South Coast 101 HOV Lanes Project

Santa Barbara County
05-SB-101-PM 1.4 to 12.3
05-0N700
Project ID# 0500000225
SCH # 2009051018

Final Revised Environmental Impact Report

Prepared by the

State of California Department of Transportation

Volume I of II

October 2017

General Information About This Document

What's in this document?

The California Department of Transportation (Caltrans) has prepared this Final Revised Environmental Impact Report in accordance with the Writ of Mandate issued by the Santa Barbara Superior Court on January 26, 2016. The Writ of Mandate directed Caltrans to vacate approval of the project and certification of the 2014 Final Environmental Impact Report and prepare and circulate a legally adequate Revised Environmental Impact Report with respect to the evaluation of intersection impacts and cumulative traffic impacts only. The project consists of widening U.S. 101 in Santa Barbara County to accommodate a high occupancy vehicle (HOV) lane in each direction for a 10.9-mile stretch. The project limits extend from 0.2 mile south of Bailard Avenue in the City of Carpinteria to Sycamore Creek in the City of Santa Barbara.

The Draft Revised Environmental Impact Report was circulated to the public from December 1, 2016 to January 31, 2017. Comments were received from the public during this circulation period. The comments and Caltrans' responses to those comments are provided in Appendix J of this document (under separate cover).

Elsewhere throughout this document, a vertical line in the right margin of the page indicates a content change made after the Draft Revised Environmental Impact Report document circulation. Minor editorial changes and clarifications have not been noted. This information supersedes and/or clarifies information contained in the Draft Revised Environmental Impact Report. In addition, any data changes made in Tables 2.1 through 2.7 are shaded in blue and the LOS Figures contained in Appendix B have been updated with changes noted by a bolded box.

This document and previously prepared environmental documents and technical reports can be viewed at: http://www.dot.ca.gov/dist05/projects/sb_101hov

Hard copies of this document and the 2014 Final Environmental Impact Report, and related traffic technical studies can be found at:

- ❖ **Caltrans District 5 Midway Building, 2885 South Higuera Street in San Luis Obispo**

Hard copies of this document, a CD of the 2014 Final Environmental Impact Report, and a CD of related traffic technical studies can be found at these libraries:

- ❖ Santa Barbara Central Library, 40 East Anapamu Street, Santa Barbara, CA 93101
- ❖ Santa Barbara Eastside Library, 1102 E. Montecito Street, Santa Barbara, CA 93103
- ❖ Montecito Branch Library, 1469 East Valley Road, Montecito, CA 93150
- ❖ Carpinteria City Library, 5141 Carpinteria Avenue, Carpinteria, CA 93013

For individuals with sensory disabilities, this document can be made available in Braille, in large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please write to or call Caltrans, Attn: Jason Wilkinson, Environmental Planning, 50 Higuera Street, San Luis Obispo, CA 93401, (805) 542-4663 (Voice), or use the California Relay Service 1 (800) 735-2929 (TTY), 1 (800) 735-2929 (Voice), or 711.

SCH# 2009051018
05-SB-101-PM 1.4 to 12.3
Project ID# 0500000225

Widen U.S. 101 to three lanes in each direction from 0.2 mile south of Bailard Avenue in the City of Carpinteria to Sycamore Creek in the City of Santa Barbara (post miles 1.4 to 12.3)

FINAL
REVISED ENVIRONMENTAL IMPACT REPORT

Submitted Pursuant to: (State) Division 13, California Public Resources Code

THE STATE OF CALIFORNIA
Department of Transportation

10/27/2017
Date of Approval

Timothy M. Gubbins
District Director
California Department of Transportation

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Executive Summary

The California Department of Transportation (Caltrans) proposes to widen over 10 miles of U.S. 101 from 0.2 mile south of Bailard Avenue in the City of Carpinteria to Sycamore Creek in the City of Santa Barbara.

A Draft Environmental Impact Report/Environmental Assessment was prepared in 2012 for the proposed project in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The Final Environmental Impact Report/Environmental Assessment with Finding of No Significant Impact was completed in August 2014 and was approved by Caltrans as the CEQA and NEPA lead agency in August 2014.

Following certification of the 2014 Final Environmental Impact Report (2014 Final EIR), a legal challenge to the 2014 Final EIR was filed in Santa Barbara County Superior Court. This Draft Revised Environmental Impact Report (Draft Revised EIR) was prepared in accordance with the Judgment of the Superior Court of California for the County of Santa Barbara and Writ of Mandate. The Judgment and Writ directed Caltrans to vacate approval of the project and certification of the 2014 Final EIR, and prepare and circulate a legally adequate Revised EIR with respect to the evaluation of intersection impacts and cumulative traffic impacts only. The Draft Revised EIR was prepared and publicly circulated to comply with the Court's Judgment and Writ issued thereon.

Both the Draft and Final Revised EIR were prepared pursuant to CEQA, and do not change the NEPA portion of the document or the Finding of No Significant Impact conclusion.

Key Issues Addressed in the Draft and Final Revised Environmental Impact Reports

Traffic Impact to Intersections – The Draft Revised EIR evaluated local intersections in greater detail than what was provided in the 2014 Final EIR. Data used to evaluate the intersections reflects information from the Forecast Operations Report, two memos and one addendum focusing specifically on evaluating options considered for the Cabrillo Boulevard/Hot Springs Road interchange and three additional memos summarizing intersection analyses. The memos and addendum are included in Appendix E of this document. Additional background information was taken from the South Coast 101 HOV Lanes Traffic Study Methodology Report (December 15, 2008) and referenced to support a number of responses to comments that questioned why certain intersections were studied or not. Additional details were added about the preparation of the traffic studies, including how traffic counts and studies were conducted.

Cumulative Traffic Impacts – Additional analysis was provided to address cumulative traffic impacts. The Final Revised EIR contains minor updates to the list of projects considered under cumulative impacts. These changes were made as a result of comments received during the circulation period.

Between the Draft and Final Revised EIR, the following was added to the document:

Two summary tables were provided in the 2014 Final EIR to note whether specific resource areas were considered to be a potential significant impact. These tables were not included as part of the Draft Revised EIR. The question of which summary table should include the topic of Traffic Circulation was raised during public comment. As part of this Final Revised EIR, a correction was made to move the topic of Traffic Circulation from the Summary Table S.1 (Summary of Potential Impacts from Alternatives) to Summary Table S.2 (Summary of Major Potential Impacts from Preferred Alternative with Mitigation/Minimization Measures). The corrected text is shown in the table on page vi.

Appendix G contains a table that was added to show how Caltrans' equitable share responsibilities were calculated. Appendix H contains traffic validation and analysis summary memos that were added to clarify and provide backup data for use in this document as well as the responses to public comments. Appendix I contains maps that were added to provide a visual representation of proposed delay reduction throughout the corridor. Under separate cover, Appendix J contains public comments received during the public review period and Caltrans' responses to these comments.

Table S.2 Summary of Major Potential Impacts of Preferred Alternative with Mitigation Measures

Potential Impacts	*Alternative 1 (Preferred Alternative)*	*No-Build Alternative*	*Mitigation Measures for Potentially Significant Impacts*
Traffic and Transportation/ Pedestrian and Bicycle Facilities	*The project would reduce freeway congestion through the corridor and encourage carpooling and public transportation with the introduction of HOV lanes. Certain intersections within the corridor may see increased traffic due to changes to traffic patterns that would occur as a result of the reconstructed Cabrillo Boulevard/Hot Springs interchange and a more efficient mainline that would facilitate faster travel/arrival times.* Based on CEQA and taking into account context and intensity, the project will have a significant impact once the project is fully constructed because the project will contribute to a substantial increase in traffic delay at particular study intersections. Bicycle and pedestrian facilities would be maintained or improved in areas where construction will occur per implementation of the Temporary Pedestrian Access Route (TPAR), which will be included in the project's Transportation Management Plan (TMP). Any improvements made to offset these impacts will be designed to ensure the changes do not conflict with or compromise bicyclist/pedestrian safety.	*Freeway congestion will continue to worsen. As a result, further degradation of local street operations due to diversion of through-trips onto the local street system which could affect pedestrian and bicycle facilities.*	A mitigation plan was established, which includes eight locations where Caltrans will either construct the improvement or will provide an equitable share for implementation by the appropriate local jurisdiction. The approach for addressing each location is listed in Table 2.8, on page 47. The improvements would ensure that the levels of service and seconds of delay do not exceed the 2020 or 2040 No-Build conditions. The following are the identified intersection locations: **#8 Southbound On-/Off-ramps and Bailard** **#19 Southbound On-/Off-ramps and Carpinteria Avenue** **#21 Northbound On-/Off-ramps and Via Real/Santa Monica** **#37 Southbound Off-ramp and San Ysidro/Eucalyptus Lane** **#107 Cabrillo Boulevard/Los Patos** **#48 Southbound Off-ramp and Milpas** **#79 Southbound On-ramp and State Street and SR 154** **#39 Olive Mill Road/Coast Village Road**

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It is anticipated that readers will review this Final Revised EIR together with the 2014 FEIR. Only modified chapters/sections are included in this Final Revised EIR.

List of Figures

List of Tables

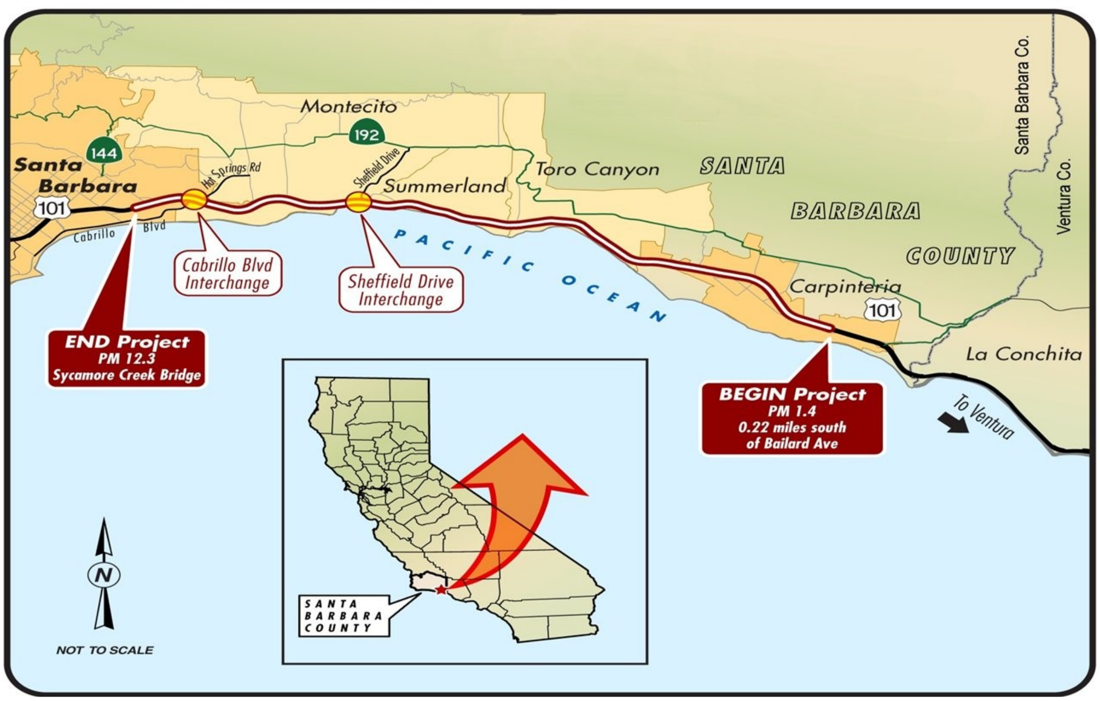
Chapter 1 Proposed Project

1.1 Introduction from the 2014 Final EIR

Portions of the original text from the 2014 FEIR have been incorporated into this Final Revised Environmental Impact Report (Final Revised EIR) and are shown in italicized font. Any additions to that original text are shown in regular, unformatted font, and any deletions of that text are shown with a strikethrough. New content associated with traffic section updates is also shown in regular, unformatted font. Text changes made between the Draft Revised EIR and the Final Revised EIR are shown with a vertical line in the right margin. Changes to Tables 2.1-2.7 are noted by blue shading.

