan that are applicable to the City's portion of the Coastal Zone and which (i) includes an alternative transportation mode study as described below, and (ii) have been incorporated by amendment into the City's certified Local Coastal Program; or
2. The project sponsor/applicant has completed an alternative transportation modes study to determine the type and extent of improvement needed to accommodate projected transportation levels. Such a study shall also evaluate the effectiveness and cost of alternative investments or strategies in attaining local, state, and national goals and objectives. The study shall consider the costs of reasonable alternatives and such factors as mobility improvements; social, economic, and environmental effects; safety; operating efficiencies; land use and economic development; financing, and energy consumption, consistent with federal regulations (Chapter 1 of Title 23 CFR, Part 450, dated October 28, 1993). The study shall specifically investigate the feasibility of alternative transportation modes such as, but not limited to, lanes dedicated to public commuter vehicles or multiple rider vehicles; mass transportation systems such as rail service; or other means of increasing the efficient use of the transportation corridor. The study shall also investigate the feasibility of accommodating non-motorized traffic through the development of recreational trails or commuter bikeways as an integral part of the transportation corridor.

For purposes of satisfying the application filing requirements relative to this standard for a Coastal Development Permit, the scope of the alternative transportation modes study shall be developed jointly by the Santa Barbara City Community Development Department and the Santa Barbara County Association of Governments and shall be proportionate and related to the scope of the proposed development.

Further, the alternative transportation modes studies shall be coordinated with Santa Barbara County, the cities within the Santa Barbara County Coastal Zone, and with the adjoining Counties of San Luis Obispo and Ventura. The information requirements under this standard will be deemed met upon a determination by the Director of the Community Development Department that the scope of work has been fulfilled through the completion of the alternative transportation modes study.

As an alternative to the above study, the Director of the Santa Barbara City Community Development Department may determine that the environmental review for a project on U.S. Highway 101, or any combination of existing studies, adequately satisfies this application filing requirement. In this instance no further study shall be required, providing that the information upon which such environmental review or other studies is based is current. This determination shall be based on the finding that the study/document(s) contain an adequate analysis of the plans, methods, and potential actions to implement feasible alternative transportation modes as described above. The cost of complying with either (a) or (b) above shall be the responsibility of the project sponsor/applicant. The application for a Coastal Development Permit shall be deemed complete only after this requirement is satisfied.

LCP Policy 11.22. Improvements to Highway 101 shall not remove any existing bikeways or pedestrian accessways or preclude the construction of any proposed bikeways without providing comparable or better replacement facilities.

101 Design Guidelines: Pedestrian and Bicycle Access. Changes to the highway corridor to provide opportunities for better pedestrian and bicycle access are strongly encouraged. To this end, these design guidelines are proposed to create a safer, more comfortable experience for persons using these modes of travel.

- Sidewalks need to be wide enough to provide reasonable separation from traffic. Features which create a comfortable atmosphere for walking (such as trees, shade, adequate lighting and street furniture) should also be provided.
- Road widths at on- and off-ramp pedestrian crossings should be as narrow as possible.
- New pedestrian accessways and revisions to existing accessways where possible should include provisions for bicycles.
- Pedestrian accessways whether new or revised, should be designed to provide access and comfortable use by the disabled, consistent with the Americans with Disabilities Act (ADA) requirements.
- Lighting for pedestrians is important and needs to be considered in designs for pedestrian accessways. The existing underpasses are dark and need more natural light and artificial illumination. However, lighting should not flood adjacent neighborhoods.

- The State Street underpass is an example of a structure which provides good pedestrian access because pedestrians are separated from traffic rather than near traffic. There is a stronger feeling of security. Being elevated also enhances this by giving a greater sense of separation. Design elements from this undercrossing should be employed when constructing new undercrossings or renovating existing ones.
- In general, designs which allow for separation of pedestrians from traffic through elevated walkways and/or location of walkways behind bridge supports are encouraged.
- In general, pedestrian overcrossings are more successful than undercrossings. The undercrossing at State Street is an exception because it allows people to feel protected. No examples or visually successful overcrossings currently exist in Santa Barbara.
- Use of interesting materials or colors is encouraged to make pedestrian overcrossings more appealing.
- The existing undercrossings represent potential palettes for artistic expression, especially for murals, mosaics, tilework, etc. The efforts should be encouraged by the City and Caltrans.
- Pedestrian access needs to be improved at the underpasses located at Quarantina and Salsipuedes Streets to create a pleasant and safe environment and a scale that is appropriate to the pedestrian. The sloped apron-like area under the bridges could be covered with brick or stone to improve its appearance. Textured or stamped concrete may also be appropriate.

Land Use Element Policy LG11 - Healthy Urban Environment. Consider health in land use, circulation and park and recreation decisions.

Conservation Element Air Quality Policy 1.0. Reduce single occupant automobile trips and increase the utilization of public transit.

Conservation Element Air Quality Policy 2.0. Improve the attractiveness and safety of bicycle use as an alternate mode of travel for short- and medium-distance trips.

Circulation Element Goal: Integrated Multi-Modal Transportation System. Create a more integrated multi-modal transportation system to connect people, places, goods, and services. Provide a choice of transportation modes and decrease vehicle traffic congestion.

Circulation Element Goal: Street Network. Provide a comprehensive street network that safely serves all transportation modes.

Circulation Element Policy C1 - Transportation Infrastructure Enhancement and Preservation. Assess the current and potential demand for alternative transportation and where warranted increase the availability and attractiveness of alternative transportation by improving related infrastructure and facilities without reducing vehicle access.

Circulation Element Policy C6 - Circulation Improvements. Where existing or anticipated congestion occurs, improve traffic flow in conjunction with providing improved access for pedestrians, bicycles and public and private transit through measures that might include physical roadway improvements, Travel Demand Management (TDM) strategies and others.

Circulation Element Policy C8 - Emergency Routes. It shall be a high priority to keep all emergency evacuation, response and truck routes free of physical restrictions that may reduce evacuation/response times.

Circulation Element Policy C9 – Accessibility. Make universal accessibility for persons with disabilities, seniors, and other special needs populations a priority in the construction of all new development for both public and private projects.

Circulation Element Goal 1 - Provide a transportation system that supports the economic vitality of the city. Establish and maintain a transportation system that supports the economic vitality of local businesses.

Circulation Element Policy 1.1. The City shall establish, maintain, and expand a mobility system that supports the economic vitality of local businesses.

Circulation Element Goal 2 - Strive to achieve equality of convenience and choice among all modes of transportation. Emphasize alternative modes in order to provide real options and opportunities for people to choose among different forms of transportation rather than relying exclusively on the automobile.

Circulation Element Policy 2.1. Works to achieve equality of convenience and choice among all modes of transportation.

Circulation Element Policy 2.3. The development and maintenance of mobility and utility systems should include consideration of the impacts and enhancements to Santa Barbara's environmental quality.

Circulation Element Goal 4 - Increase Bicycling as a Transportation Mode. Develop a comprehensive system of bicycle routes which are integrated with other modes of transportation and which provide safe and efficient bikeways.

Circulation Element Policy 4.2. The City shall work to expand, enhance, and maintain the system of bikeways to serve current community needs and to develop increased ridership for bicycle transportation and recreation.

Circulation Element Goal 5 - Increase Walking and other Paths of Travel. Develop a comprehensive system of pedestrian routes which are integrated with other modes of transportation and which provide safe and efficient paths of travel.

Circulation Element Policy 5.1. The City shall create an integrated pedestrian system within and between City neighborhoods, schools, recreational areas, commercial areas and places of interest.

Circulation Element Policy 5.5. The City shall create and foster a pedestrian friendly environment through physical and cultural improvements and amenities.

Circulation Element Policy 5.6. The City shall make street crossings easier and more accessible to pedestrians.

Circulation Element Policy 9.1. The City shall encourage use of alternative modes of transportation, especially non-motorized options, in and around the Coastal Zone.

Circulation Element Policy 14.1. The City shall encourage regional transportation plans and programs (such as those under the jurisdiction of the Santa Barbara County Association of Governments) that support the Circulation Element.

Circulation Element Policy 14.2. The City shall encourage coordination with the County of Santa Barbara and other agencies and jurisdictions through joint work sessions in order to pursue regional transportation goals.

Circulation Element Policy 14.5. The City shall cooperate with regional efforts that promote the use of alternative transportation.

Circulation Element Policy 16.7. Ensure that utility and transportation facilities are well maintained and located, so as not to impede pedestrians or traffic, and are aesthetically pleasing.

Bicycle Master Plan Goal 2. To create and maintain an extensive network of bikeways, which enhances access between residential, recreational, educational, institutional and commercial areas within and outside the City.

Bicycle Master Plan Policy 2.1. The City shall expand the bikeway network to increase ridership for bicycle transportation and recreation.

Bicycle Master Plan Policy 2.3. The City shall enhance the bikeway network.

Bicycle Master Plan Policy 3.3. The City shall require all development projects to be designed to meet the needs of people who ride bicycles, as appropriate.

Pedestrian Master Plan Goal 1. Improve the pedestrian system to increase walking in Santa Barbara.

Pedestrian Master Plan Policy 1.1. The City shall expand the sidewalk network to increase walking for transportation and recreation.

Pedestrian Master Plan Policy 1.2. The City shall improve pedestrian crossing at intersections.

Pedestrian Master Plan Policy 1.3. The City shall enhance pedestrian corridors.

Pedestrian Master Plan Policy 1.4. The City shall work to eliminate Highway 101 as a barrier to pedestrian travel.

Pedestrian Master Plan Policy 1.5. The City shall assist neighborhoods that desire to improve pedestrian access to, from, and within their neighborhood.

Pedestrian Master Plan Policy 1.6. The City shall support the establishment and construction of urban trails to enhance circulation and provide recreational opportunities through parks and open spaces.

Pedestrian Master Plan Policy 1.7. The City shall maintain, protect, and improve sidewalk facilities on an on-going basis and during public and private construction projects.

Pedestrian Master Plan Policy 1.9. The City shall work to make the pedestrian environment accessible to people with disabilities, children, and the elderly.

Pedestrian Master Plan Goal 4. Create public pedestrian environments that are attractive, functional, and accessible to all people.

Economic Vitality

LCP Policy 4.7. Proposed highway improvement projects for Highway 101 shall include methods to address potential disruptions to the local economy and particularly coastal visitor-serving uses during construction, operation, and maintenance of the highway improvement. Proposed projects shall identify the timing and length of any ramp closures, the location of alternative access points, methods to protect access to local businesses, proposed signage, and any other effective methods to mitigate such impacts.

Actions

- As part of an application for a Coastal Development Permit, Caltrans shall submit a Traffic Management Plan to the City for all highway improvements involving road or ramp closures that require a Coastal Development Permit. Prior to project construction, Caltrans shall also provide the City with a Closure Plan that identifies the timing and length of ramp closures, the location of alternative access points, methods to protect access to visitor-serving businesses and visitor destinations and points of interest, proposed signage, and any other methods to mitigate the impacts of the closure.
- The City should consider relaxing sign ordinance requirements on adjacent properties during construction of major highway improvements in order to allow businesses to temporarily advertise their location and the location of alternative accessways.

Circulation Element Policy 12.3. Sustain or improve economic vitality and quality of life in business areas or corridors by working with property owners, business owners, residents, tenants, and other interested parties to mitigate the impacts of vehicular traffic in business areas. The City shall consult with commercial tenants, property owners, and residents located in close proximity to any corridor or street before implementing improvements that could result in changes to the existing characteristics of that corridor or street, its traffic patterns or infrastructure. Improvements shall be consistent with Business Area Mobility Plans.