The California Department of Transportation (Caltrans) proposes to build high occupancy vehicle (HOV) lanes, also called carpool lanes, on U.S 101 from 0.2 mile south of Bailard Avenue (postmile 1.4) in the City of Carpinteria to Sycamore Creek (postmile 12.3) in the City of Santa Barbara. Caltrans is the lead agency for the project under the National Environmental Policy Act and the California Environmental Quality Act. See Figure 1.1 below for the Project Location Map.

Figure 1.1 Project Location Map



Three build alternatives and a No-Build Alternative ~~have been~~ were considered for this project. A Preferred Alternative was identified in the 2014 FEIR. The alternative and Cabrillo interchange configuration selected remains the preferred alternative for the purpose of project approval and certification of this Final Revised EIR. The preferred alternative was selected based on balancing the resources within the corridor. This conclusion does not change as a result of the lawsuit, which focuses solely on traffic. Furthermore, the selected F Modified configuration at the Hot Springs/Cabrillo interchange still remains the best option operationally.

~~*Each build alternative*~~ The preferred alternative *would add a single HOV lane in both the northbound and southbound directions and rebuild interchanges at Sheffield Drive and Cabrillo Boulevard. The HOV lanes would be reserved for qualifying vehicles during morning and afternoon peak hours of operation each weekday. Qualifying vehicles include those containing two or more people, motorcycles, and certain zero-emission vehicles. Outside of the specified peak hours, the HOV lanes would be open to any vehicles.*

Background

The passage of Proposition 11 in 1990 increased the gas tax to fund congestion management and required urbanized counties to create a Congestion Management Program (CMP). The Santa Barbara County Association of Governments (SBCAG) became the Congestion Management Agency for the County and established the CMP in 1991. California Government Code Section 65089(b) describes what the CMP must contain, including Level of Service (LOS) standards established for a system of designated highways and roadways, performance measures, and a program to analyze the impacts of land use decisions made by local jurisdictions on regional transportation systems including an estimate of the costs associated with mitigating those impacts. The most recent CMP was approved by SBCAG on October 20, 2016.

The CMP addresses the problem of increasing congestion on regional highways and principal arterials through a coordinated approach involving the State, County, cities, transit providers, and the Air Pollution Control District. Bringing these groups to the table to address regional and multi-jurisdictional issues related to congestion, land development, and air quality, the CMP ensures that limited transportation funds are more efficiently invested to improve the transportation system.

As part of the SBCAG CMP process, U.S. 101 was identified as a deficient facility. In response, the ~~*A series of studies sponsored by the SBCAG, including the U.S. 101 Alternatives Study (1995) and the South Coast U.S.*~~ Highway *101 Deficiency Plan*

(2002) assessed options for relieving congestion in the corridor without the need for freeway widening. The ~~South Coast U.S.~~ Highway *101 Deficiency Plan identified ~~the~~ problems on the highway and proposed short-term strategies aimed at improving transit, managing travel demand, and providing transportation system enhancements.*

As a result of the ~~U.S.~~ Highway *101 Deficiency Plan ~~(2002)~~, ~~the~~ SBCAG and the local cities adopted 34 short-term projects aimed at correcting operational deficiencies on both U.S. 101 and adjacent roads. The plan acknowledged that these improvements would not address long-term freeway congestion and that further action on a communitywide basis would be required to address the projected increases in traffic volumes along the corridor. One of the actions required from the ~~U.S.~~* Highway *101 Deficiency Plan was to develop an implementation plan for the adopted projects. The 101 Implementation Plan began in 2004 and evolved into what is now known as 101 In Motion.*

Completed by ~~the~~ SBCAG in July 2006, the two-year corridor study took a multi-modal approach and involved extensive community outreach to develop a vision for long-term mobility along the U.S. 101 corridor. Recommendations by the Steering Committee, Stakeholders Advisory Committee, and Technical Advisory Group for implementation arising out of the 101 In Motion process included a number of strategies, but the main recommendation to address commuter and goods movement needs was "add a lane and a train" strategy between the Ventura County line and the City of Santa Barbara. The lane portion of the strategy was for the addition of a new lane in each direction, to be defined as an HOV lane. The train portion of the strategy included the development of "commuter friendly" passenger rail service on the Union Pacific Railroad tracks between Oxnard and Goleta. Other elements to improve operations and facilities as needs shift to transit and carpooling were also included. The 101 In Motion consensus recommendations were approved unanimously by the SBCAG board in October 2005. The consensus recommendations were also approved by the local jurisdictions.

The overall 101 In Motion consensus package consists of five elements that, together, would implement a multi-modal strategy to accommodate future travel demand while facilitating a modal shift to carpooling, transit, and passenger rail. Without implementation of these elements, 101 In Motion projected that Level of Service F conditions would exceed 10 hours a day in each direction by 2030. Recommended elements in 101 In Motion include the following:

- *Add a lane and a train (a carpool/HOV lane and commuter rail service)*
- *Facilitate transit and carpool use*
- *Use demand management strategies*
- *Improve operations and communication*
- *Select operational improvements north of Milpas Street*

Each of the five elements includes one or more individual improvements. Since the adoption of 101 In Motion in 2006, efforts have been made to implement these elements. These efforts include progress in exploring options for commuter rail service, including the Los Angeles-Ventura-Santa Barbara-San Luis Obispo Rail Corridor Agency (LOSSAN) North Strategic Plan expansion of commuter express transit service, implementation of Intelligent Transportation Systems (ITS) solutions, and future U.S. 101 operational improvements.

The South Coast 101 HOV Lanes project is critical to the objective of the first element in the 101 In Motion list to "add a lane." The South Coast 101 HOV Lanes project is one of four planned project segments that would "add a carpool/HOV lane in both directions south of Milpas Street to Ventura County Line" as stated in 101 In Motion.

1.2 Purpose and Need from the 2014 Final EIR

Purpose

- *Reduce congestion and delay*
- *Provide capacity for future travel demand*
- *Improve travel time on U.S. 101 within the project limits*
- *Provide for high occupancy vehicle lane continuity on U.S. 101 in southern Santa Barbara County, as planned for in the 2040 Regional Transportation Plan and Sustainable Communities Strategy, adopted August 15, 2013*
- *Encourage a modal shift to transit and carpooling*

To achieve the project goals in 2040, on typical weekdays[1] this project should meet the following performance measures:

[1] Performance measures were derived from *101 In Motion.*

- *Reduce corridor delay by at least 7,000 person-hours daily*[2]
- *Reduce peak hour peak direction travel time on U.S. 101 in the project area for carpoolers and express bus riders by 25 percent or more on average*

Need

U.S. 101 is the main route for commuters, interregional traffic, and cargo throughout the South Coast area. U.S. 101 serves as the primary connection for vehicle travel between the communities of Goleta, Santa Barbara, Montecito, Summerland, and Carpinteria. It is a major interregional road as part of the national highway system, connecting Northern California and Southern California. U.S. 101 also plays a large role in the state economy by serving as a secondary route to Interstate 5. Local highway travelers rely on U.S. 101 for commuting purposes as well as for travel related to school, personal use, business and leisure. Employment is concentrated at the northern end of the corridor in and near the cities of Santa Barbara and Goleta. The University of California Santa Barbara campus, near Goleta, also attracts a large number of vehicles during the peak commute periods.

The project limits consist of a high-demand stretch of U.S. 101 that is a four-lane section bounded by a six-lane section to the north and the Ventura/Santa Barbara 101 HOV project to the south. ~~*Currently under construction and expected to be completed in late 2015, the*~~ The *Ventura/Santa Barbara 101 HOV project*, which *is the second phase of the U.S. 101 widening plan for the South Coast area,* was completed in 2015*. The Ventura/Santa Barbara 101 HOV project* ~~*is adding*~~ added *a high occupancy vehicle lane in each direction from Ventura County to the southern limits of the South Coast 101 HOV Lanes project. The completion of the South Coast 101 HOV Lanes project would provide six lanes from the City of Ventura through the City of Goleta (refer to Figure 1.1 in the 2014 Final EIR for further clarification).*

Current demand is exceeding the capacity of U.S. 101 during weekday and weekend peak travel periods. In 2008, average daily traffic counts within the project limits ranged from 65,000 to 95,000 vehicles. By 2020, average daily traffic counts on U.S. 101 are projected to increase by 17 to 21 percent over 2008 volumes. By 2040, the average daily traffic counts on U.S. 101 within the project limits are forecast to

[2] Delay is a measure of time "lost" per person due to travel in congested conditions. Delay occurs on U.S. 101 when vehicles travel at speeds below 55 miles per hour. Total person hours of delay are calculated by multiplying the amount of time lost per person per day during peak hours by the number of vehicles traveling during the congested peak periods in the traffic study area.

increase by 50 percent over 2008 levels. Figure 1-2 shows the growth in average daily traffic volumes within the project limits.

Currently on U.S. 101, traffic congestion occurs during morning and afternoon peak periods within the project limits. Traffic congestion lasts for 2 hours in the morning peak period and 2.5 hours in the afternoon peak period for a total of 4.5 hours of congestion each day. Without roadway improvements in the project limits, congested flow conditions during the peak travel periods are expected to increase to a total of 7.5 hours a day in 2020 and over 11 hours a day in 2040.

In order to provide a visual depiction of what will occur on the mainline as a result of this project, Peak Hour Congestion Maps have been added in Appendix I. The data used for these maps comes from the Forecast Operations Report.