Economy and Fiscal Health Element Goal: Tourism. Continue to support tourism and related support services for visitors to Santa Barbara.

Economy and Fiscal Health Element Goal: Interconnected Regional Economy. Recognize that commerce is intertwined with transportation, natural resources and housing, and together are key elements of a healthy economy that is regional in scope.

Economy and Fiscal Health Element Goal: Minimize Impacts and Costs. Internalize impacts to the environment of new development and redevelopment, and avoid costs to the community.

Economy and Fiscal Health Element Policy EF1 - Integral Parts of Economic Development. Promote energy efficiency, innovation, public health, and arts and culture as integral parts of economic development.

Economy and Fiscal Health Element Policy EF4 - Existing Businesses. Give priority to retaining existing enterprises as the best source of business expansion and local job growth, and encourage government, businesses and residents to patronize local businesses and contractors, by working with local businesses to initiate a "Buy Local" program, with the City setting the example.

Economy and Fiscal Health Element Policy EF7 - Eco-Tourism. Support eco-tourism, such as bicycle tours, that takes advantage of existing hotels and resources such as the beach, ocean, and foothill trails.

Economy and Fiscal Health Element Policy EF9 - Infrastructure Improvements. Identify, evaluate and prioritize capital improvements that would assist in business retention or expansion, such as increased public transit, a rail/transit transfer center, city-wide wi-fi, sidewalk improvements, or consolidated customer parking facilities.

Historic/Archaeological Resources

Coastal Act 30244. Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

LCP Policy 10.1. Proposed improvements to Highway 101 shall be designed in a manner that is sensitive in design and function to the highway's historic role within the City.

LCP Policy 10.2. Improvements to Highway 101 shall avoid to the greatest degree possible impacts to historic resources.

LCP Policy 10.3. Any proposed changes to the Cabrillo Blvd. /Hot Springs Road/Coast Village Road interchange shall recognize the historical significance of the Cabrillo Boulevard area and shall avoid to the greatest degree possible changes in the appearance, context, or function of Cabrillo Boulevard and the surrounding area.

LCP Policy 10.4. Any proposed changes to the Cabrillo Blvd. /Hot Springs Road/Coast Village Road interchange shall minimize changes to the location, setting or context of the C.C. Park Watering Trough and Fountain.

Land Use Element Goal: Historic Preservation. Protect, preserve and enhance the City's historic resources.

Conservation Element Cultural and Historic Resources Goal. Sites of significant archaeological, historic, or architectural resources will be preserved and protected wherever feasible in order that historic and prehistoric resources will be preserved.

Conservation Element Cultural and Historic Resources Policy 1.0 Activities and development which could damage or destroy archaeological, historic, or architectural resources are to be avoided.

Conservation Element Cultural and Historic Resources Policy 4.0 The requirements and restrictions administered by the Landmarks Committee and the Architectural Board of Review will apply to City and other public agencies as well as private projects.

Historic Resources Element Goal – Protection and Enhancement of Historic Resources. Continue to identify, designate, protect, preserve and enhance the City's historical, architectural, and archaeological resources. Ensure Santa Barbara's "sense of place" by preserving and protecting evidence of its historic past, which includes but is not limited to historic buildings, structures, and cultural landscapes such as sites, features, streetscapes, neighborhoods, and landscapes.

Historic Resources Element Goal – Governmental Cooperation. Incorporate preservation principles as a valid and necessary component in decision-making, at every phase of City government, and secure cooperation from all levels and agencies of government in these efforts.

Historic Resources Element Policy HR1 – Protect Historic and Archaeological Resources. Protect the heritage of the City by preserving, protecting and enhancing historic resources and archaeological resources. Apply available governmental resources, devices and approaches, such as measures enumerated in the Land Use Element of this Plan, to facilitate their preservation and protection.

Historic Resources Element Policy HR2 – Ensure respectful and compatible development. Seek to ensure that all development within the City respects rather than detracts from individual historic and archaeological resources as well as the neighborhood and the overall historical character of the City. Assure compatibility of development, respect for the historical context of historical resources, and consideration of sustainable design alternatives where compatible.

Historic Resources Element Policy HR5 – Protect Neighborhood Historic Resources. Identify neighborhoods in the city that have substantially maintained historical character, and pursue measures to preserve that character. Protect such neighborhoods, especially those in close proximity to the downtown and commercial cores from development that might transform their historic character.

Historic Resources Element Policy HR6 – Protect Traditional Public Resources and Streetscapes. Identify and preserve significant public resources and streetscapes and ensure a public review process in order to protect their historical features and attributes.

Historic Resources Element HR7 – Protect Cultural Landscapes. Identify and preserve historic landscapes.

Land Development/Infrastructure

Coastal Act 30253. New development shall do all of the following:

- (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.
- (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.
- (c) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development.
- (d) Minimize energy consumption and vehicle miles traveled.
- (e) Where appropriate, protect special communities and neighborhoods that, because of their unique characteristics, are popular visitor destination points for recreational uses.

Coastal Act 30254. New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route 1 in rural areas of the coastal zone remain a scenic two-lane road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal-dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.

Environmental Resources Element Goal: Sustainable Resource Use. Protect and use natural resources wisely to sustain their quantity and quality, minimize hazards to people and property, and meet present and future service, health and environmental needs.

Environmental Resources Element Goal: Reduce Greenhouse Gases. Reduce where practicable greenhouse gas emissions contributions to climate change, and to air pollution and related health risks.

Environmental Resources Element Goal: Climate Change Adaptation. If applicable, incorporate adaptation to climate change in proposals for new development, redevelopment and public infrastructure.

Environmental Resources Element Policy ER1- Climate Change. As applicable, private development and public facilities and services may be required to incorporate measures to minimize contributions to climate change and to adapt to climate changes anticipated to occur within the life of each project.

Environmental Resources Element Policy ER4 - Incorporation of Adaptation in Development. New public and private development or substantial redevelopment or reuse projects shall estimate the useful life of proposed structures, and, in conjunction with available information about established hazard potential attributable to climate change, incorporate adaptation measures in the design, siting and location of the structures.

Safety and Public Services Element - Present and Future Service Needs. Ensure that public infrastructure and services are planned, sited, upgraded and maintained to meet present and future service needs efficiently, economically and in a manner consistent with a sustainable community and climate change.

Safety and Public Services Element - Safety and Preparedness. Emphasize safety and emergency preparedness as an integral part of land use planning.

Intersection Control Evaluation (ICE) Screening Evaluation

Olive Mill Road / Coast Village Road / US 101 Interchange

Santa Barbara, California

Draft

January 2015



KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

This Intersection Control Evaluation has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.



A handwritten signature in black ink that reads "Sean T. Houck".

SEAN T. HOUCK, P.E., Registered Civil Engineer

DATE

Intersection Control Evaluation (ICE) Screening Evaluation

Olive Mill Road / Coast Village Road / US 101 Interchange

Santa Barbara, California

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Project No. 17493

January 2015





Olive Mill Road / Coast Village Road / US 101 Interchange INTERSECTION CONTROL EVALUATION: SCREENING SUMMARY

Kittelison & Associates, Inc. (KAI) conducted an Intersection Control Evaluation (ICE) to objectively evaluate and screen intersection control and access alternatives at the following intersection(s):

US 101 Northbound Off-Ramp Terminal / US 101
Southbound On-Ramp Terminal / Olive Mill Road
/ Coast Village Road / North Jameson Road

The control options include:

- Traffic signal control
- Roundabouts
- Stop control (existing)

The City of Santa Barbara, County of Santa Barbara, and Caltrans jointly own and operate the intersection. Operationally, the roundabout configuration is the most likely, viable alternative to serve forecast traffic. The existing stop-control or, no project alternative, is a feasible traffic control alternative for the near term but will degrade over time with queues exceeding available storage capacity of the existing northbound off-ramp. Signal control is not a viable alternative considering the project constraints given for this evaluation. There may be other considerations, constraints, and project factors identified in future design evaluations that could affect the prioritization of a specific configuration.

The intersection evaluation considered year 2040 “build” condition traffic operations, geometrics, constraints, and other design considerations.

KEY FINDINGS INCLUDE:

- Roundabout control type would provide superior AM/PM peak hour operations over either the stop controlled or the signal controlled alternatives.
 - The roundabout alternative preserves the existing US 101 overpass bridge.
 - The roundabout alternative would simplify the existing intersection and reduce the number of decision points.
 - Traffic signal operations would not be acceptable for the existing nor 2040 design year. Stop control operations would not be acceptable for the 2040 design year.
 - With stop control, queues lengths on the US-101 northbound off ramp will exceed the available storage in year 2022, and spillback would affect mainline operations.
 - The roundabout alternative would not require right of way acquisition. The signal alternative is fatally flawed given the project constraints.
- The Caltrans District 5 ICE coordinator has reviewed the initial roundabout concept and agrees the project is viable to move forward into further analysis. No fatal flaws have been identified in this phase.



Figure 1. Site Vicinity Map

The roundabouts will provide speed control and the required sight distance, as well as accommodate traffic movements for the California Truck, Bus 45, and emergency response design vehicles. The roundabout alternative allows for less complex guide signing through the intersection. Additionally, the roundabout alternative has better expected safety performance than the traffic signal and stop control alternatives.

KAI recommends the roundabout alternative be advanced as viable intersection control and access strategies for the Olive Mill Road / Coast Village Road / US 101 Intersection.

Table 1 provides a summary of the operations comparison and Figure 2 displays the roundabout alternative concept design.

Table 1. Year 2040 Operations Comparison

Year 2040 Existing Stop Control	Year 2040 Signal Control	Year 2040 Roundabout Control
<ul style="list-style-type: none"> • Over capacity • LOS F in the a.m. peak hour with average delay of 71 seconds • LOS F in the p.m. peak hour with average delay of 57 seconds • Inadequate queue storage 	<ul style="list-style-type: none"> • Over capacity • LOS F in the a.m. peak hour with average delay of 124 seconds • LOS F in the p.m. peak hour with average delay of 209 seconds • Inadequate queue storage 	<ul style="list-style-type: none"> • Under capacity • LOS B in the a.m. peak hour with average delay of 10 seconds • LOS B in the p.m. peak hour with average delay of 14 seconds • Adequate queue storage