1.3 Alternatives from the 2014 Final EIR

The Project Development Team (Caltrans staff, together with representatives from the Santa Barbara County Association of Governments, City of Santa Barbara, Santa Barbara County, and City of Carpinteria) considered many alternatives in determining how best to accommodate an HOV lane in both the northbound and southbound directions on U.S.101. The team met over the course of two years to analyze the opportunities as well as the physical barriers (including the railroad, ocean, and existing development) of such a project. The project was designed to conform with standards that apply to lane and shoulder width, ramp slopes, and other safety-related features. A number of design exceptions were approved to minimize impacts as part of the project, where adequate justification existed for approval.
The project proposes widening U.S. 101 (where necessary) from four lanes to six lanes (three lanes in each direction) from 0.22 mile south of Bailard Avenue (post mile 1.4) in the City of Carpinteria to Sycamore Creek (post mile 12.3) in the City of Santa Barbara (see Figures 1-4 and 1-5). Each build alternative would add a part-time HOV lane in both the northbound and southbound direction from Carpinteria Creek in the City of Carpinteria to Cabrillo Boulevard in the City of Santa Barbara. To accommodate the new lanes, two interchanges—Sheffield Drive and Cabrillo Boulevard/Hot Springs Road—would need to be reconstructed. Three build alternatives and a No-Build Alternative were considered.

Common Design Features of the Build Alternatives

- *Add pavement width in each direction on U.S. 101 to provide for a six-lane facility within the project limits.*

- *Add a part-time, continuous access HOV lane in each direction on U.S. 101 extending from Carpinteria Creek in the City of Carpinteria to Cabrillo Boulevard in the City of Santa Barbara.*
- *Improve the southbound shoulder ditches near the Bailard Avenue interchange to provide graded, flat-bottom swales to be used for storm water treatment.*
- *Replace bridge structures at Arroyo Paredon (Parida), Toro Canyon, Romero (Picay), Oak, and San Ysidro creeks.*
- *Widen bridge structures at Franklin and Santa Monica creeks.*
- *Widen traffic undercrossing structures at South Padaro Lane and Evans Avenue.*
- *Build a southbound auxiliary lane between the Sheffield Drive on-ramp and the Evans Avenue off-ramp.*
- *Reconstruct the highway to remove a localized rise in the roadway north of Sheffield Drive near the Romero (Picay) Creek bridge that causes drivers to have somewhat limited visibility of the freeway ahead of them. The freeway profile would be lowered a maximum of 2 feet to flatten the roadway.*
- *Reconstruct the interchange at Sheffield Drive, including reconfiguring the southbound highway lanes and ramps. Note that a change to the interchange was made for Alternative 1 (preferred alternative).*
- *Rebuild the interchange at Cabrillo Boulevard/Hot Springs. Five configurations, as described later in this section, were considered for this interchange.*
- *Install traffic signals where warranted.*
- *Provide median landscaping from 0.4 mile south of Carpinteria Creek to 0.3 mile north of Carpinteria Creek (this is the only location where median planting is the same for all alternatives).*
- *Install replacement planting where appropriate.*
- *Build soundwalls for noise abatement where appropriate.*
- *Build retaining walls where necessary. Each alternative and interchange configuration differs on the number of walls proposed.*
- *Provide noise-attenuating pavement surfacing on all mainline travel lanes through the limits of the HOV improvements. The current proposal is to use continuously reinforced concrete instead of asphalt concrete pavement.*

Because pavement strategies are evolving, the final decision for type of treatment would be determined during the design phase.

- *Relocate underground and aboveground utilities as needed.*
- *Lengthen cross culverts to accommodate additional pavement width.*
- *Build maintenance vehicle pullout areas.*
- *Incorporate permanent storm water treatment best management practices, with an emphasis on vegetated bio-filtration type best management practices.*
- *Incorporate measures that preserve the pre-construction runoff rates.*

Cabrillo Boulevard/Hot Springs Road Interchange

The Cabrillo Boulevard interchange would be rebuilt under all three build alternatives. Five mutually exclusive interchange configurations—F, F Modified, J, M, and M Modified—were considered under each of the three build alternatives. Configuration F Modified (Northbound Half Diamond with Hermosillo Drive Off-ramp and Southbound Half Diamond) was selected and incorporates the following features:

- *Close both median off-ramps at Cabrillo Boulevard and the Los Patos Way off-ramp.*
- *Add a northbound right-side off-ramp at Cabrillo Boulevard.*
- *Improve the northbound Cabrillo Boulevard on-ramp.*
- *Retain the northbound Hermosillo Drive off-ramp. No additional access control is necessary.*
- *Construct new southbound on- and off-ramps to intersect at Cabrillo Boulevard immediately adjacent and to the right of the southbound freeway lanes.*
- *Build a total of six retaining walls—two at the outside shoulders of the southbound ramps, two in the southbound direction between the mainline and southbound ramps, one at the outside shoulder of the northbound on-ramp, and one in the northbound direction between the mainline and northbound off-ramp.*

Identification of the Preferred Alternative

Caltrans has identified Alternative 1 as the preferred alternative (widening to the median in some locations and widening to the outside in other locations) with the F Modified configuration for the Cabrillo Boulevard/Hot Springs Road interchange (see ~~Section 1.3~~ above *for description of the F Modified configuration). Identification* *of the preferred alternative came after consideration of public input received on the draft environmental document. Input was received from individuals, community groups, state and local agencies, and elected officials. The team also considered project funding, schedule, right-of-way constraints, and feasibility of project alternatives.*

While all three viable build alternatives studied in the draft environmental document would satisfy the purpose and need, Alternative 1 would maximize opportunities to retain and enhance high-value resources including scenic views, wetlands and median/outside landscaping. Although Alternative 3 has the smallest construction footprint and minimizes impacts to wetlands, it provides no opportunities for median landscaping. Alternative 2 provides the greatest opportunity for median landscaping, but would also have the largest construction footprint.

The following changes were made to the preferred alternative since the 2012 *Draft Environmental Impact Report/Environmental Assessment was released:*

1) *By using a single median barrier instead of retaining enough room for a planted median from South Padaro Lane to the Carpinteria Marsh (post miles 4.7 to 5.3), the originally proposed retaining wall in this area is no longer needed, making it more compatible with the County of Santa Barbara's proposal for Santa Claus Lane parking and beach access.*
2) *The construction footprint would be reduced by narrowing the inside shoulder width in the northbound direction in the vicinity of the Via Real Redeposited Midden.*
3) *A realignment and separation will be accommodated in the northbound and southbound mainlines at the Sheffield Drive interchange (post miles 8.9 to 9.1) to provide a wider median. The new alignment was in response to comments from local agencies that expressed the desire for keeping a wider median, if possible. The change requires two additional retaining walls along the southbound mainline shoulder edge.*
4) *The proposed structural section for the highway is currently proposed to be continuously reinforced concrete pavement instead of asphalt concrete pavement, which could improve noise attenuation and extends the service life (from the previous estimate of 20 years) to 40 years.*
5) *Cabrillo Boulevard interchange Concept F Modified is to be revised to have a lane added to Cabrillo Boulevard between the northbound and southbound ramp*

connections to provide for two eastbound lanes. The originally proposed median will be shifted north one lane width to provide for a continuation of two eastbound lanes to the roundabout. There will be only one Cabrillo Boulevard westbound right-turn lane into the northbound on-ramp instead of two.

The traffic studies considered scenarios for both Build and No-Build conditions. The local jurisdiction analysis completed as part of this Final Revised EIR performed subsequent to issuance of the Writ does not change selection of the preferred alternative identified in the 2014 Final EIR. This remains the preferred alternative for the purposes of project approval and certification of this Final Revised EIR. Subsequent memos addressing traffic data for the F Modified configuration were also prepared prior to releasing the 2014 Final EIR, including one that reflected a design change to F Modified for the southbound Cabrillo Boulevard ramp. (See Appendix E.)

1.4 Background

As required by CEQA Guidelines Section 15087, a Notice of Availability (NOA) of the 2012 Draft Environmental Impact Report (2012 DEIR) was distributed on April 23, 2012 to applicable public agencies and interested individuals. The 2012 DEIR was made available for public review, and copies of the document were made available online, at the Caltrans District Office, and at four local libraries within the project area.

In addition, Caltrans held two public meetings on April 27 and 28, 2012 in Carpinteria and Montecito. The 2012 DEIR contained the following technical chapters:

- Chapter 2.1.1 Land Use
- Chapter 2.1.2 Growth
- Chapter 2.1.3 Community Impacts
- Chapter 2.1.4 Utilities/Emergency Service
- Chapter 2.1.5 Traffic and Transportation/Pedestrian and Bicycle Facilities
- Chapter 2.1.6 Visual/Aesthetics
- Chapter 2.1.7 Cultural Resources
- Chapter 2.2.1 Hydrology and Floodplain
- Chapter 2.2.2 Water Quality and Storm Water Runoff
- Chapter 2.2.3 Geology/Soils/Seismic/Topography

- Chapter 2.2.4 Paleontology
- Chapter 2.2.5 Hazardous Waste or Materials
- Chapter 2.2.6 Air Quality
- Chapter 2.2.7 Noise
- Chapter 2.3 Biological Environment
- Chapter 2.4 Construction Impacts
- Chapter 2.5 Cumulative Impacts
- Chapter 3.2.6 Climate Change

Caltrans received comments on the 2012 Draft EIR via e-mail, mail, and dictation to a court reporter. Caltrans subsequently prepared the 2014 Final EIR, which included detailed, written responses to every comment as well as updates/changes in response to these comments.

1.5 Purpose of this Final Revised Environmental Impact Report

Following certification of the 2014 Final EIR, a legal challenge to the 2014 Final EIR was filed in Santa Barbara County Superior Court, Case No. 1468969. The Court ruled that:

> " …the 2014 Final Environmental Impact Report certified by Caltrans in August 2014 was deficient in two respects: (1) the 2014 EIR failed to adequately identify, analyze, and mitigate impacts to area intersections, and (2) the 2014 Final EIR did not adequately complete a cumulative traffic impacts analysis associated with local intersections. An EIR must discuss cumulative impacts when they are significant, and the project's incremental contribution is "cumulatively considerable." "

The Court issued a Writ of Mandate ordering Caltrans to rescind approval of the project and certification of the 2014 Final EIR, but did not reopen the 2014 FEIR as to any other impacts or analyses. In response to the Court's ruling, Caltrans vacated project approval and decertified the 2014 Final EIR, and has prepared this Final Revised EIR to comply with the Judgment and Writ of Mandate.

The CEQA Guidelines specify that, when a portion of an EIR is being recirculated or revised, the lead agency may request that reviewers limit their comments to the revised parts of the EIR that have been recirculated. The CEQA Guidelines specify that the lead agency is not required to respond to comments on the recirculated EIR that do not relate to the portion(s) of the EIR that have been revised and recirculated (Section 15088.5 (f)(2)).

Pursuant to the Writ, Caltrans prepared a revised Traffic and Transportation/ Pedestrian and Bicycle Facilities section. The revisions specifically focus on the impact to intersections and cumulative traffic impacts to the mainline and intersections within the traffic study area. Any proposed improvements for identified traffic intersections will be designed to accommodate bicycles and pedestrians and will be consistent with Caltrans' Complete Streets Policy (2001, 2008, with updated directives issued 2012) and the recently adopted State Bicycle and Pedestrian Plan (May 2017). Chapter 3 "Determining Significance under CEQA" specific to traffic impacts is also being recirculated. Several sections of Chapter 1 are also included, but only to provide context. No other portions of the 2014 Final EIR are being recirculated.

Recirculation of an EIR, or revision of a portion of an EIR, requires public notice and a public review period pursuant to CEQA Guidelines Section 15087, and consultation with other agencies pursuant to Section 15086 (CEQA Guidelines Section 15088.5(d)).

Caltrans provides that no person be excluded from participation or otherwise be subjected to discrimination under any program or activity administered by Caltrans (see Appendix C, Title VI Statement).

1.6 Scope of the Final Revised EIR and Scope of Comments

In compliance with the Writ, which focused on intersection impacts covered in Chapter 2.1.5 - Traffic and Transportation/Pedestrian and Bicycle Facilities and Chapter 2.5 - Cumulative Impacts for Traffic and Transportation/Pedestrian and Bicycle Facilities of the 2014 Final EIR, Caltrans has revised portions of Chapter 2.1.5, Chapter 2.5, as well as Chapter 3 - CEQA Evaluation and Chapter 4 - Comments and Coordination for public review and comments.

The Draft Revised EIR was circulated during a 60-day review period. The review period occurred between December 2, 2016 and January 31, 2017. A minimum 45-day review period is set forth in the CEQA Guidelines. The Draft Revised EIR, 2014 FEIR, and relevant traffic technical studies were available at the following locations for review as well as online at the website below:

- Santa Barbara City Central Library (40 East Anapamu Street)
- Santa Barbara Eastside Library (1102 East Montecito Street)
- East Montecito Branch Library (1469 East Valley Road)

- Carpinteria City Library (5141 Carpinteria Avenue)
- Caltrans District 5 Midway Building (2885 South Higuera Street, San Luis Obispo)
- Online: http://www.dot.ca.gov/dist05/projects/sb_101hov

Following the 60-day public review period, Caltrans received public comments on the Draft Revised EIR and prepared responses to those comments. Both are included in this Final Revised EIR in Appendix J (under separate cover). Any necessary revisions and additions were made to the Final Revised EIR based on these comments and responses. Text changes to the Final Revised EIR made after circulation of the Draft Revised EIR are identified with a vertical line in the right-hand margin. Changes made to Tables 2.1 through 2.7 are denoted with a blue highlighted background. The Final Revised EIR Findings and a Statement of Overriding Considerations were also prepared. Staff recommends that the District Director certify the Final Revised EIR, adopt the Findings and Statement of Overriding Considerations, and approve the project.

1.7 Organization of the Final Revised EIR

The chapters contained in this Final Revised EIR are organized as follows:

Chapter 1 – Introduction to the Final Revised EIR

Provides an introduction and background, and describes the layout and intended use for the Final Revised EIR.

Chapter 2.1.5 – Traffic and Transportation/Pedestrian and Bicycle Facilities

Contains the methodology for evaluating the 108 intersections analyzed as part of the traffic studies, and the results of the analyses.

Chapter 2.5 – Cumulative Impacts—Traffic Circulation

Includes expanded discussion focused on cumulative traffic impacts.

Chapter 3 – California Environmental Quality Act Evaluation

Discusses significance determination under CEQA for traffic-related impact and additional mitigation measures.

Chapter 4 – Comments and Coordination

Includes summaries of meetings with local jurisdictions to discuss the impact to intersections and appropriate mitigation strategies.

Appendices

Several appendices were added as references. In addition, technical memos that update/clarify traffic data for the Linden and Casitas Pass project, Milpas to Hot Springs Operational Improvement project, and Cabrillo Boulevard area have been included in Appendix E.

The following appendices were added since release of the Draft Revised EIR:

Appendix G contains a table that was added to show how Caltrans' equitable share responsibilities were calculated. Appendix H contains traffic validation and analysis summary memos that were added to clarify and provide backup data for use in this document as well as the responses to public comments. Appendix I contains maps that were added to provide a visual representation of proposed delay reduction throughout the corridor. Under separate cover, Appendix J contains the public comments received during the public review period and Caltrans' responses to these comments.

Chapter 2 Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

As discussed above, portions of Sections 2.1.5 Traffic and Transportation/Pedestrian and Bicycle Facilities, 2.5 Cumulative Impacts, and Chapter 3 California Environmental Quality Act Evaluation have been revised to analyze the traffic impact to intersections and cumulative traffic impacts. As the CEQA lead agency, Caltrans was directed by the Writ of Mandate issued January 26, 2016 to prepare and circulate a legally adequate Revised Environmental Impact Report with respect to the impact to intersections and cumulative traffic impacts. The Court found no fault with either the analysis or conclusions of any other portions of the 2014 Final EIR.

Changes were made since the Draft Revised EIR was circulated between December 1, 2016 and January 31, 2017. Public comments and responses are compiled under separate cover in Appendix J. Revisions to the Final Revised EIR text to further explain or support the responses are shown with a vertical black line in the right margin. Changes made to Tables 2.1-2.7 are shown with blue shading, and changes made to the figures in Appendix B are shown with black borders.

The Draft and Final Revised EIR were prepared pursuant to CEQA, and do not change the NEPA portion of the document or the Finding of No Significant Impact conclusion.

2.1 Human Environment

2.1.1 Traffic and Transportation/Pedestrian and Bicycle Facilities

Regulatory Setting

Please see Chapter 2.1.5 in the 2014 Final EIR.

Affected Environment

U.S. 101 is the most heavily traveled facility in the county and serves as a vital north-south connection between Northern California and Southern California. The highway also plays a vital role in enabling motorists to access local communities (Ventura, *Carpinteria, Summerland, Montecito, Santa Barbara, and Goleta) and coastal areas near the project area. Recognition of this corridor's important role was the basis for preparing a comprehensive set of traffic studies for the proposed South Coast 101 HOV Lanes project.*

Traffic data collected in April 2008 along a 27.5-mile section of U.S. 101 were used as a baseline for the following reports: Existing Conditions Operational Analysis (December 15, 2008, Amended December 9, 2011); Methodology Report (December 2008)*; Travel Forecast Report (February 9, 2009); Forecast Operations Report (October 19, 2009, amended December 9, 2011); and Cabrillo-Hot Springs Interchange Configuration Analysis Technical Memoranda (March 21, 2011 and July 19, 2011).*

In addition to traffic studies listed above, the following technical memos were used in the analysis:

- Addendum to July 19, 2011 Cabrillo/Hot Springs Interchange Configuration Analysis Technical Memo (March 14, 2014)
- Cabrillo Boulevard I/C Alternative LOS Analysis at Milpas and US 101 SB Ramp Technical Memo (April 20, 2012)
- Updated ICU Analysis for Garden Street and Yanonali Street (June 27, 2016)
- Linden Casitas Area Intersection Performance Updates/Clarification (August 23, 2016)

The traffic studies analyzed 27.5 miles of U.S. 101 from south of Rincon Point/Bates Road interchange to north of the Hollister interchange in Goleta. The extended study limits were necessary to gain a better understanding of how the proposed project would affect the entire South County section of U.S. 101. Within the traffic study area, U.S. 101 varies between four and six lanes wide, with auxiliary lanes in some segments. With the completion of the Ventura/Santa Barbara HOV project in 2015, three lanes in each direction ~~will~~ now *exist to the south of the project on U.S. 101 from the City of Ventura in Ventura County to the Carpinteria Creek Bridge (post mile 2.0). North of the project limits U.S. 101 has three lanes in each direction from Cabrillo Boulevard (post mile 11.5) to Fairview Avenue (post mile 22.5). The traffic analysis studied the existing operating characteristics of U.S. 101 as well as the interchanges on U.S. 101 that provide access to and from the local street network.*

In this corridor, travel patterns show that most commuters travel from the cities of Ventura and Carpinteria into Santa Barbara in the morning and then travel the *reverse commute in the evening. The morning peak commute period is generally 7:00 a.m. to 9:00 a.m., and the afternoon peak commute period is 3:30 p.m. to 6:30 p.m. This commuter trend is expected to continue based on existing and predicted housing and job patterns. In addition to daily commuter travel, the afternoon travel period tends to have a greater diversity in trip types, which is reflected by the higher numbers seen during the northbound afternoon peak hours of delay (see Table 2.15 in the 2014 Final EIR). Other trip types in this corridor include interregional travel, goods movement, tourist travel as well as more localized travel for activities such as shopping, recreation, and coastal access.*

The remainder of the Affected Environment section beginning with the second paragraph on page 103 of the 2014 Final EIR remains intact.

Environmental Consequences

The U.S. 101 Mainline Analysis section found on pages 108-114 of the 2014 Final EIR remains intact. No additional discussion of mainline traffic has been added to this section. The Intersection Analysis section begins on page 115 of the 2014 Final EIR.

Intersection Analysis

A Peak hour intersection analysis was also conducted at U.S. 101 interchange locations within the traffic study limits. A total of ~~104~~ 108 *intersections were analyzed within the 27.5-mile traffic study area.*[3] *These intersections generally included ramp-junction intersections as well as adjacent*[4] *intersections near the end of the ramp within the traffic study area. This analysis was completed to ensure that the project would not result in substantial changes to traffic levels at ramp junctions and local intersections. Many of the intersections in the study were outside of the project limits. The purpose of ~~an expanded study~~* a 27.5-mile-long traffic study area *was to determine the current conditions and to anticipate changes that could be brought about by the project as a result of traffic diversion and shifting traffic patterns. Peak hour intersection Delay, Level of Service* (LOS), *and 95th Percentile Queue were used as the main measures of effectiveness for intersection analysis.*

In 2008, to support the development of the EIR for the project, Caltrans prepared a Traffic Study Methodology Report. The report was developed under the review of a traffic subcommittee team, which included local agency staff. The intersections

[3] The 2014 Final EIR stated there were 104 intersections analyzed; however, the number was incorrect as four intersections were omitted from the total. The total is now corrected to 108 in this Final Revised EIR.

[4] Defined in the Forecast Operations Report as one intersection from a state ramp node.

included in the study were identified by the Caltrans Traffic Operations staff with input from the local agencies. Peak period intersection turning counts were gathered at all of the initially identified 103 intersections. Five more intersections were subsequently added using local agency-supplied data at the request of local agencies.