Bold indicates unacceptable operations

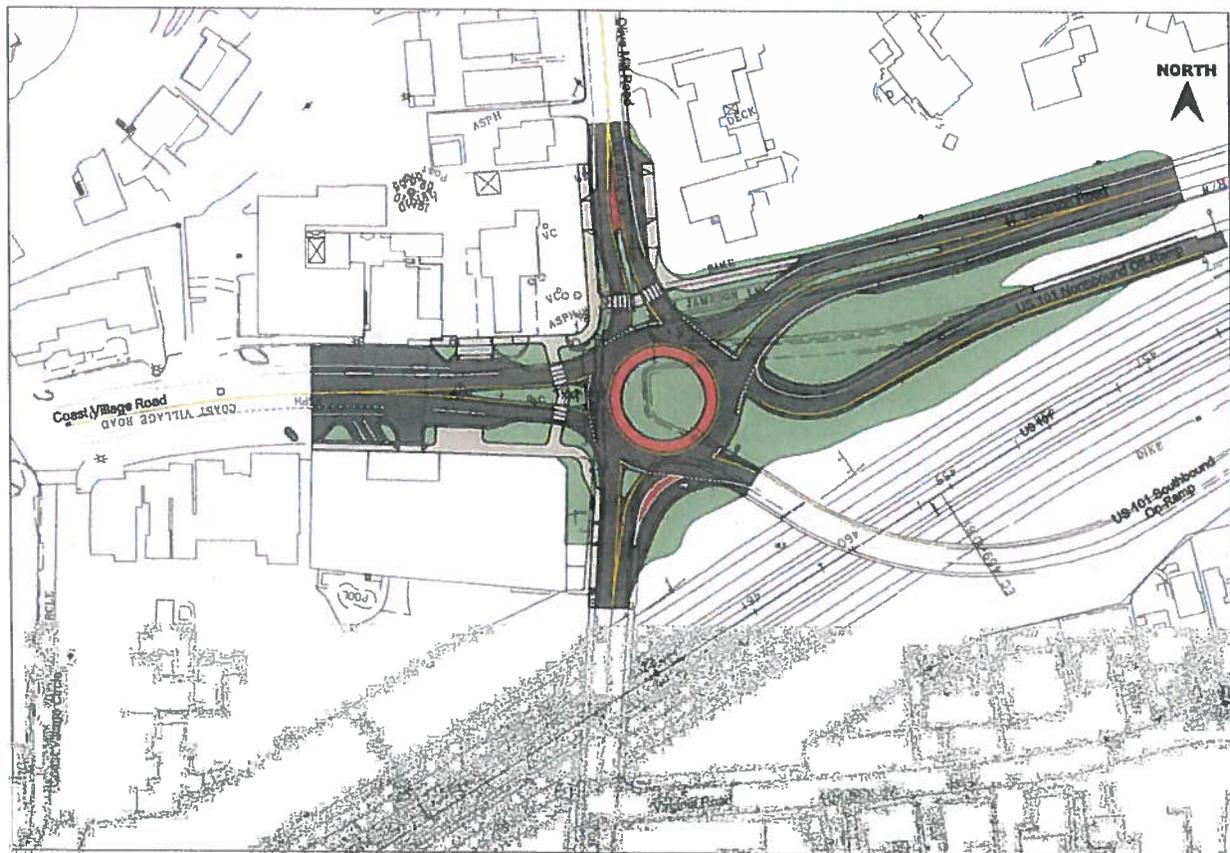


Figure 2. Roundabout Alternative Concept Design

INTRODUCTION

PROJECT OVERVIEW

This Intersection Control Evaluation (ICE) objectively evaluates alternatives for the intersection control form at the Olive Mill Road / Coast Village Road / US 101 interchange.

Figure 3 displays the site vicinity map.

This document explores intersection control alternatives at the study intersection. Three project alternatives were analyzed as described in this ICE:

- Stop Control Intersection (Existing Condition)
- Signalized Intersection
- Roundabout Intersection

PROJECT CONTEXT

The project context identifies the transportation facilities and geometric characteristics of the roadways within the study area. Table 2 describes the study area roadways.

As seen in Figure 3, the Olive Mill Road / Coast Village Road / US 101 interchange is an interchange controlled by stop signs on all approach legs. The stop limit-lines for the southbound and northbound Olive Mill Road approach are approximately 145 feet apart. The Coast Village Road, US 101 Off-Ramp, US 101 On-Ramp, and the N. Jameson Road approaches all fall within the intersection defined by the Olive Mill Road stop limit-lines.

The Coast Village Road leg is a gateway to the City of Santa Barbara and the Coast Village Business District.

All parcels in the immediate vicinity of the project are developed.

Table 2: Study Area Roadways

Roadway	Corridor Context				Multimodal Transportation		
	Cross Section	Functional Classification	Speed Limit	Regional Context	Transit Service	Pedestrian Considerations	Bicycle Routes
Olive Mill Road (City of Santa Barbara and County of Santa Barbara)	Undivided two-lane	Local Street	40 mph North of US Hwy 101 30 mph south of US Hwy 101	Serves local communities to the north and south of the study area Serves tourist and recreation destinations to the south and west of the study area	Local transit service is operated by MTD Santa Barbara in the study area. Service is provided via the Line 14 – Montecito north of the study intersection. A bus stop is located just north of N. Jameson Road.	Sidewalks are provided along the west side of Olive Mill Road within the City of Santa Barbara. Consistent with Montecito Association guidelines, sidewalks are not provided within the County of Santa Barbara.	Class II bicycle lanes are provided north of N. Jameson Road

Roadway	Corridor Context				Multimodal Transportation		
	Cross Section	Functional Classification	Speed Limit	Regional Context	Transit Service	Pedestrian Considerations	Bicycle Routes
Coast Village Road (City of Santa Barbara)	Undivided two-lane On-street angled parking	Commercial, shopping, entertainment, corridor	Not Posted	Serves local communities to the west. Gateway to Santa Barbara. Serves local and tourist shopping, entertainment, professional, and lodging services to the west. Alternate, parallel route to US 101	Local transit service is operated by MTD Santa Barbara in the study area. Service is provided via the Line 14 – Montecito. A bus stop is located just west of Olive Mill Road.	Sidewalks are provided along both sides	Class II bicycle lanes are provided
North Jameson Road (County of Santa Barbara)	Undivided two-lane	Local Street	40 mph	Serves local communities to the east. Serves local and tourist shopping, entertainment, professional, and lodging services to the west. Alternate, parallel route to US 101	None	None. Potential pedestrian destination limited to north of N. Jameson Road midblock. Consistent with Montecito Association guidelines, sidewalks are not provided within the County of Santa Barbara.	Class II bicycle lanes are provided
US 101	Four-lane divided highway	Highway		Bisects the City of Santa Barbara to provide north-south service through the City and to regional destinations	None	None	None

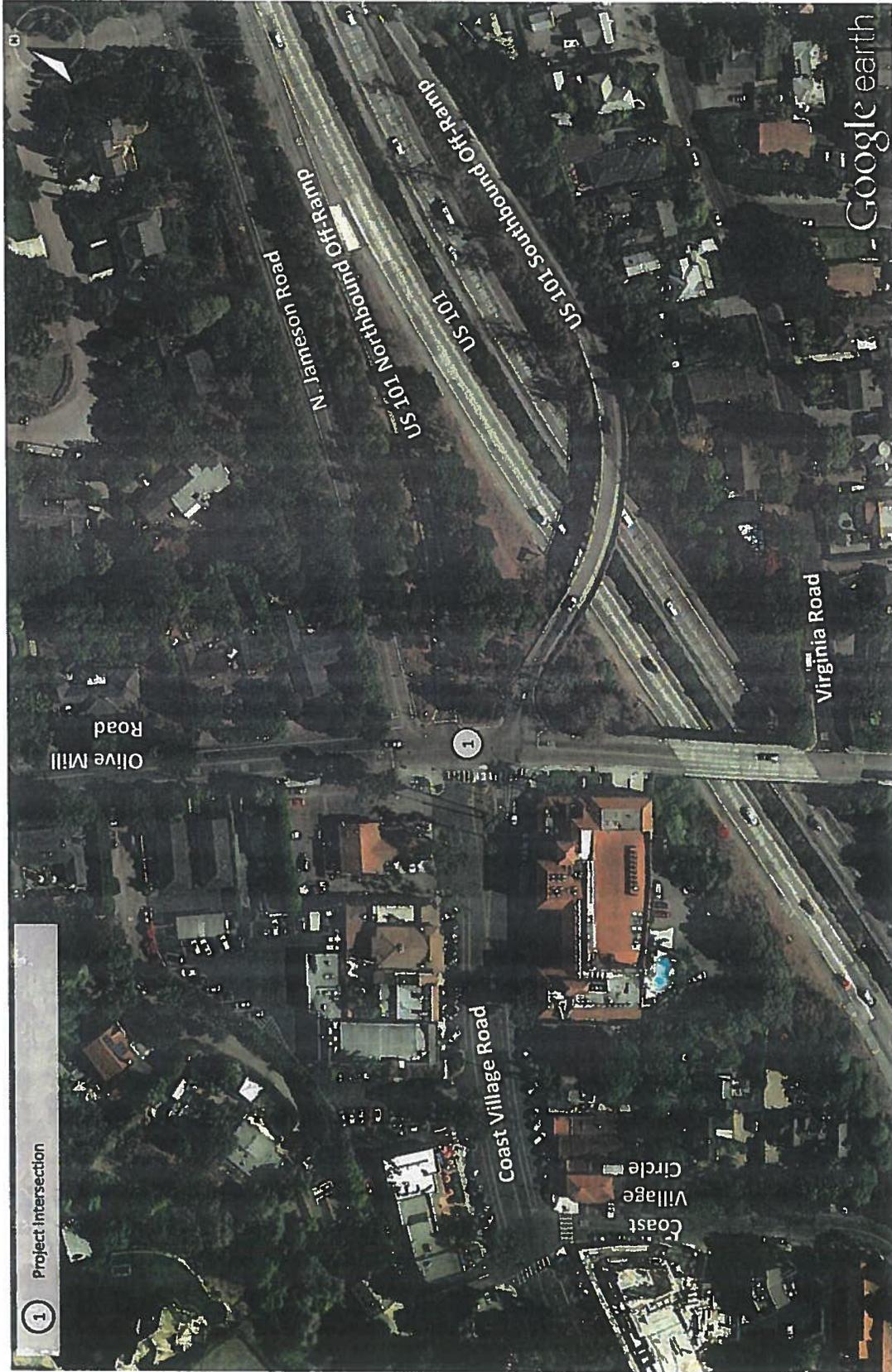


Figure 3. Study Area and Existing Study Intersection Lane Configuration

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PLANNING AND DESIGN FRAMEWORK

EXISTING CONDITIONS AND DESIGN CONSTRAINTS

The following section and Table 3 describe the existing conditions and constraints identified in Figure 4 and Figure 5.

RIGHT OF WAY

The project intersection is bisected by the City of Santa Barbara to the west and the County of

Santa Barbara to the east. The centerline of Olive Mill Road is the approximate location of the jurisdictional boundary.

Caltrans right of way generally follows the southerly fence line of N. Jameson Road and the westerly back of sidewalk of Olive Mill Road. Right of extends to a portion of Olive Mill Road north of N. Jameson Road. The existing intersection is largely within Caltrans R/W.

Table 3: Existing Conditions and Design Constraints

BOLD indicates either a fatal flaw identified by the City of Santa Barbara or a deviation from Caltrans Highway Design Manual (HDM) advisory or mandatory design standards effective September 22, 2014.