All turning movement counts for signalized intersections identified to collect data on the number of vehicles turning right on red were performed and presented in Figure 39 of the Forecast Operations Report. For 51 of these intersections, turning movement counts also included pedestrian counts. Additional intersection counts and studies occurred during evaluation of the Cabrillo/Hot Springs Road interchange portion of the project.

Pedestrian count data was collected at select intersections. The intersections were selected by the Project Traffic Committee, which included participants from all jurisdictions in the study area. Once the intersections were identified, pedestrian count data was collected from each and entered into the intersection analysis models.

Where pedestrian crossings occurred, the information was factored into the collected pedestrian data and handled within the signal timing. For pedestrian usage at unsignalized intersections, the pedestrian count data was collected and entered into the analysis model. Then the intersection capacity was adjusted accordingly to accommodate the pedestrian effect and calculated as part of the delay calculation.

Pedestrian movements are accommodated at all study intersections, and changes associated with the HOV project would not reduce or eliminate this access. Where modifications are proposed to provide mitigation, which are discussed later in this document, pedestrian access and safety will be addressed during the design phase of each improvement. This process will involve coordination between Caltrans and the applicable jurisdictions as discussed further in Chapter 4 of this document.

According to the California Vehicle Code (CVC 21200), bicyclists generally have the same rights and responsibilities as motor vehicle drivers. As such, bicycles are assumed to be part of the vehicle stream and are adequately served by the various types of intersections, whether signalized or unsignalized. When a bike lane or shoulder exists, it is anticipated that bikes using the bike lane will operate in tandem with the vehicle stream. Under these conditions, which are typical for the local street systems within the study area, added vehicle delays have limited influence on bicycle travel.

The data collected for all 108 intersections is shown in Tables 2.1 and 2.2. Appendix B contains figures showing a graphic representation of LOS measurements at each of the 108 intersections.

The Draft Revised EIR contained data entry errors caused primarily by use of the wrong reference document. Staff inadvertently used the Future Baseline conditions LOS ratings from the Cabrillo/Hot Springs Road Technical Memo dated July 19, 2011 instead of No-Build outputs from the Forecast Operations Report. The errors mainly affected intersection data reported in the Draft Revised EIR between the San Ysidro Road interchange in Montecito and the Garden Street interchange in the City of Santa Barbara. Tables 2.1 and 2.7 have been updated to provide the correct values. The updates to the tables are shown with blue shading.

Upon using the correct data, the results did not change the overall outcome or impact determination. In several study intersections, the corrections demonstrated how traffic conditions will logically degrade over time under the No-Build condition as land use development occurs. No-Build conditions are projected to occur with or without the project.

Correction of a data entry error has changed the 2040 AM delay increase at the Southbound 101 off-ramp and San Ysidro Road/Eucalyptus Lane intersection (#37). The increase in delay reported in the Draft Revised EIR was 21.1 seconds and it is now 8.3 seconds. As a result, this intersection no longer meets the impact criteria established for unsignalized intersections. However, because this intersection was disclosed as being impacted in the Draft Revised EIR, and extensive coordination with the County to develop this location as part of the mitigation plan has taken place to date, Caltrans continues to identify this throughout the Final Revised EIR as a location experiencing substantial delay. As a result, it will still be addressed in the mitigation plan in Table 2.8 and Appendix F.

Additionally, as a result of the correction of data transfer errors, the Olive Mill Road/Coast Village Road intersection (#39) was found to have an 11 second increase in delay between the Build and No-Build conditions in the 2040 PM peak hours. The 2040 PM delay change between the Build and No-Build reported at this location in the Draft Revised EIR was zero seconds. As a result, this intersection was added to the previously identified locations requiring improvements (see pages 40-41) and the mitigation plan in Table 2.8 and Appendix F now includes this intersection.

The additional intersection does not change the significance determination from the Draft Revised EIR since the project already identified a significant traffic impact associated with delays at particular study intersections.

An impact to intersections is considered significant if the project would substantially increase delays at particular study intersections, taking into consideration context and intensity. Increased intersection delays are considered substantial if, overall, they adversely affect traffic flow at study intersections, in light of the magnitude and location of the delays.

Context is the setting surrounding a particular resource, and intensity is a measure of the severity or magnitude of an impact to that resource. Context provides a backdrop against which the intensity of impacts can be applied to understand their importance, and the significance of an activity may vary with its setting (CEQA Guidelines Section 15064(b)). For purposes of this evaluation, the context is the 27.5-mile corridor of U.S. 101 that constitutes the traffic study area along with 108 intersections that were selected within the corridor. These intersections function as ramp junctions or are located one node or intersection beyond the ramp junction. All 108 intersections interface with the local street system.

These 108 intersections can be categorized into low, medium, and high volume according to the average amount of traffic volumes they serve in the morning or evening peak hours. Intersections carrying less than 1,000 vehicles in the peak hour are classified as low volume intersections, those serving approximately 1,000 to 2,000 vehicles are classified as medium volume intersections, and those serving more than 2,000 vehicles are classified as high volume intersections.

Typically, low volume intersections provide access to lower density land uses such as single-family residential. Examples of representative low volume intersections in the traffic study area include the Southbound 101 on- and off-ramps at Bailard Avenue in Carpinteria, and the 101 on- and-off ramp junctions at North and South Padaro Lane.

Intersections that carry medium traffic volumes tend to be those that provide access to residential areas and small business districts. These tend to connect with local roads that parallel the freeway and may also provide cross-freeway connectivity. The Turnpike Road and Calle Real intersection in Goleta and the Northbound 101 off-ramp and Coast Village Road/Hermosillo Drive intersection in Santa Barbara are representative examples of medium volume intersections in the traffic study area.

Typically, the higher volume intersections tend to be at locations where local roads cross the freeway and provide connectivity to higher density land uses. They also provide access to connector roads that access outlying areas. Examples of these intersections in the study area include the Southbound 101 on- and off-ramps at Glen Annie Road in Goleta, and Calle Real and Las Positas Road in Santa Barbara.

The intensity is a measure of the user experience at each of the 108 intersections both in terms of the overall intersection delay as well as the delay experienced by individual vehicular users. The Highway Capacity Manual (HCM) method determines LOS based on the estimated delay for an intersection. The definitions for LOS at signalized and unsignalized intersections taken from the 2000 HCM are as follows:

> Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity.[5]
>
> Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion.[5]

A signalized intersection is designed to carry higher traffic volumes, and users expect greater delay than at an unsignalized intersection. Unsignalized intersections are associated with more uncertainty for users, since delays are less predictable than they are at signals. This uncertainty can reduce users' delay tolerance.

Highway Capacity Manual Analysis

The standard intersection analysis method used by Caltrans is the Highway Capacity Manual (HCM) method. Because the HCM signal methodology provides an

[5] Source: 2000 Highway Capacity Manual, Transportation Research Board

operations level of assessment, it is preferred by Caltrans for intersection operations and signal timing analysis.

As described above, the HCM method determines LOS based on the estimated delay for an intersection. Delay is measured in seconds per vehicle and takes into account vehicles slowing in advance of an intersection, time spent stopped on an intersection approach, time spent as vehicles move up in the queue, and time needed for vehicles to accelerate to their desired speed. Delays at signalized and unsignalized intersections are analyzed differently because user perceptions differ among transportation facility types.

The HCM method uses the LOS grading scale of letters A-F, with LOS A representing near free-flow conditions and LOS F representing extreme congestion. Figures 2.1 through 2.3 below are a graphic representation of the LOS grading scale for different types of intersections.

Another intersection analysis method used by Caltrans is the 95th percentile queue analysis. This analysis method is widely accepted by traffic industry professionals to gauge vehicle queuing at intersections, which is important because it can predict vehicle backups onto the highway mainline or street. A queue is a line of vehicles waiting to be served due to a signal or stop sign, a bottleneck, or other causes. The 95th percentile queue is defined to be the queue length (in vehicles) that has only a 5 percent probability of being exceeded during the analysis time period. It is a useful parameter for determining the appropriate length of off-ramps and/or turn pockets, but it's not typical of what an average driver would experience[5]. It should be understood, therefore, that typical vehicle queues will be better represented by the 50th percentile queue (average queue) than the values represented by the 95th percentile queue outputs. The 95th percentile queue data is shown in Tables 2.3 and 2.4.

Local Thresholds and Congestion Management Plan Analysis

During preparation of the Forecast Operations Report, several local jurisdictions requested that Caltrans consider their local development traffic thresholds in the intersection analysis. The jurisdictions requesting this were the cities of Carpinteria, Santa Barbara, and Goleta as well as the County of Santa Barbara. As a courtesy, Caltrans agreed to incorporate local thresholds into the analysis of the intersections located within the traffic study area for informational purposes.

[5] Source: 2000 Highway Capacity Manual, Transportation Research Board

Local agencies in this corridor use the Intersection Capacity Utilization (ICU) method as their preferred tool for signalized intersection analysis. In the Forecast Operations Report, local ICU thresholds were applied to signalized intersections under local jurisdiction, and the state HCM thresholds were applied to intersections under state jurisdiction as well as locally controlled intersections.

For locally operated intersections designated as part of the Santa Barbara County Congestion Management Plan (CMP), thresholds from the CMP were also applied to identify a change in intersection delay. For the purposes of the Forecast Operations Report, Caltrans used CMP criteria to identify impacts at state-controlled intersections. That criteria and related findings are also provided in this Final Revised EIR for informational purposes. However, this analysis has been superseded by more specific assessments provided later in this document which are being used to develop context and intensity findings.

Although Caltrans agreed to analyze intersections using local ICU and CMP thresholds in the Forecast Operations Report, at no time did Caltrans agree to adopt these thresholds as the basis for determining whether the project's impact to intersections will or will not be significant under CEQA. Both ICU and CMP thresholds are used by the local jurisdictions to evaluate traffic changes resulting from local land use decisions. Caltrans is not adopting local standards that are intended for land use development applications because they cannot be applied consistently corridor-wide and they use measures of analysis not supported by Caltrans. As described above, Caltrans uses the HCM methodology for analyzing intersection traffic impacts. Caltrans exclusively uses HCM intersection analysis methodology statewide because it takes into account detailed signal operations parameters, while the ICU methodology does not. The ICU method is a planning-level model and is best suited for transportation planning uses such as preparation of Traffic Impact Studies for proposed developments. In addition, the ICU method can overestimate intersection capacity, which may underestimate local development impacts on state and local facilities. Local and CMP thresholds analysis results are found in Appendix D. The CMP intersections are identified with a "~" throughout the various tables included in this document. If these intersections fall below the CMP-established criteria (excluding certain trips, such as inter-regional, trips generated from high density housing or mixed land use development in close proximity to transit), they must be addressed in a deficiency plan. If not, they will be considered deficient or risk being found in "non-conformance" with the CMP requirements. When the CMP was initiated in 1991, SBCAG and the local agencies selected a minimum acceptable LOS of "D" for these intersections and roadways.