Focus Area	Description	HDM Design Deviation Alt.1/Alt.2	Alt. 1 Existing (Figure 4)	Alt. 2 Proposed Roundabout (Figure 5)
A	Olive Mill Bridge	No/No	<ul style="list-style-type: none"> • Potential Design Constraint / Fatal Flaw if altered 	<ul style="list-style-type: none"> • No Impact • Preserves existing bridge
B	US 101 Southbound On-Ramp Bridge	No/No	<ul style="list-style-type: none"> • Potential Design Constraint / Fatal Flaw if altered 	<ul style="list-style-type: none"> • No Impact • Preserves existing bridge
C	Retaining Structure Easterly side of Olive Mill Road	No/No	<ul style="list-style-type: none"> • Cost consideration if modified 	<ul style="list-style-type: none"> • New retaining structure will be required. The cost and magnitude of the structure will be influenced by Focus Area P.
D	Montecito Inn Parcel 009-293-007	No/No	<ul style="list-style-type: none"> • Potential Right of Way Constraint / Fatal Flaw if additional Right of Way needed 	<ul style="list-style-type: none"> • No significant impact • Landscape modifications may be needed to accommodate landscaping and sidewalk
E	76 Service Station Parcel 009-230-043	No/No	<ul style="list-style-type: none"> • Potential Right of Way Constraint / Fatal Flaw if additional Right of Way needed 	<ul style="list-style-type: none"> • No significant Right of Way impact • Significant access impact. Access for fuel trucks may be significantly impacted. Refer to Focus Areas K and L. • Landscape modifications may be needed to accommodate landscaping and sidewalk. • Improvements will likely replace existing sidewalk within parcel.
F	Private Residence Parcel 009-241-001	No/No	<ul style="list-style-type: none"> • Potential Right of Way Constraint / Fatal Flaw if additional Right of Way needed 	<ul style="list-style-type: none"> • No Impact • Improvements do not encroach

Focus Area	Description	HDM Design Deviation Alt.1/Alt.2	Alt. 1 Existing (Figure 4)	Alt. 2 Proposed Roundabout (Figure 5)
G	Northbound Off-Ramp Deceleration Length	No/Unlikely	<ul style="list-style-type: none"> • First curve radius = 650 feet (approx.) • Curve is approx. 420 feet from gore 	<ul style="list-style-type: none"> • Design Deviation Unlikely • There is sufficient length to accommodate a variety of alignments to approach the roundabout. • As shown, the first curve radius is 500 feet with approx. 420 deceleration length. • Future studies should evaluate horizontal and vertical approach alignments that balance superelevation requirements, retaining structure costs, roundabout geometric guidance, intersection sight line angles, and ramp deceleration length.
H	Distance to Virginia Road from southbound US 101 on-ramp	Yes/Yes	<ul style="list-style-type: none"> • Existing deviation from Mandatory Design Standard for HDM Topic 504.3 (3) • Curb return to curb return distance is less than 400 feet 	<ul style="list-style-type: none"> • Maintains deviation from Mandatory Design Standard with minor improvement over existing • Distance from ICD to curb return, measured at Olive Mill Road centerline is 270 feet.
I	Distance to Coast Village Circle from Olive Mill Road	Yes/Yes	<ul style="list-style-type: none"> • Existing deviation from Advisory Design Standard for HDM Topic 504.3 (3) • Curb return to curb return distance is less than 500 feet but greater than 400 feet. 	<ul style="list-style-type: none"> • Maintains deviation from Advisory Design Standard with minor improvement over existing • Distance from ICD to curb return, measured at Coast Village Road centerline is 425 feet.
J	Driveway APN 009-230-043	Yes/Yes	<ul style="list-style-type: none"> • Existing deviation from Advisory Design Standard for HDM Topic 504.8 • Curb return to curb return distance is less than 100 feet but greater than 50 feet 	<ul style="list-style-type: none"> • Maintains deviation from Advisory Design Standard • Distance from ICD to driveway, measured at Coast Village Road centerline is 80 feet.
K	Driveway APN 009-230-043	Yes/No	<ul style="list-style-type: none"> • Existing deviation from Mandatory Design Standard for HDM Topic 504.8 • Curb return to curb return distance is less than 50 feet 	<ul style="list-style-type: none"> • Deviation from Mandatory Design Standard is not needed with this alternative. • Driveway is removed with this concept
L	Driveway APN 009-230-043	Yes/No	<ul style="list-style-type: none"> • Existing deviation from Mandatory Design Standard for HDM Topic 504.8 • Curb return to curb return distance is less than 50 feet 	<ul style="list-style-type: none"> • Deviation from Mandatory Design Standard is not needed with this alternative. • Driveway is removed with this concept
M	Driveway APN 009-230-043	Likely/No	<ul style="list-style-type: none"> • May be an Existing deviation from Advisory Design Standard for HDM Topic 504.8 • Curb return to curb return distance may be less than 100 feet but is greater than 50 feet 	<ul style="list-style-type: none"> • Either maintains existing deviation or a new deviation from Advisory Design Standard may be needed with this alternative. • Driveway location may be 85 feet from ICD to driveway measured along the proposed Olive Mill Road centerline.
N	Distance to N. Jameson Road	Yes/No	<ul style="list-style-type: none"> • Existing deviation from Mandatory Design Standard for HDM Topic 504.3 (3) • Curb return to curb return distance is less than 400 feet 	<ul style="list-style-type: none"> • Deviation from Mandatory Design Standard is not needed with this alternative • N. Jameson Road is realigned to become a part of the ramp terminal intersection

Focus Area	Description	HDM Design Deviation Alt.1/Alt.2	Alt. 1 Existing (Figure 4)	Alt. 2 Proposed Roundabout (Figure 5)
O	Driveway APN 009-293-007	Yes/Yes	<ul style="list-style-type: none"> Existing deviation from Advisory Design Standard for HDM Topic 504.8 Curb return to curb return distance is less than 100 feet but is greater than 50 feet 	<ul style="list-style-type: none"> Maintains deviation from Advisory Design Standard Distance from ICD to driveway, measured at Coast Village Road centerline is approximately 90 feet.
P	Pedestrian access though easterly side of intersection	No/No	<ul style="list-style-type: none"> Accessible pedestrian facilities are not provided along the easterly side of Olive Mill Road between the bridge and N. Jameson Road. 	<ul style="list-style-type: none"> No change in pedestrian route Accessible pedestrian facilities are not proposed, as illustrated. Accessible pedestrian facilities could be provided through intersection. If provided, cost of retaining structure identified in Focus Area C will likely increase. Also see Focus Areas Q and R
Q	Pedestrian access on Olive Mill Road bridge	No/No	<ul style="list-style-type: none"> Accessible pedestrian facilities exist on both sides of bridge 	<ul style="list-style-type: none"> No change
R	Pedestrian access at intersection of Virginia Road and Olive Mill Road	No/No	<ul style="list-style-type: none"> Curb ramps and crosswalks are not present 	<ul style="list-style-type: none"> Refer to Focus Area P Northbound pedestrians should be routed to the westerly side of Olive Mill Road if pedestrian facilities are not provided on the easterly side of the project intersection
S	Bus stop with turnout bay	No/No	<ul style="list-style-type: none"> Consideration for all proposed improvements 	<ul style="list-style-type: none"> Bus stop with turnout bay is improved at existing location
T	Olive Mill Road, South Leg	No/No	<ul style="list-style-type: none"> 12 foot lanes 2 foot shoulders 5 foot sidewalk along westerly side No crosswalk at study intersection 	<ul style="list-style-type: none"> No Change No Change No Change No Change Right turn lane with mountable channelization added at intersection Splitter island
U	Coast Village Road, West Leg	No/No	<ul style="list-style-type: none"> At intersection <ul style="list-style-type: none"> Eastbound 10.5 foot left turn lane Eastbound 14.5 foot through and right turn lane Westbound 14.5 foot lane Crosswalk Variable width median with pedestrian refuge 12 foot eastbound lane 17 foot westbound lane 6 foot bicycle lanes On-street, angled parking Sidewalks 	<ul style="list-style-type: none"> At intersection <ul style="list-style-type: none"> Removed <ul style="list-style-type: none"> 12 foot eastbound left-through-right lane Westbound 12 foot lane No change No change No change No change No change No change No change
V	Olive Mill Road, North Leg	No/No	<ul style="list-style-type: none"> 12.5 foot lanes 5 foot Class II bicycle lanes Sidewalk along APN 009-230-043 only No crosswalk at intersection 	<ul style="list-style-type: none"> 12 foot lanes No change Add 50 feet of sidewalk along easterly side, north of intersection Add crosswalk Add splitter island with mountable median at Focus Area M
W	N. Jameson Road, Northeast Leg	No/No	<ul style="list-style-type: none"> 10.5 foot lanes 5 foot Class II bicycle lanes No sidewalks No crosswalk at intersection 	<ul style="list-style-type: none"> 12 foot lanes No Change 110 foot sidewalk/path along northerly side, east of intersection No Change Splitter island

Focus Area	Description	HDM Design Deviation Alt.1/Alt.2	Alt. 1 Existing (Figure 4)	Alt. 2 Proposed Roundabout (Figure 5)
X	US 101 Northbound Off-Ramp, East Leg	Possible*/ No	<ul style="list-style-type: none"> • 12 foot lane • 8 foot right shoulder • 2 foot left shoulder* <p>* Assumes concurrence for restrictive condition per Note (2), Table 302.1 in HDM</p>	<ul style="list-style-type: none"> • No change • No change • 4 foot left shoulder
Y	US 101 Southbound On-Ramp, Southeast Leg	Possible*/ Possible*	<ul style="list-style-type: none"> • 12 foot lane • 8 foot right shoulder • 2 foot left shoulder* <p>* Assumes concurrence for restrictive condition per Note (2), Table 302.1 in HDM</p>	<ul style="list-style-type: none"> • No change • No change • No change*
Z	Design Vehicle (DV) Refer to Figures in Appendix A	No/No	<ul style="list-style-type: none"> • DV: CA Truck <ul style="list-style-type: none"> ○ <u>Right turns</u>: Limited - DV will encroach into oncoming traffic lane. ○ <u>Left turns</u>: Possible with 1 Limitation – Left turn from southbound Olive Mill Road to N. Jameson Road, trailer will track into westbound lane. ○ <u>US 101 Northbound Off-Ramp to N. Jameson Road</u>: Not Possible ○ <u>Eastbound Olive Mill Road to N. Jameson Road</u>: Limited – DV will track into opposing westbound N. Jameson lane 	<ul style="list-style-type: none"> • DV: CA Truck <ul style="list-style-type: none"> ○ <u>Right turns</u>: Possible. ○ <u>Left turns</u>: Possible. ○ <u>US 101 Northbound Off-Ramp to N. Jameson Road</u>: Possible if DV circulates through roundabout. ○ <u>Eastbound Olive Mill Road to N. Jameson Road</u>: Possible.

CRASH DATA AND OPERATING SPEEDS

Existing crash data was not reviewed as part of this effort. Vehicle speed data was not collected as part of this effort. If physical and operational constraints assessments presented herein do not inform the ICE process, these factors could be examined at a later time.

SPECIAL EVENTS

The Santa Barbara Triathlon course goes through this intersection from Olive Mill Road (south leg) to Jameson Road.

TRAFFIC CONTROL STRATEGIES, CONSIDERATIONS, AND PERFORMANCE ANALYSES

Traffic control alternatives evaluated as part of this ICE include:

- Retaining the existing intersection control and geometry. This alternative would retain all-way stop control (AWSC) at the intersection.
- Converting the intersection to signal control.
- Converting the intersection to a roundabout.

AWSC and signal alternatives with new geometric configurations are not identified in this study. Geometric modifications for AWSC and signal control are not considered feasible due to the operational constraints identified as fatal flaws (i.e., queue spill-back onto the US-101 off-ramp).

Using operations methodologies consistent with the *US 101 HOV PA-ED* (dated December 2011) described in Appendix C, KAI evaluated the traffic control alternatives. The analysis results for each intersection are presented below. Supporting material, including more detailed operations results and the operations analysis worksheets can also be found in Appendix C.

ANALYSES RESULTS

All-Way Stop Control with Existing Geometry

The AWSC with existing geometry alternative assumes the existing lane configuration remains the same under year 2040 conditions. Under year 2040 conditions, the intersection is projected to operate over capacity. Queues on the US 101 Northbound Off-Ramp will exceed available storage during the weekday a.m. and p.m. peak hours.