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Table 2.1 2020 HCM and Entering Volume Outputs for all 108 Intersections (signalized and unsignalized)

2020 HCM and Entering Volume Outputs for all 108 Intersections (signalized and unsignalized)																							
2020 Corridor Intersection Performance			2020 No Build		2020 Build		LOS Points Change		2020 No Build		2020 Build		Delays Change (seconds)		Total Entering AM Traffic Volume			Total Entering PM Traffic Volume			Signal Warrant Met?		Jurisdiction
Int. #	Intersections	Interchange	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	No Build	Build	Delta	No Build	Build	Delta	No Build	Build	
1	NB On/Off & Bates *	Bates I/C	A	A	A	A	0	0	9.0	9.2	9.0	9.2	0.0	0.0	42	42	0	90	90	0	No	No	State
2	SB On/Off & Bates *		A	A	A	A	0	0	8.8	9.7	8.8	9.7	0.0	0.0	69	79	10	103	103	0	No	No	State
3	NB On/Off & SR 150 *	Rte 150 I/C	B	B	B	B	0	0	12.2	13.8	12.3	13.9	0.1	0.1	717	722	5	619	629	10	No	No	State
4	SB On/Off & SR 150 *		B	D	B	D	0	0	12.1	30.0	12.2	32.0	0.1	2.0	378	383	5	643	654	11	No	No	State
5	Via Real & SR 150 *		C	B	C	C	0	-1	18.8	14.8	19.0	15.1	0.2	0.3	575	580	5	638	648	10	No	No	State
6	Carpinteria Ave & SR 150 *		A	A	A	A	0	0	9.8	8.9	9.8	10.0	0.0	1.1	285	285	0	257	257	0	No	No	State
7	NB On/Off & Bailard *	Bailard I/C	C	C	C	C	0	0	18.6	19.2	19.2	20.9	0.6	1.7	996	1022	26	1158	1223	65	No	No	State
8	SB On/Off & Bailard *		E	E	E	F	0	-1	44.0	45.2	46.3	71.8	2.3	26.6	883	892	9	918	968	50	Yes	Yes	State
9	Via Real & Bailard *		B	E	B	D	0	1	12.0	36.0	12.3	34.6	0.3	-1.4	1019	1043	24	1218	1228	10	No	No	City of Carpinteria
10	Carpinteria Ave & Bailard *		B	B	B	C	0	-1	11.8	14.8	12.0	15.4	0.2	0.6	736	743	7	873	895	22	No	No	City of Carpinteria
11	Via Real & Casitas Pass Rd	Casitas Pass I/C	B	C	B	B	0	1	16.9	21.8	19.1	17.3	2.2	-4.5	1340	1867	527	1639	1860	221	N/A	N/A	City of Carpinteria
12	Vellocito & Via Real *		B	B	B	B	0	0	10.5	13.7	10.8	10.5	0.3	-3.2	358	377	19	686	366	-320	No	No	City of Carpinteria
13	SB On/Off & Casitas Pass Rd		B	B	B	B	0	0	11.9	14.4	11.7	13.9	-0.2	-0.5	1221	1767	546	1739	2012	273	N/A	N/A	State
14	Carpinteria Ave & Casitas Pass Rd ~		B	C	C	C	-1	0	18.6	22.9	21.8	27.5	3.2	4.6	1459	1586	127	1844	1980	136	N/A	N/A	City of Carpinteria
100	NB On/Off & Via Real		A	A	A	A	0	0	6.5	6.2	7.7	6.9	1.2	0.7	994	1412	418	892	1105	213	N/A	N/A	State
15	NB On/Off & Ogan Rd * (RAB)	Linden Ave I/C	A	B	A	A	0	1	4.8	4.9	7.9	4.3	3.1	-0.6	764	1265	501	911	738	-173	N/A	N/A	State
16	Linden Ave & Ogan Rd		B	B	B	A	0	1	10.8	13.7	12.4	8.6	1.6	-5.1	1271	1568	297	1389	1156	-233	N/A	N/A	City of Carpinteria
17	SB Off & Linden Ave		A	A	A	B	0	-1	9.1	9.0	8.9	11.1	-0.2	2.1	1076	1348	272	1100	1248	148	N/A	N/A	State
18	Linden Ave & Sawyer Ave *		C	C	D	C	-1	0	17.2	16.6	26.8	18.8	9.6	2.2	955	1206	251	976	1058	82	No	No	City of Carpinteria
19	SB On/Off & Carpinteria Ave *	Santa Ynez - Santa Monica I/C	C	F	C	F	0	0	22.7	59.2	22.5	90.3	-0.2	31.1	781	773	-8	1215	1121	-94	No	No	State
20	Santa Ynez Ave/7th St & Carpinteria Ave		C	C	C	C	0	0	20.3	31.2	20.1	31.9	-0.2	0.7	880	870	-10	1439	1384	-55	N/A	N/A	City of Carpinteria
21	NB On/Off & Via Real *		E	E	F	E	-1	0	43.7	46.2	78.4	39.6	34.7	-6.6	1226	1348	122	1347	1314	-33	No	No	State
22	NB On/Off & S. Padaro Ln *	Padaro Ln - Santa Claus Ln I/C	A	B	A	B	0	0	9.5	12.2	9.6	11.1	0.1	-1.1	449	462	13	780	660	-120	No	No	State
23	Via Real & S. Padaro Ln *		C	C	D	B	-1	1	24.9	17.7	26.0	13.5	1.1	-4.2	884	884	0	927	780	-147	No	No	County of SB
24	SB On/Off & Santa Claus Ln/S. Padaro Ln *		B	F	B	D	0	2	11.3	53.0	11.5	32.4	0.2	-20.6	276	309	33	663	628	-35	No	No	State
25	NB On/Off & N. Padaro Ln *	Padaro Ln - Via Real I/C	B	A	B	A	0	0	12.2	9.9	12.0	10.0	-0.2	0.1	657	660	3	539	486	-53	No	No	State
26	N. Padaro Ln & Via Real *		C	B	C	B	0	0	18.8	14.4	18.0	11.1	-0.8	-3.3	920	881	-39	762	572	-190	No	No	County of SB
27	SB On/Off & N. Padaro Ln *		B	B	B	B	0	0	10.8	11.7	10.8	11.8	0.0	0.1	245	247	2	340	359	19	No	No	State
28	NB Off & Ortega Hill Rd *	Evans St - Ortega Hill Rd I/C	B	C	B	B	0	1	12.2	16.1	12.0	13.3	-0.2	-2.8	434	415	-19	613	475	-138	No	No	State
29	Evans Ave & Ortega Hill Rd *		B	B	A	A	1	1	10.2	12.4	10.0	9.7	-0.2	-2.7	648	608	-40	826	663	-163	No	No	County of SB
30	NB On & Ortega Hill Rd *		C	C	C	C	0	0	16.8	19.9	15.4	17.3	-1.4	-2.6	485	443	-42	592	453	-139	No	No	State
31	SB Off & Evans Ave *		B	B	A	B	1	0	10.2	12.9	10.0	12.9	-0.2	0.0	192	182	-10	354	356	2	No	No	State
32	NB On/Off & Sheffield *	Sheffield Dr I/C	B	A	B	A	0	0	12.5	9.6	12.9	9.7	0.4	0.1	802	833	31	634	635	1	No	No	State
33	SB On/Off & Sheffield *		B	B	C	B	-1	0	15.0	11.8	16.2	12.2	1.2	0.4	425	461	36	249	268	19	No	No	State
34	Jameson & Sheffield *		B	B	B	B	0	0	12.8	13.8	12.7	11.5	-0.1	-2.3	965	956	-9	886	721	-165	No	No	County of SB
35	NB On/Off & San Ysidro Rd *	San Ysidro I/C	B	B	B	B	0	0	13.3	13.8	13.3	12.4	0.0	-1.4	1002	1031	29	1091	1005	-86	No	No	State
36	San Ysidro Rd & N. Jameson Ln *		E	E	D	D	1	1	37.8	37.0	33.2	25.7	-4.6	-11.3	1332	1289	-43	1362	1216	-146	No	No	County of SB
37	SB Off & San Ysidro Rd/Eucalyptus Ln *		D	F	D	C	0	3	26.3	55.8	28.5	23.9	2.2	-31.9	728	734	6	853	666	-187	No	No	State
38	S. Jameson Ln & San Ysidro Rd/Eucalyptus Ln *		A	B	A	A	0	1	9.8	10.6	9.8	10.0	0.0	-0.6	226	226	0	380	281	-99	No	No	County of SB
39	Olive Mill Rd I/C *	Olive Mill Rd I/C	D	C	D	C	0	0	35.0	24.2	26.1	19.6	-8.9	-4.6	1196	1175	-21	1052	1109	57	Yes	Yes	State
39a	N. Jameson Ln & Olive Mill Rd *		C	B	C	B	0	0	17.3	11.0	16.5	12.0	-0.8	1.0	942	924	-18	757	824	67	No	No	City/County of SB
40	SB On & Olive Mill Rd *		C	D	B	C	1	1	18.3	28.1	14.1	18.1	-4.2	-10.0	1109	974	-135	1296	1188	-108	Yes	Yes	State
41	SB Off & Depot *		B	B	B	A	0	1	11.1	10.1	10.6	9.3	-0.5	-0.8	431	380	-51	314	191	-123	No	No	State
42	Olive Mill & Spring *		C	C	C	B	0	1	17.0	17.3	15.1	12.3	-1.9	-5.0	759	615	-144	744	542	-202	No	No	City of Santa Barbara
43	NB Off & Coast Village Rd/Hermosillo Dr *	Hermosillo Rd Off	C	F	C	E	0	1	24.7	62.7	18.8	35.0	-5.9	-27.7	946	841	-105	1356	1169	-187	No	Yes	State
44	SB On/Off & NB Off & Cabrillo Blvd	Cabrillo Blvd I/C	C	C	B	C	1	0	20.9	21.5	17.4	20.9	-3.5	-0.6	1053	1286	233	1195	1502	307	N/A	N/A	State
45	NB On & Cabrillo Blvd		A	B	A	A	0	1	9.4	12.8	5.7	8.3	-3.7	-4.5	1382	1500	118	1740	1830	90	N/A	N/A	State
107	Cabrillo Blvd/Los Patos *		C	D	C	F	0	-2	17.5	27.4	19.5	56.9	2.0	29.5	774	827	53	997	1174	177	No	No	City of Santa Barbara
108	Cabrillo Blvd/Hot Springs & Old Coast Hwy (RAB)		A	B	B	C	-1	-1	9.0	17.1	12.1	20.9	3.1	3.8	2116	2177	61	2636	2614	-22	N/A	N/A	City of Santa Barbara

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection
(RAB) = Roundabout with SIDRA analysis outputs
Changes made after circulation of the Draft Revised EIR are indicated in blue.