Given the limitations of existing state-of-the-art operational software combined with the a-typical geometric design of the current interchange, two analysis approaches have been developed to

analyze the AWSC conditions of the Olive Mill interchange. A static analysis using SYNCHRO was applied in the US101 HOV PA-ED study (with Modified F Configuration at Cabrillo Hot-Springs) which analyzed the Olive Mill interchange as three distinct and separate TWSC intersections (NB Off-Ramp/Olive Mill Road; North Jameson Lane/Olive Mill Road; and SB On-Ramp/Olive Mill Road). This analysis determined that the NB Off-Ramp and SB On-Ramp portions of the interchange failed (LOS E/F). For this ICE determination, a VISSIM micro-simulation model calibrated to site specific conditions with field measured flow rates and queue lengths was developed which holistically analyzed interchange operations (as one unified intersection). All capacity analysis results presented in this memo for all-way stop control were determined using the microsimulation model. Both approaches yielded similar/consistent results i.e., LOS E/F under 2040 conditions.

Signal Control with Existing Geometry

The signal control alternative with existing geometry alternative assumes the existing lane configuration remains the same under year 2040 conditions. Under year 2040 conditions, the intersection is projected to operate over capacity with significant queuing during the weekday a.m. and p.m. peak hours.

Roundabout Control

A roundabout configuration was evaluated to determine lane configurations needed to support the 2040 design year conditions. The proposed roundabout lane configuration is shown in Figure 7. The proposed roundabout is projected to operate with a volume to capacity (v/c) ratio of 0.77 or less on all approaches for year 2040 build conditions, with the US 101 Northbound Off-Ramp as the critical approach during the p.m. peak hour.

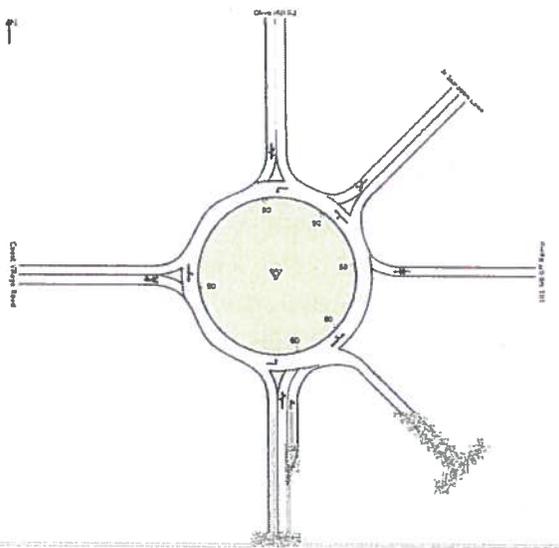


Figure 7. Proposed Roundabout Lane Configuration

Roundabout vs. AWSC and Signal Comparison

Comparing these models to the year 2040 intersection operations shows the roundabout to be the configuration with better predicted operational performance and no identified fatal flaws. Under AWSC and signalized conditions, the intersection is expected to exceed capacity and experience significantly greater delays than under the roundabout alternative. Further, any mitigated geometry alternatives to the AWSC and signal control options would exceed given right of way constraints and would be considered fatally flawed.

Table 4: Existing (2014) Operations

Approach	Movement*	Delay (seconds/vehicle)		95th % Queue (feet) ¹		Storage (feet) ²	Adequate Storage (Yes/No)
		AM	PM	AM	PM		
Northbound – Olive Mill Road	L/T/R	29.1 (D)	31.2 (D)	150	225	275	Yes
Westbound – US-101 NB-Off Ramp	L/T/R	58.9 (F)	30.8 (D)	325	125	750	Yes
Westbound – Jameson Lane	L/T/R	22.4 (C)	14.4 (B)	100	75	710	Yes
Southbound – Olive Mill Road	L/T/R	29.1 (D)	31.2 (D)	150	225	720	Yes
Eastbound – Coast Village Road	Left	17.4 (C)	58.6 (F)	100	1425	410	No
	T/R	23.0 (C)	35.1 (E)	150	1600	150	No

*Movement Key: L=Left turn, T=Through, R=Right turn.

1. Rounded up to the nearest 25 feet

2. Storage = Available storage

Bold and shaded indicates inadequate condition

Table 5. Year 2040 Operations Comparison

Time Period	Existing All Way Stop Control*			Signal Control*			Roundabout Control**		
	Volume to Capacity Ratio	Delay (seconds/vehicle)	Queue Length (feet)	Volume to Capacity Ratio	Delay (seconds/vehicle)	Queue Length (feet)	Volume to Capacity Ratio	Delay (seconds/vehicle)	Queue Length (feet)
AM	0.542	71.6 (LOS F)	> 1000 (E)	> 1.00	112.5 (LOS F)	700 (S)	0.421	9.6 (LOS A)	100 (E)
PM	0.676	58.3 (LOS F)	> 1000 (E)	> 1.00	162.3 (LOS F)	775 (S)	0.555	13.7 (LOS B)	250 (W)

*Overall intersection operations shown for the all way stop control and signalized alternatives

**Critical movement volume to capacity ratio and overall intersection average delay shown for each alternative

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

Kittelson & Associates, Inc. (KAI) conducted an Intersection Control Evaluation (ICE) to objectively evaluate and screen intersection control and access alternatives at the following intersection(s):

- US 101 Northbound Off-Ramp Terminal / US 101 Southbound On-Ramp Terminal / Olive Mill Road / Coast Village Road / North Jameson Road

The control options include:

- Traffic signal control
- Roundabouts
- Stop control (existing)

The intersection evaluations considered year 2040 traffic operations, geometrics, constraints, and other design considerations.

INTERAGENCY COORDINATION

Review of the project concept geometry and operations were conducted with project stakeholders and KAI. Project stakeholders include City of Santa Barbara, County of Santa Barbara, Santa Barbara County Association of Governments (SBCAG), and Caltrans. The following reviews were conducted:

1. Meeting 1, July 9, 2014. Santa Barbara North County Public Works Conference Room, Orcutt, CA.
2. Meeting 2, November 12, 2014. City of Santa Barbara Public Works Main Conference Room, Santa Barbara, CA.
3. Draft ICE document review, January 2015.

CONCLUSIONS

Key findings include:

- The Caltrans District 5 ICE coordinator has reviewed the initial roundabout concept and agrees the project is

viable to move forward into further analysis. No fatal flaws have been identified in this phase.

- Roundabout control type would provide superior AM/PM peak hour operations over either the stop controlled or the signal controlled alternatives.
- The roundabout alternative preserves the existing US 101 overpass bridge.
- The roundabout alternative would simplify the existing intersection and reduce the number of decision points.
- Traffic signal operations would not be acceptable for the existing nor 2040 design year. Stop control operations would not be acceptable for the 2040 design year.
- With stop control, queue lengths on the US-101 northbound off ramp will exceed the available storage in year 2022, and spillback would affect mainline operations. The roundabout alternative would not require right of way acquisition. The signal alternative is fatally flawed given the project constraints.

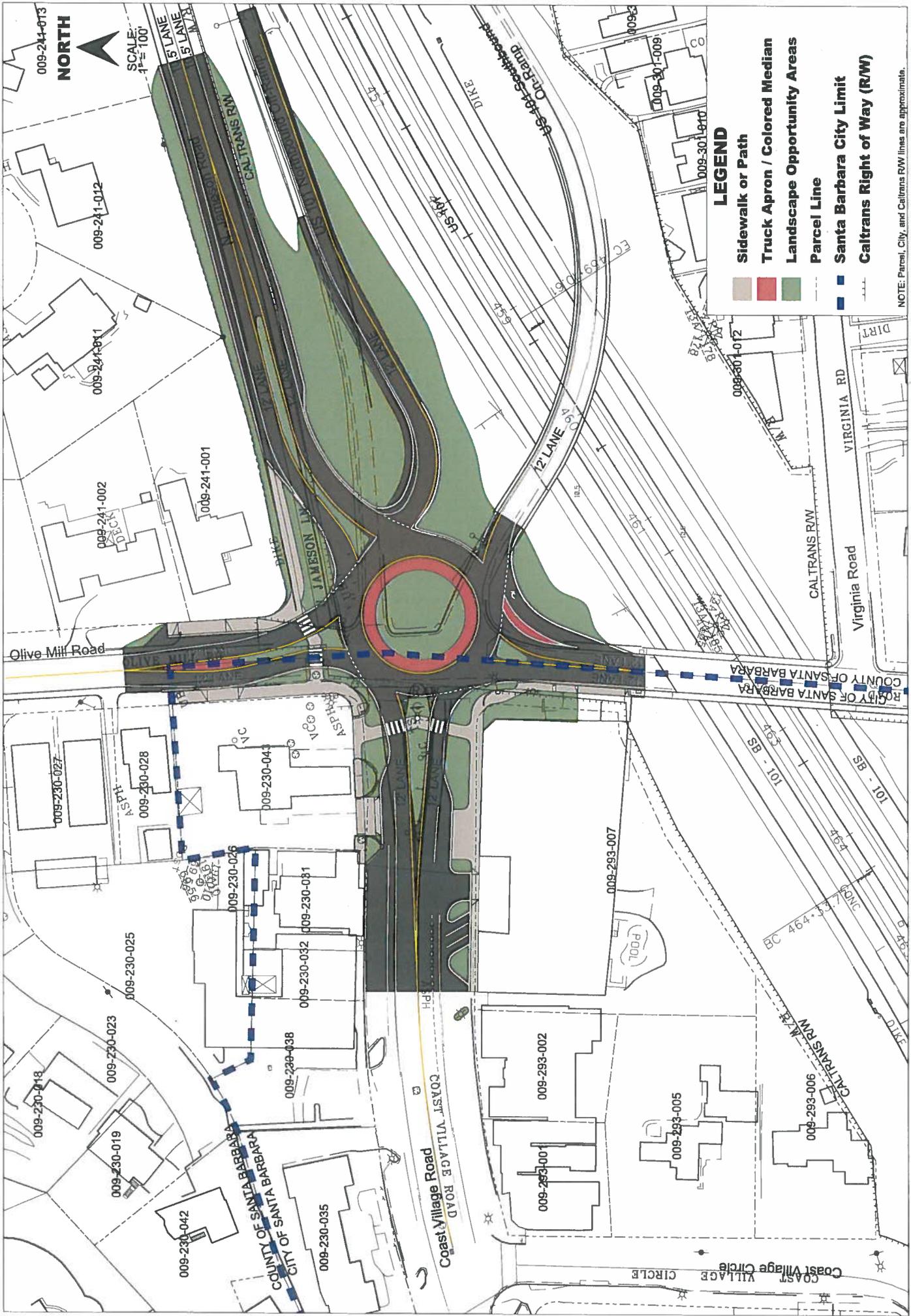
RECOMMENDATIONS

KAI recommends the roundabout alternatives be advanced as viable intersection control and access strategies for the Olive Mill Road/Coast Village Road/US-101 Interchange intersection.

REFERENCES

1. Dowling Associates. SC101 HOV PA-ED Traffic Study. December 2011.
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4. Tian, Zong Z., Feng Xu, Lee A. Rodegerdts, Wade E. Scarbrough, Brian L. Ray, William E. Bishop, Thomas C. Ferrara, Sannow Mam. Roundabout Geometric Design Guidance. University of Nevada, Reno. California Department of Transportation, Division of Research and Innovation, Research Project #65A0229. June 2007.
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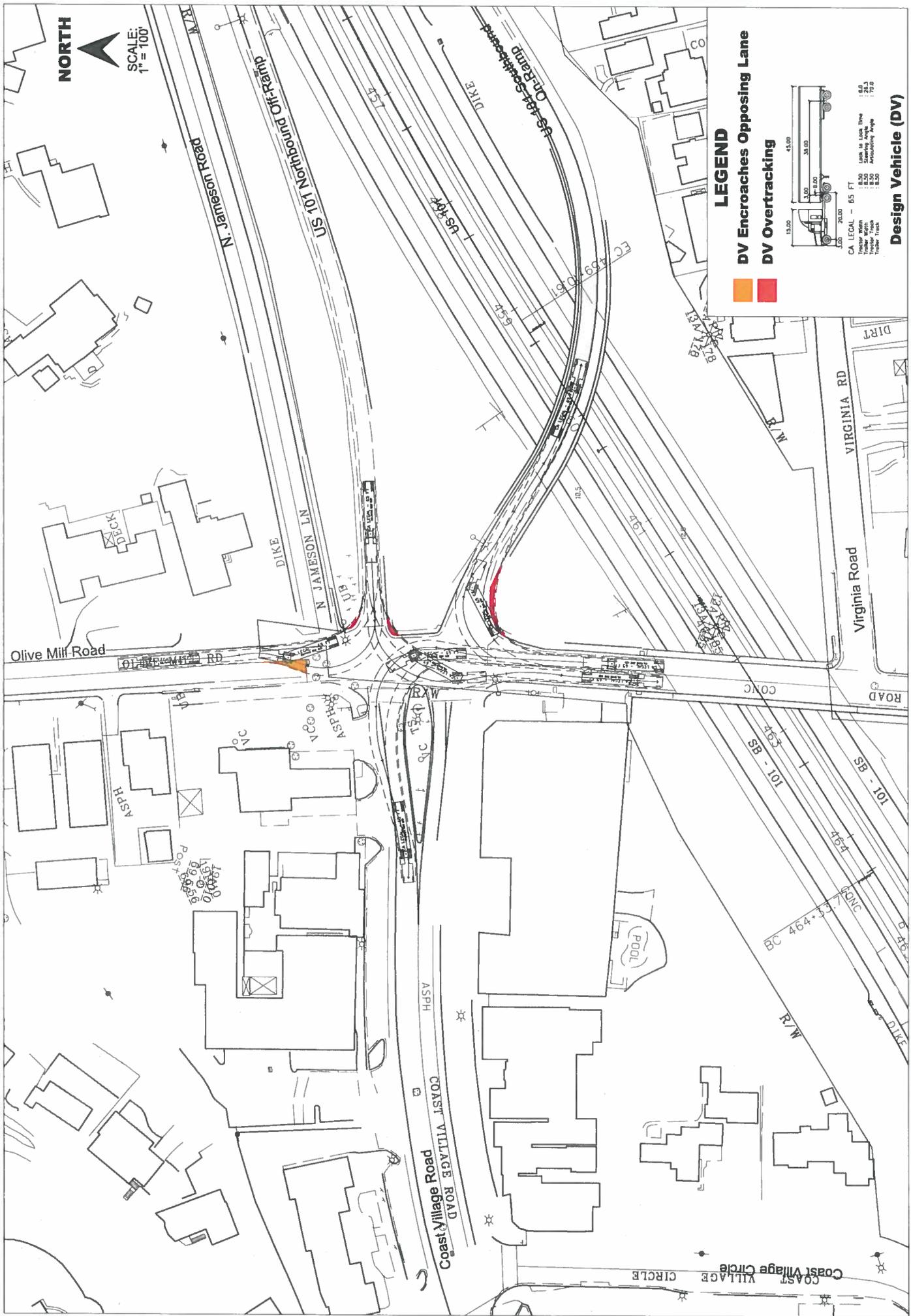
Appendix A
Conceptual Roundabout
Layouts



- LEGEND**
- Sidewalk or Path
 - Truck Apron / Colored Median
 - Landscape Opportunity Areas
 - Parcel Line
 - Santa Barbara City Limit
 - Caltrans Right of Way (RW)

NOTE: Parcel, City, and Caltrans RW lines are approximate.

US 101 at Olive Mill Road and Coast Village Road Roundabout Concept Layout
January 2015



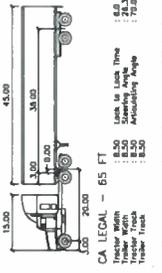
NORTH

SCALE:
1" = 100'

LEGEND

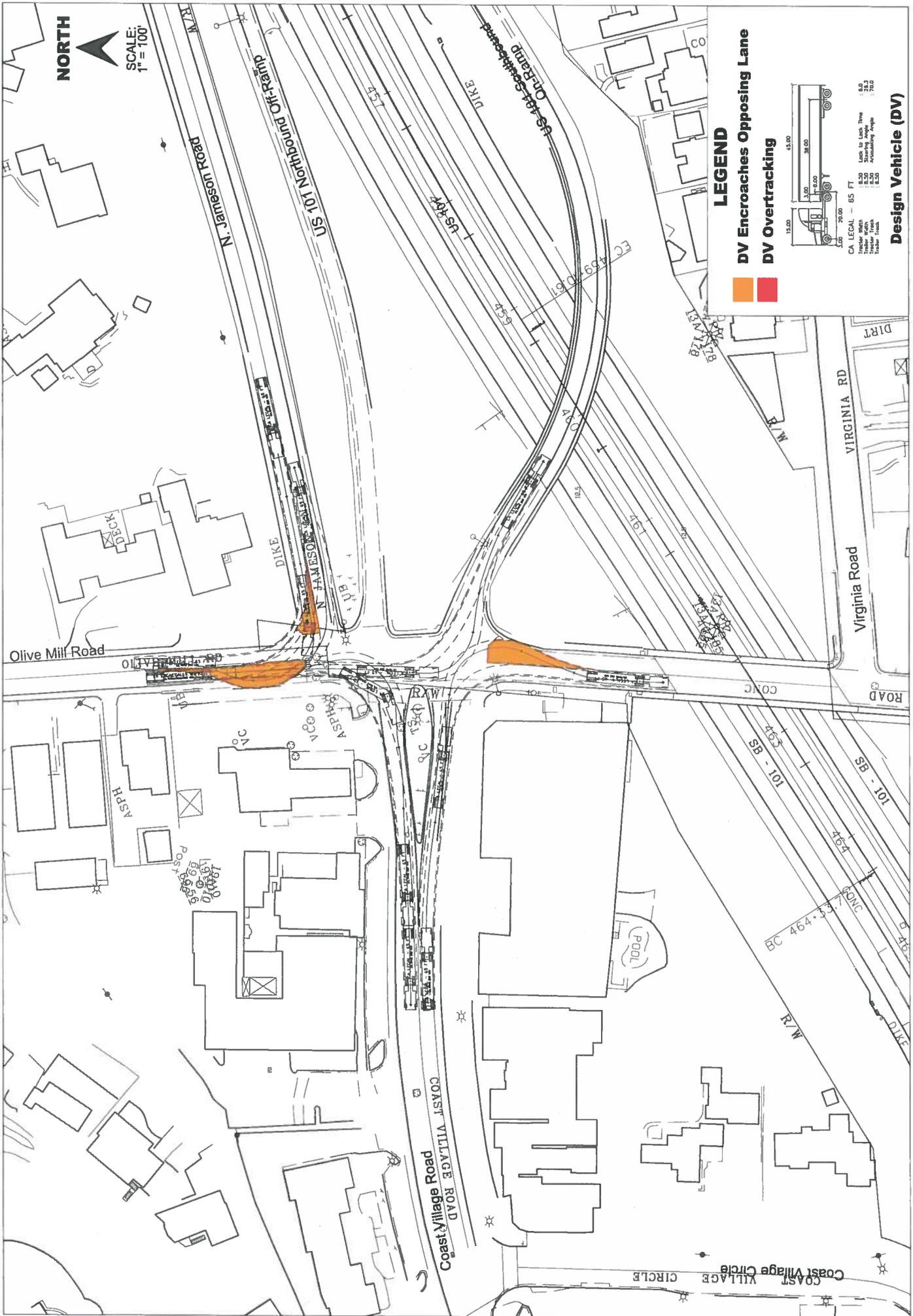
DV Encroaches Opposing Lane

DV Overtracking



Design Vehicle (DV)

**US 101 at Olive Mill Road and Coast Village Road
Design Vehicle Path - Exsiting NB - WB**



NORTH

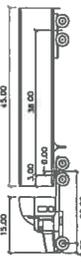


SCALE:
1" = 100'

LEGEND

 DV Encroaches Opposing Lane

 DV Overtracking



CA LEGAL - 65 FT
 Maximum Width : 8.50
 Maximum Length : 45.00
 Maximum Wheelbase : 38.00
 Maximum Front Overhang : 13.00
 Maximum Rear Overhang : 57.00

Design Vehicle (DV)

**US 101 at Olive Mill Road and Coast Village Road
 Design Vehicle Path - Exiting NB - WB**
 January 2015

Appendix B
Level-of-Service Concept

APPENDIX B LEVEL-OF-SERVICE CONCEPT

Level of service (LOS) is a concept developed to quantify the degree of comfort (including such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles) afforded to drivers as they travel through an intersection or roadway segment. Six grades are used to denote the various level of service from "A" to "F".

SIGNALIZED INTERSECTIONS

The six level-of-service grades are described qualitatively for signalized intersections in Table B1. Additionally, Table B2 identifies the relationship between level of service and average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Using this definition, Level of Service "D" is generally considered to represent the minimum acceptable design standard.

Table B-1: Level-of-Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values.

1 Most of the material in this appendix is adapted from the Transportation Research Board, Highway Capacity Manual, (2000).

Table B-2: Level-of-Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

UNSIGNALIZED INTERSECTIONS

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The 2000 Highway Capacity Manual (HCM) provides models for estimating control delay at both TWSC and AWSC intersections. A qualitative description of the various service levels associated with an unsignalized intersection is presented in Table B3. A quantitative definition of level of service for unsignalized intersections is presented in Table B4. Using this definition, Level of Service "E" is generally considered to represent the minimum acceptable design standard.

Table B3: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle to Minor Street
A	<ul style="list-style-type: none"> Nearly all drivers find freedom of operation. Very seldom is there more than one vehicle in queue.
B	<ul style="list-style-type: none"> Some drivers begin to consider the delay an inconvenience. Occasionally there is more than one vehicle in queue.
C	<ul style="list-style-type: none"> Many times there is more than one vehicle in queue. Most drivers feel restricted, but not objectionably so.
D	<ul style="list-style-type: none"> Often there is more than one vehicle in queue. Drivers feel quite restricted.
E	<ul style="list-style-type: none"> Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. There is almost always more than one vehicle in queue. Drivers find the delays approaching intolerable levels.
F	<ul style="list-style-type: none"> Forced flow. Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection.

Table B-4: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10.0 and ≤ 15.0
C	>15.0 and ≤ 25.0
D	>25.0 and ≤ 35.0
E	>35.0 and ≤ 50.0
F	>50.0

The level-of-service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is

designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less galling than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections. No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

In the performance evaluation of TWSC intersections, other measures of effectiveness (MOEs) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th-percentile queue lengths should be considered because of their impacts on the operational and safety performance of the intersection. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions. The potential for making such inappropriate decisions is likely to be particularly pronounced when the HCM level-of-service thresholds are adopted as legal standards, as is the case in many public agencies.