2020 HCM and Entering Volume Outputs for all 108 Intersections
(signalized and unsignalized)

2020 Corridor Intersection Performance			2020 No Build		2020 Build		LOS Points Change		2020 No Build		2020 Build		Delays Change (seconds)		Total Entering AM Traffic Volume			Total Entering PM Traffic Volume			Signal Warrant Met?		Jurisdiction
Int. #	Intersections	Interchange	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	No Build	Build	Delta	No Build	Build	Delta	No Build	Build	
46	NB On/Off & Salinas St *	Salinas St I/C	A	A	A	A	0	0	8.7	7.6	8.7	7.6	0.0	0.0	633	659	26	560	583	23	N/A	N/A	State
47	NB On/Off & Milpas St (RAB) ~		A	A	A	A	0	0	4.2	4.3	5.1	4.9	0.9	0.6	2759	3242	483	3030	3631	601	N/A	N/A	State
48	SB Off & Milpas St * ~	Milpas St I/C	C	F	D	F	-1	0	24.6	119.0	31.7	159.4	7.1	40.4	2202	2317	115	2746	2883	137	N/A	N/A	State
49	SB On & Milpas St ~		C	E	D	D	-1	1	29.8	60.0	35.8	50.6	6.0	-9.4	1932	2161	229	2621	2615	-6	N/A	N/A	State
106	Quinientos St & Milpas St		A	B	A	B	0	0	9.5	15.4	9.4	16.0	-0.1	0.6	2660	2647	-13	2987	3011	24	N/A	N/A	City of Santa Barbara
50	NB On/Off & Garden St ~		B	C	B	B	0	1	13.4	21.2	10.4	19.7	-3.0	-1.5	1987	2206	219	2564	2617	53	N/A	N/A	State
51	NB Off & Palm Ave *		A	A	A	A	0	0	9.9	9.5	10.0	9.6	0.1	0.1	407	427	20	301	313	12	No	No	State
102	Gutierrez St & Garden St	Garden St I/C	B	D	C	C	-1	1	20.0	64.4	20.1	34.2	0.1	-30.2	2672	2697	25	2977	2981	4	N/A	N/A	City of Santa Barbara
52	SB On/Off & Garden St ~		C	C	B	B	1	1	21.8	28.3	18.9	15.3	-2.9	-13.0	1918	2013	95	2267	2272	5	N/A	N/A	State
53	Garden St & E. Yanonali St		C	E	C	C	0	2	27.7	78.3	24.2	33.0	-3.5	-45.3	1271	1327	56	1565	1630	65	N/A	N/A	City of Santa Barbara
54	NB Off & Bath St *		B	C	B	C	0	0	12.5	15.3	12.6	15.4	0.1	0.1	434	440	6	609	614	5	No	No	State
55	NB On & Castillo St ~		D	F	D	F	0	0	41.1	103.3	41.9	104.0	0.8	0.7	1632	1629	-3	2280	2294	14	N/A	N/A	State
56	W. Haley St & Bath St	Castillo St I/C	A	B	A	B	0	0	9.2	15.1	9.2	15.0	0.0	-0.1	1026	1024	-2	1503	1500	-3	Yes	Yes	City of Santa Barbara
57	SB On/Off & Castillo St ~		C	C	C	C	0	0	21.5	32.8	21.8	33.0	0.3	0.2	2002	2001	-1	2456	2469	13	N/A	N/A	State
103	Montecito St & Castillo St ~		E	D	E	D	0	0	61.0	50.8	60.1	50.6	-0.9	-0.2	2471	2464	-7	2990	2990	0	N/A	N/A	City of Santa Barbara
58	NB On/Off & Carrillo St ~		C	C	C	C	0	0	21.0	28.4	21.1	28.4	0.1	0.0	3131	3140	9	3846	3857	11	N/A	N/A	State
59	SB On/Off & Carrillo St ~		D	C	D	C	0	0	36.9	28.9	38.2	29.2	1.3	0.3	3164	3170	6	3677	3685	8	N/A	N/A	State
60	Carrillo St & Castillo St ~	Carrillo St I/C	B	C	C	C	-1	0	20.0	21.3	20.2	20.8	0.2	-0.5	2758	2792	34	3684	3679	-5	N/A	N/A	City of Santa Barbara
61	Carrillo St & San Pascual St *		B	B	B	B	0	0	13.6	12.4	13.6	12.4	0.0	0.0	2252	2247	-5	2637	2632	-5	Yes	Yes	City of Santa Barbara
104	San Andres & Carrillo St		C	C	C	C	0	0	29.6	30.9	29.5	30.7	-0.1	-0.2	2330	2324	-6	2632	2622	-10	N/A	N/A	City of Santa Barbara
62	NB On/Off & Castillo St *	Arregllaga St I/C	F	F	F	F	0	0	54.0	142.9	55.2	142.3	1.2	-0.6	864	872	8	1050	1054	4	Yes	Yes	State
63	NB On/Off & Mission St ~		C	B	C	B	0	0	21.3	10.8	22.1	11.5	0.8	0.7	2782	2791	9	2710	2756	46	N/A	N/A	State
64	SB On/Off & Mission St ~		C	C	C	D	0	-1	32.0	33.3	32.5	35.4	0.5	2.1	2593	2600	7	2485	2517	32	N/A	N/A	State
65	Mission St & Castillo St	Mission St I/C	A	A	A	A	0	0	5.2	9.0	5.2	9.8	0.0	0.8	2312	2308	-4	2512	2555	43	N/A	N/A	City of Santa Barbara
66	Mission St & San Andres St *		C	C	C	C	0	0	15.6	16.3	15.6	18.0	0.0	1.7	1369	1365	-4	1484	1502	18	No	No	City of Santa Barbara
105	Modoc Rd & Mission St *		E	E	E	E	0	0	44.3	46.4	45.3	48.1	1.0	1.7	1514	1521	7	1686	1695	9	Yes	Yes	City of Santa Barbara
67	NB Off Pueblo St & Calle Real *	Pueblo St Off	E	F	E	F	0	0	39.1	114.5	39.2	114.5	0.1	0.0	817	818	1	810	783	-27	Yes	Yes	State
68	NB On & Calle Real ~		C	C	C	C	0	0	21.8	21.7	23.1	21.7	1.3	0.0	1600	1625	25	1669	1673	4	N/A	N/A	State
69	Calle Real & Las Positas Rd ~		D	D	D	D	0	0	36.1	39.8	35.8	39.8	-0.3	0.0	3027	3056	29	3243	3231	-12	N/A	N/A	City of Santa Barbara
70	SB On/Off & Las Positas Rd ~	Los Positas Rd I/C	C	D	C	D	0	0	28.9	37.3	29.2	37.3	0.3	0.0	2825	2852	27	2840	2852	12	N/A	N/A	State
71	Las Positas Rd & Modoc Rd ~		F	E	F	E	0	0	129.4	67.5	127.9	67.8	-1.5	0.3	2623	2610	-13	2626	2627	1	N/A	N/A	City of Santa Barbara
72	NB On/Off & Calle Real ~	Hope Ave I/C	C	C	C	C	0	0	25.8	31.5	26.0	32.1	0.2	0.6	1560	1594	34	1982	2018	36	N/A	N/A	State
73	SB On/Off & La Cumbre Rd ~	La Cumbre Rd I/C	B	B	B	B	0	0	14.4	18.0	14.4	18.0	0.0	0.0	2062	2061	-1	2200	2197	-3	N/A	N/A	State
74	La Cumbre Rd & Calle Real ~		A	B	A	B	0	0	9.3	11.6	9.3	11.6	0.0	0.0	1726	1724	-2	2098	2096	-2	N/A	N/A	City of Santa Barbara
75	NB Off & State St & Calle Real	State St I/C	C	C	C	C	0	0	22.7	28.4	22.8	28.8	0.1	0.4	2398	2411	13	2953	2962	9	N/A	N/A	State
76	NB On & State St * ~		A	A	A	A	0	0	0.0	0.0	0.0	0.0	0.0	0.0	1409	1407	-2	1703	1692	-11	N/A	N/A	State
77	Calle Real & SR 154 & San Marcos Pass Rd ~		C	C	C	C	0	0	30.8	27.3	30.9	27.4	0.1	0.1	2577	2590	13	2194	2207	13	N/A	N/A	City of Santa Barbara
78	SB Off & State St ~		B	C	B	C	0	0	16.7	25.8	16.8	26.0	0.1	0.2	1746	1750	4	1904	1901	-3	N/A	N/A	State
79	SB On & State St & SR 154 ~	US101-Rte154 I/C	F	F	F	F	0	0	72.2	53.3	75.5	58.7	3.3	5.4	1984	1994	10	1703	1722	19	N/A	N/A	State
79a	State St & San Marcos Pass Rd ~		C	B	C	B	0	0	24.2	17.3	24.2	17.4	0.0	0.1	1876	1884	8	2008	2014	6	N/A	N/A	County of Santa Barbara
80	NB On/Off & Calle Real & El Sueno Rd *	El Sueno Rd I/C	C	C	C	C	0	0	18.2	18.7	18.2	18.8	0.0	0.1	986	988	2	1079	1083	4	No	No	State
81	NB On/Off & Turnpike Rd ~		C	B	C	B	0	0	30.9	18.4	31.6	18.3	0.7	-0.1	2149	2183	34	2234	2279	45	N/A	N/A	State
82	SB On/Off & Turnpike Rd ~	Turnpike Rd I/C	C	B	C	B	0	0	24.3	16.6	24.5	17.0	0.2	0.4	2500	2503	3	2286	2327	41	N/A	N/A	State
83	Turnpike Rd & Calle Real		C	F	C	F	0	0	23.5	211.0	23.5	213.5	0.0	2.5	1675	1704	29	1945	2017	72	N/A	N/A	County of SB
84	NB On/Off & Patterson Ave ~		C	B	C	C	0	-1	24.2	18.3	25.5	22.3	1.3	4.0	2546	2619	73	2961	3074	113	N/A	N/A	State
85	SB On/Off & Patterson Ave ~	Patterson Ave I/C	B	C	B	C	0	0	19.5	26.8	19.7	27.6	0.2	0.8	2445	2528	83	3104	3162	58	N/A	N/A	State
86	Patterson Ave & Calle Real		B	C	B	C	0	0	17.3	28.8	17.5	34.4	0.2	5.6	1882	1909	27	2592	2665	73	N/A	N/A	County of Santa Barbara
87	NB On/Off & Fairview Ave ~		C	B	C	B	0	0	21.5	17.2	21.1	17.5	-0.4	0.3	2790	2809	19	2764	2790	26	N/A	N/A	State
88	Calle Real & Fairview Ave ~	Fairview Ave I/C	D	D	D	C	0	1	36.7	36.4	37.1	35.0	0.4	-1.4	2155	2163	8	2807	2823	16	N/A	N/A	City of Goleta
89	SB On/Off & Fairview Ave ~		B	B	B	B	0	0	14.0	15.4	13.8	15.5	-0.2	0.1	2532	2541	9	2347	2372	25	N/A	N/A	State
90	NB On/Off & Los Carneros Rd ~		C	B	D	B	-1	0	32.3	18.6	35.0	19.3	2.7	0.7	1652	1692	40	1934	2007	73	N/A	N/A	State
91	SB On/Off & Los Carneros Rd ~	Los Carneros I/C	B	B	B	B	0	0	14.2	15.2	14.1	16.3	-0.1	1.1	1998	2043	45	2616	2686	70	N/A	N/A	State
92	Los Carneros Rd & Calle Real		B	B	B	B	0	0	15.0	12.1	15.0	11.6	0.0	-0.5	873	872	-1	1292	1310	18	N/A	N/A	City of Goleta
93	NB On/Off & Glen Annie Rd & Calle Real ~		F	F	F	F	0	0	122.4	83.7	122.0	81.5	-0.4	-2.2	2783	2783	0	3091	3089	-2	N/A	N/A	State
94	Glen Annie Rd & Del Norte Rd *	Glen Annie I/C	B	A	B	B	0	-1	11.1	10.0	11.1	10.1	0.0	0.1	1086	1086	0	897	902	5	No	No	City of Goleta
95	SB On/Off & Glen Annie Rd ~		F	A	F	A	0	0	115.6	9.9	115.5	9.9	-0.1	0.0	3518	3518	0	3653	3642	-11	N/A	N/A	State
96	Calle Real & NB On *	Cathedral Oaks	B	B	B	B	0	0	10.8	12.2	10.8	12.2	0.0	0.0	335	334	-1	437	437	0	No	No	State
97	SB On/Off & Hollister Ave *	Winchester	C	B	C	B	0	0	18.5	14.4	18.5	14.5	0.0	0.1	922	922	0	903	911	8	No	No	State
98	NB Off & Winchester Canyon Rd *	Canyon I/C	A	A	A	A	0	0	8.4	9.7	8.4	9.7	0.0	0.0	433	433	0	590	590	0	No	No	State