ROUNABOUT INTERSECTIONS

The levels of service (LOS) criteria for automobiles in roundabouts are given in Table B-5. As the table notes, LOS F is assigned if the volume-to-capacity ratio of a lane exceeds 1.0 regardless of the control delay. For assessment of LOS at the approach and intersection levels, LOS is based solely on control delay. The thresholds in Table B-5 are based on the considered judgment of the Transportation Research Board Committee on Highway Capacity and Quality of Service.

Table B-5: Level-of-Service Criteria for Roundabout Intersections

Control Delay (s/veh)	Level of Service by Volume-to-Capacity Ratio*	
	$v/c \leq 1.0$	$v/c > 1.0$
0-10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

*For approaches and intersection-wide assessment, LOS is defined solely by control delay

Roundabouts share the same basic control delay formulation with two-way and all-way STOP-controlled intersections, adjusting for the effect of YIELD control. However, at the time of publication of 2010 edition of the Highway Capacity Manual (HCM), no research was available on traveler perception of quality of service at roundabouts. In the absence of such research, the service measure and thresholds have been made consistent with those for other unsignalized intersections, primarily on the basis of this similar control delay formulation.

Appendix C
Operations Methodology and Analysis Results

INTRODUCTION

Kittelson & Associates, Inc. (KAI) has completed an evaluation of the performance of existing and proposed intersection control alternatives at the intersection of US 101 and Olive Mill Road. The purpose of this analysis is to summarize the design year operations at this interchange assuming the following intersection control options: 1) stop control; 2) signal control; and, 3) roundabout. This analysis was conducted in support of, and in accordance with, the Caltrans Traffic Operations Policy Directive 13-02 (TOPD 13-02) for Intersection Control Evaluations (ICE) effective August 30, 2013. The purpose of TOPD 13-02 is to apply a performance based assessment to test the full range of intersection control options to identify the most cost-effective solution.

The analysis tools and methodologies described herein were based on and are consistent with those documented in the *SC101 HOV PA-ED Traffic Study (Kittelson & Associates (formally Dowling Associates) December 2011)*.

The analysis for the *SC101 HOV PA-ED Traffic Study* reflected a 2008 baseline and a 2040 design year. Hence, this intersection control analysis of the Olive Mill interchange at US 101 was also based on a 2040 design year.

RESULTS SUMMARY

Based on the 2040 design year operations, this intersection control evaluation of the Olive Mill interchange with US 101 in the City of Santa Barbara has determined that a roundabout control type would provide superior AM/PM peak hour operations over either an all way stop controlled or signalized control alternative.

A modern roundabout achieves the best level of service (i.e., delay) for the entire intersection, including the US-101 NB off-ramp approach. If the existing all way stop control is maintained through year 2040, the average delay during the AM peak will be 72 seconds (level of service F), and the average delay during the PM peak will be 58 seconds (level of service F). A signalized intersection would result in a - 113 second average delay (level of service F) in the AM peak period and a 162 second average delay (level of service F) in the PM peak period. A roundabout would result in a 9 second average delay (level of service A) in the AM peak period and an 14 second delay in the PM peak period.

For the US-101 NB off-ramp in year 2040, all way stop control will result in XX seconds of delay (level of service X) during the AM peak, and XX seconds of delay (level of service X) during the PM peak. Signalized control would result in 124 seconds of delay (level of service F), and 209 seconds of delay (level of service F) during the PM peak. A roundabout would result in 6.9 seconds of delay (level of service A) during the AM peak, and 18.1 seconds of delay (level of service C) during the PM peak.

In addition to superior delay based performance, a roundabout will achieve the shortest 95th percentile queues for the intersection. For the all-way stop alternative, it was determined using VISSIM analysis that the US 101 NB Off-ramp's maximum queue will be over 1000-feet by year 2040, which exceeds the available ramp storage of 750-feet, and will cause spill back onto the US-101 mainline. The off-ramp queue at the existing stop controlled intersection is projected to exceed the available storage in the AM

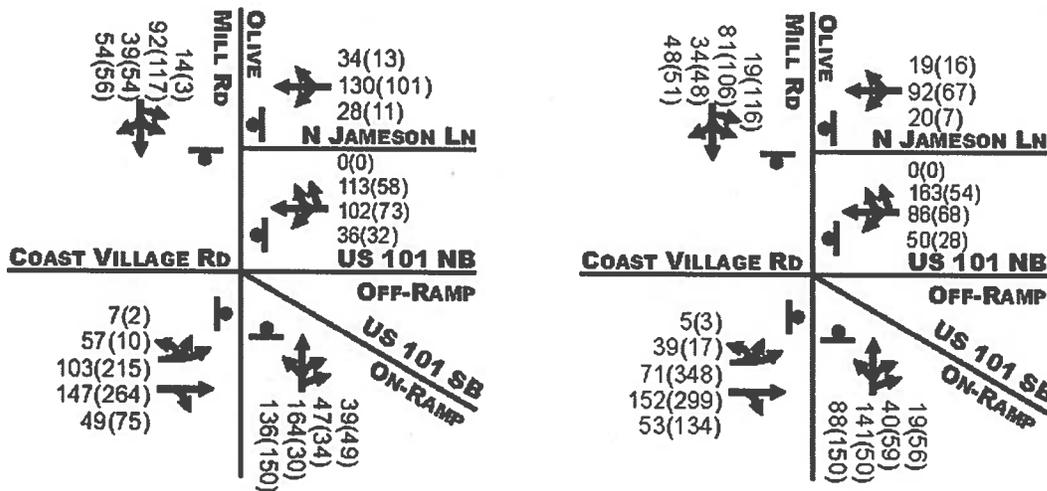
peak period by year 2022 and in the PM peak period by year 2036. For the signalized alternative, queues on the off-ramp will reach 680-feet in the AM peak period and 633 feet in the PM peak period by year 2040. Conversely, the proposed roundabout will result in a 92-foot queue in the AM peak period and a 59-foot queue in the PM peak period under 2040 conditions.

BASELINE CONDITION

Traffic counts performed as part of the *SC101 HOV PA-ED Traffic Study* were examined. These turning movement counts were collected in April 2008. Given that six years had transpired since this count was taken, a more recent 2014 turning movement count was performed for this analysis. Similar to the 2008 traffic count, the 2014 count was performed during the 7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM peak periods. The true AM/PM peak hour volumes were identified from this four hour count.

A graphical comparison between the 2008 and 2014 AM/PM peak hour turning movement counts is provided below in Figure 8.

Figure 8: 2008 Traffic Counts (left) and 2014 Traffic Counts (right)



LEGEND: XX (YY) – AM (PM) Peak Hour

From 2008 to 2014, an overall reduction of 2% was experienced at this interchange in the AM peak hour and 0.69% increase was experienced in the PM peak hour.

Although holistically traffic demand at this interchange has not significantly changed, inspection of specific movements show several significant differences. Of note, in the AM peak period, Olive Mill Road coming from Coast Village Road experienced 18 and 32 reduction in vehicle counts traveling left onto Olive Mill Road and left onto North Jameson Lane respectively. Additionally, in the AM peak period, vehicles traveling northbound right from Olive Mill onto the US-101 SB on-ramp experienced a 20 vehicle count reduction from 2008 volumes. Conversely, in the PM peak period, there were an additional 25 vehicles traveling northbound right from Olive Mill onto North Jameson Lane. Also in the

PM peak period, there were approximately 100 additional vehicles traveling southbound on Olive Mill Road onto Coast Village Road.

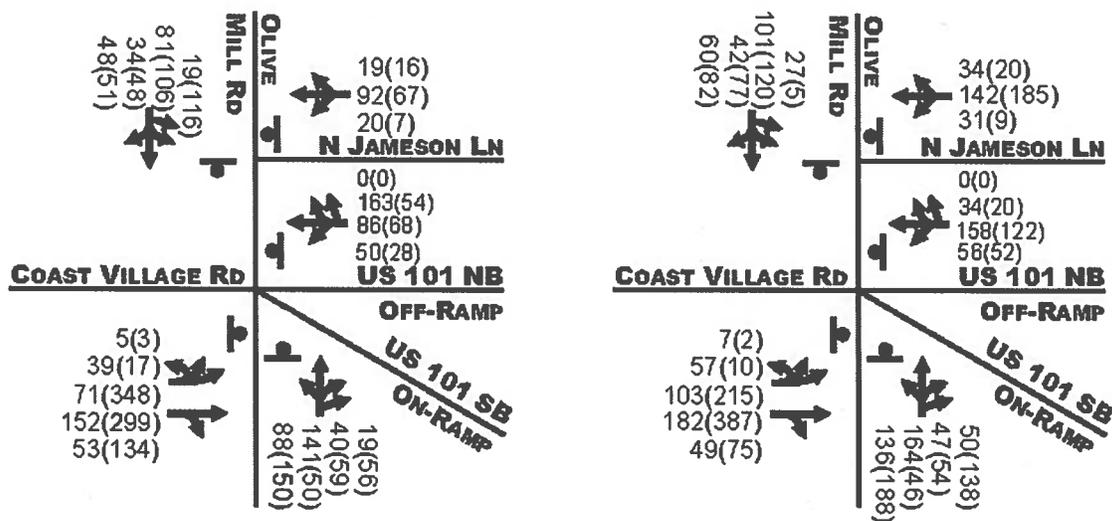
DESIGN YEAR CONDITION

The basis for the design year volume set were the traffic projections developed for the *SC101 HOV PA-ED Traffic Study (December 2011)* which were generated using the Santa Barbara County Association of Governments (SBCAG) travel demand model. The AM/PM peak hour models were used to forecast 2040 year volumes appropriate for peak hour operational analysis as seen in Figure 9.

To ensure reasonable intersection turn movement forecasts, a refinement process called the Furness Method was applied. This post-processing adjustment is needed given that travel models are calibrated to produce more accurate results on road segments than for individual turn movements. The Furness Method iteratively adjusts the 2014 turning movement counts until the directional sum of the movements balance to the adjusted future link volumes. This factoring process produces forecast turn distributions that resemble the count distribution, but turn movement proportions change in response to different growth rates on different legs as produced by the AM/PM peak hour travel demand model. Additional "spot" adjustments were performed to ensure that no future volume for a given turn movement was less than the 2014 traffic count.

Given that the Olive Mill Interchange is be affected by operations at near-by adjacent interchanges, planned modifications to the Cabrillo-Hot Springs interchange are reflected in this analysis. Kittelson & Associates, Inc. (as Dowling and Associates, Inc.) prepared the Cabrillo Boulevard I/C Modified Configurations Analysis (July 19, 2011) included as part of the Cabrillo/Hot Springs Interchange Configuration Analysis Technical Memorandums (December 11, 2011). Based on these technical studies, the "Modified F" configuration has been advanced as the preferred configuration for the Cabrillo-Host Springs interchange. This configuration is assumed as part of this US 101/Olive Mill interchange analysis.

Figure 9: 2014 Traffic Counts (left) and 2040 Forecast Traffic Counts (right)



LEGEND: XX (YY) – AM (PM) Peak Hour

As seen in **Error! Reference source not found.** above, from 2014 to 2040, a 1% compound growth in the AM peak period and 0.65% in the PM peak period is projected. There is an increase in 31 vehicles traveling northbound turning right onto the US-101 SB on-ramp and 72 additional vehicles traveling westbound thru in the AM peak period. In the PM peak period, there are over 100 vehicles traveling westbound right on Jameson movements, 83 additional vehicles traveling westbound right from US-101 NB onto Olive Mill Road, and 82 additional vehicles traveling northbound right from Olive Mill Road onto US-101 SB on-ramp.

TRAFFIC OPERATIONS ANALYSIS

This subsection summarizes operational analysis methodology and results at the study location.

Analysis Methodology

Site visits were performed and aerial imagery was also used to document the physical, geometric and operational characteristics of each of the study area intersections and roadway approach segments. This included observed queue lengths and back of queue distances at each approach.

The adjusted 2040 turn movement forecasts were input into the operational software SYNCHRO 8.0 and Sidra. Further volume balancing adjustments were performed to ensure that conservation of traffic flow was maintained at adjacent intersections. For stop controlled and signalized intersection analysis, SYNCHRO analysis was performed to yield the intersection LOS and queue lengths results. Sidra analysis was performed for the roundabout option.

Given that micro-simulation can better capture the interaction of closely spaced intersections, a simulation analysis using the VISSIM software was developed to better determine queues and delays at the study intersection. The model was developed and calibrated to existing conditions using field measured queue lengths delays to ensure an accurate reflection of this atypical intersection. Given that queue spill-back onto the freeway mainline is a major safety concern, this check of future queue lengths on the off-ramp is considered a fatal flaw assessment. VISSIM simulation runs were based on a minimum 10 minute seeding time, 60 minute analysis time (divided into four 15 minute intervals), and reflect an average of 5 multiple runs. VISSIM simulation for this analysis was validated for existing queue spillback by the *FHWA Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software* prepared by Dowling Associates, Inc. (now Kittelson & Associates, Inc.) in July 2004.

Stop Controlled and Signalized Intersections

Roadway operations are typically governed by, and most constrained at, intersections. The measure of effectiveness commonly used to determine the quality or level of service (LOS) experienced by motorists at intersections is average control delay. The methodology used to analyze intersection LOS is outlined in the Transportation Research Board's Highway Capacity Manual, 2010 version (HCM 2010).

LOS is a qualitative measure of driver satisfaction and is quantitatively expressed by the level of delay and congestion experienced by motorists using an intersection. LOS is designated by the letters A through F, with A being the best condition and F being the worst (high delay and congestion). A summary of LOS criteria for signalized and unsignalized intersections can be found in Table 5 below.

Table 6: LOS Criteria for Signalized and Unsignalized Intersections

LOS	Average Delay (sec/veh)		Description
	Signalized	Unsignalized	
A	≤10.0	≤10.0	Very Low Delay: This occurs when progression is extremely favorable and most vehicles arrive during a green phase. Most vehicles do not stop at all.
B	>10.0 & ≤20.0	>10.0 & ≤15.0	Minimal Delays: This generally occurs with good progression, short cycle lengths, or both. More vehicles stop than at LOS A, causing higher levels of average delay.
C	>20.0 & ≤35.0	>15.0 & ≤25.0	Acceptable Delay: Delay increases due to only fair progression, longer cycle lengths, or both. Individual cycle failures (<i>to service all waiting vehicles</i>) may begin to appear at this level of service. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	>35.0 & ≤55.0	>25.0 & ≤35.0	Approaching Unstable/Tolerable Delays: The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	>55.0 & ≤80.0	>35.0 & ≤50.0	Unstable Operation/Significant Delays: These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	>80.0	>50.0	Excessive Delays: This level, considered to be unacceptable to most drivers, often occurs with oversaturation (i.e., when arrival flow rates exceed the capacity of the intersection). It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: *Highway Capacity Manual*, Transportation Research Board, Washington D.C, 2010

This analysis includes stop control and signal controlled alternatives. For all-way stop intersections, Chapter 20 of the HCM 2010 outlines the operational methodology to analyze this type of control. Signal-controlled intersections were analyzed using the operational methodology outlined in the HCM 2010, Chapter 18. This procedure calculates the average control delay per vehicle at a signalized intersection, and assigns a LOS designation based upon the delay. The SYNCHRO 8.0 software package was used to perform LOS analysis. Intersection geometrics were based on aerial imagery and field observations. Bicycle and pedestrian counts were not used.

Roundabouts

Roundabout operations were evaluated using Sidra Intersection 6 software using the 2010 Highway Capacity Manual (HCM) capacity model. The 2010 HCM capacity model was calibrated to better reflect gap acceptance behavior of California drivers for critical headway and follow-up headway. The calibration factors, or HCM Parameters A and B, used in this analysis are recommended in the Caltrans document “Roundabout Geometric Design Guidance” dated June 2007. The A and B parameters were derived based on field observations to more accurately reflect operational performance of California

roundabouts. The differences among the default parameters used in the 2010 HCM methodology and identified for California roundabouts are shown below in Table 6.

Table 7: Roundabout Model Parameters for Entry Capacity

	Default 2010 HCM Parameters		Modified HCM Parameters based on Caltrans guidance	
	A	B	A	B
Single-lane circulating stream ($n_c=1$)				
Single-lane entry ($n_e=1, n_c=1$)	1130	0.00100	1440	0.00100
Multi-lane entry ($n_e > 1, n_c=1$): apply to all lanes	1130	0.00100	1440	0.0010
Multi-lane circulating stream ($n_c > 1$)				
Single-lane entry ($n_e=1, n_c=1$)	1130	0.00070		
Multi-lane entry ($n_e > 1, n_c=1$)				
Dominate lane (right lane)	1130	0.00070	1640	.00090
Subdominate lane (left lane)	1130	0.00075	1640	.00100

LOS criteria specified in the 2010 HCM was used to establish the quality of service for the roundabout from a user’s perspective. The 2010 HCM uses the average control delay (s/veh) and volume-to-capacity ratio (v/c) to establish thresholds for intersection LOS. These thresholds are shown in Table 7.

Table 8: Level of Service Criteria

Control Delay (s/veh)	Level of Service by Volume-to-Capacity Ratio*	
	$v/c \leq 1.0$	$v/c > 1.0$
0-10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

*For approaches and intersection-wide assessment, LOS is defined solely by control delay

For roundabouts, v/c ratios in the range of 0.85 to 0.90 represent an approximate threshold for satisfactory operations. Individual lanes with v/c ratios near this threshold should be evaluated to determine the sensitivity of the lane to varying traffic conditions and/or driver behavior.

DESIGN YEAR ANALYSIS RESULTS

Level of Service (LOS) and 95th percentile queue (feet) results for each control type are provided in this section.

Operations for the roundabout were calculated using the 2010 HCM with California Calibration capacity model (HCM-CA) according to the methodology above. As shown, the proposed roundabout is expected to perform at an acceptable LOS through the 2040 forecast year.

The VISSIM model was run for a number of different years to determine the approximate year when queue lengths for the off-ramp will exceed the available storage length of 750-feet. It was assumed that the project is built by year 2020, as the 2020 “build” traffic volumes from the *SC101 HOV PA-ED Traffic Study (December 2011)* report were used. Traffic volumes were assumed to have straight line growth between 2020 and 2040. As seen in Table 8 below, the queue during AM peak period is projection to exceed the available storage in year 2022, and the PM peak period queue length for the off-ramp will exceed available storage in year 2036.

Table 9: Maximum Queue Results for East (Northbound US-101 Off-Ramp) Approach

Year	Max Queue (ft.)		Simulated	
	Approach Lane	Location	AM	PM
2014	East	101 NB Off-Ramp	104.05	14.13
2020	East	101 NB Off-Ramp	530.80	134.70
2021	East	101 NB Off-Ramp	634.50	137.40
2022	East	101 NB Off-Ramp	827.70*	101.00
2030	East	101 NB Off-Ramp	1560.20	242.90
2034	East	101 NB Off-Ramp	1664.50	440.20
2036	East	102 NB Off-Ramp	1666.80	784.50*
2040	East	101 NB Off-Ramp	1672.40	1616.20

* Projected queue length exceeds available storage on off-ramp (750-feet)

ANALYSIS RESULTS

Table 10. Year 2040 US 101 at Olive Mill Road All Way Stop Control with Existing Lane Configuration

Approach	Movement	Level of Service (LOS)		Volume to Capacity Ratio		Delay (seconds/vehicle)		95th % Queue (feet) ¹		Storage (feet) ²	Adequate Storage (Yes/No)
		AM	PM	AM	PM	AM	PM	AM	PM		
Northbound - Olive Mill Road	L/T/R	F	F	0.47	0.45	101.7	97.3	160.4	235.6	275	No
Westbound - US-101 NB-Off Ramp	L/T/R	F	F	1.02	1.03	195.6	228.0	1,672.4	1,616.2	750	Yes
Westbound - Jameson Lane	L/T/R	E	C	0.49	0.50	36.8	19.2	148.9	131.5	710	No
Southbound - Olive Mill Road	L/T/R	F	F	0.50	0.61	101.7	97.3	160.4	235.6	720	No
Eastbound - Coast Village Road	Left	D	F	0.40	0.61	22.0	69.6	112.3	365.9	410	No
	T/R	F	F	0.36	0.86	28.0	95.7	206.9	1,603	150	Yes

1. Rounded up to the nearest 25 feet

2. Storage = Available storage to the nearest local street intersection or distance to ramp gore point

Bold and shaded indicates inadequate condition

Table 11. Year 2040 US 101 at Olive Mill Road Signalized Intersection Control with Existing Lane Configuration

Approach	Movement	Level of Service (LOS)		Volume to Capacity Ratio		Delay (seconds/vehicle)		95th % Queue (feet) ¹		Storage (feet) ²	Adequate Storage (Yes/No)
		AM	PM	AM	PM	AM	PM	AM	PM		
Northbound - Olive Mill Road	L/T/R	F	F	1.07	1.22	117	169	681	775	275	Yes
Westbound - US-101 NB- Off Ramp	L/T/R	F	F	0.93	1.35	121	228.3	221	633	750	No
Westbound - Jameson Lane	L/T/R	E	F	1.08	1.10	62	111.1	680	286	710	No
Southbound - Olive Mill Road	L/T/R	F	F	1.06	1.16	135	155	448	626	720	No
Eastbound - Coast Village Road	Left	F	E	0.88	0.70	101	68.2	321	330	410	No
	T/R	F	F	1.08	1.41	139	242.2	451	889	150	Yes

1. Rounded up to the nearest 25 feet

2. Storage = Available storage to the nearest local street intersection or distance to ramp gore point

Table 12. Year 2040 US 101 at Olive Mill Road Proposed Roundabout Alternative

Approach	Movement	Level of Service (LOS)		Volume to Capacity Ratio		Delay (seconds/vehicle)		95th % Queue (feet) ¹		Storage (feet) ²	Adequate Storage (Yes/No)
		AM	PM	AM	PM	AM	PM	AM	PM		
Northbound - Olive Mill Road	L/T	B	C	0.463	0.546	10.5	16.3	68.2	79.1	275	Yes
	R	A	A	0.066	0.259	5.0	9.7	6.7	26.8	85	No
Westbound - US-101 NB- Off Ramp	L/T/R	B	A	0.548	0.425	12.8	9.9	92	59	700	No
Westbound - Jameson Lane	L/T/R	B	A	0.363	0.315	10.9	8.3	43	37	670	No
Southbound - Olive Mill Road	L/T/R	A	B	0.327	0.497	8.6	12.2	38	74	735	No
Coast Village Road	LT/R	A	C	0.411	0.772	7.8	18.9	60	239	425	No

1. Rounded up to the nearest 25 feet

2. Storage = Available storage to the nearest local street intersection or distance to ramp gore point

Italics and shaded represent mitigated lane configuration changes