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection
(RAB) = Roundabout with SIDRA analysis outputs
Changes made after circulation of the Draft Revised EIR are indicated in blue.

Table 2.2 2040 HCM and Entering Volume Outputs for all 108 Intersections (signalized and unsignalized)

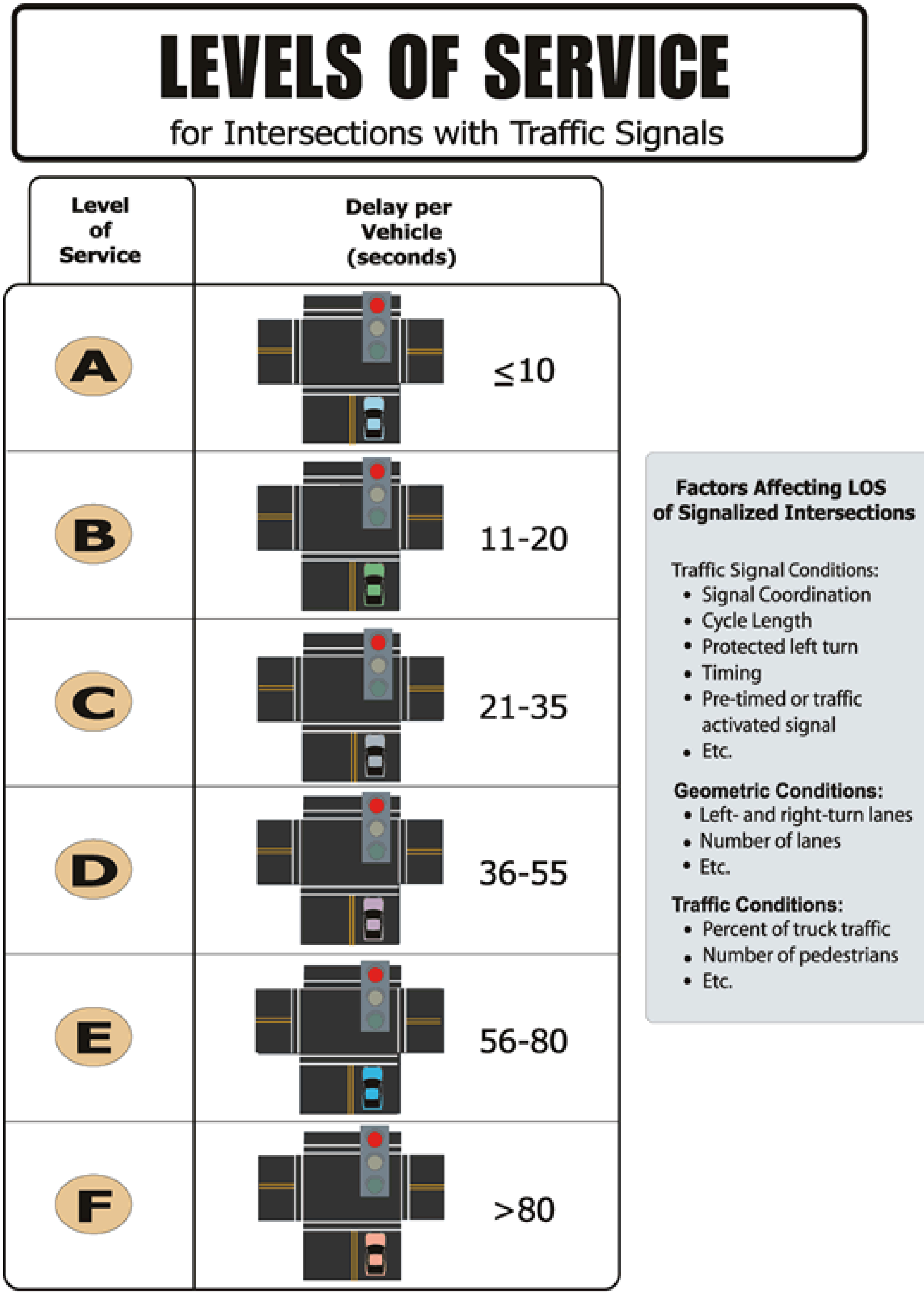
2040 HCM and Entering Volume Outputs for all 108 Intersections (signalized and unsignalized)																						
2040 Corridor Intersection Performance			2040 No Build		2040 Build		LOS Points Change		2040 No Build		2040 Build		Delays Change (seconds)		Total Entering AM Traffic Volume			Total Entering PM Traffic Volume			Signal Warrant Met?		Jurisdiction
Int. #	Intersections	Interchange	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	No Build	Build	Delta	No Build	Build	Delta	No Build	Build	
1	NB On/Off & Bates *	Bates I/C	A	A	A	A	0	0	9.1	9.3	9.1	9.3	0.0	0.0	47	47	0	110	110	0	No	No	State
2	SB On/Off & Bates *		A	B	A	B	0	0	8.8	10.1	8.8	10.1	0.0	0.0	82	82	0	138	138	0	No	No	State
3	NB On/Off & SR 150 *	Rte 150 I/C	B	B	B	B	0	0	12.3	13.8	12.5	14.3	0.2	0.5	723	736	13	621	649	28	No	No	State
4	SB On/Off & SR 150 *		B	D	B	E	0	-1	12.1	30.0	12.3	36.3	0.2	6.3	378	393	15	642	672	30	No	No	State
5	Via Real & SR 150 *		C	B	C	C	0	-1	19.0	14.9	19.5	15.8	0.5	0.9	587	600	13	640	668	28	No	No	State
6	Carpinteria Ave & SR 150 *		A	A	A	A	0	0	9.8	10.0	9.9	10.0	0.1	0.0	285	286	1	257	257	0	No	No	State
7	NB On/Off & Bailard *	Bailard I/C	C	C	C	D	0	-1	20.8	21.0	22.7	27.0	1.9	6.0	1117	1185	68	1215	1309	94	No	No	State
8	SB On/Off & Bailard *		F	F	F	F	0	0	165.8	80.1	181.1	233.4	15.3	153.3	1093	1116	23	986	1119	133	Yes	Yes	State
9	Via Real & Bailard *		C	F	C	F	0	0	17.6	91.1	19.0	83.4	1.4	-7.7	1273	1338	65	1554	1583	29	Yes	Yes	City of Carpinteria
10	Carpinteria Ave & Bailard *		B	B	C	C	-1	-1	14.6	15.0	15.3	16.9	0.7	1.9	836	853	17	887	943	56	No	No	City of Carpinteria
11	Via Real & Casitas Pass Rd	Casitas Pass I/C	C	D	C	C	0	1	26.2	35.3	28.0	21.8	1.8	-13.5	1617	2160	543	2495	2462	-33	N/A	N/A	City of Carpinteria
12	Vellocito & Via Real *		B	D	B	B	0	2	10.9	33.9	11.5	13.0	0.6	-20.9	465	493	28	1306	663	-643	No	No	City of Carpinteria
13	SB On/Off & Casitas Pass Rd		B	B	B	B	0	0	13.2	18.8	13.2	18.7	0.0	-0.1	1436	2001	565	2138	2421	283	N/A	N/A	State
14	Carpinteria Ave & Casitas Pass Rd ~		B	C	C	D	-1	-1	18.9	29.9	26.3	37.4	7.4	7.5	1484	1742	258	2088	2224	136	N/A	N/A	City of Carpinteria
100	NB On/Off & Via Real		A	A	A	A	0	0	7.8	7.8	9.4	8.9	1.6	1.1	1292	1710	418	1443	1521	78	N/A	N/A	State
15	NB On/Off & Ogan Rd * (RAB)	Linden Ave I/C	A	A	B	A	-1	0	6.3	10.5	13.8	6.2	7.5	-4.3	960	1421	461	1510	1196	-314	N/A	N/A	State
16	Linden Ave & Ogan Rd		B	C	B	B	0	1	11.0	22.1	14.5	17.2	3.5	-4.9	1512	1769	257	1892	1624	-268	N/A	N/A	City of Carpinteria
17	SB Off & Linden Ave		B	B	B	B	0	0	10.2	13.3	10.4	12.5	0.2	-0.8	1284	1516	232	1292	1405	113	N/A	N/A	State
18	Linden Ave & Sawyer Ave *		C	C	D	C	-1	0	18.8	19.1	26.9	19.5	8.1	0.4	1066	1277	211	1097	1133	36	No	No	City of Carpinteria
19	SB On/Off & Carpinteria Ave *	Santa Ynez - Santa Monica I/C	D	F	D	F	0	0	28.1	537.1	27.4	999.0	-0.7	461.9	882	863	-19	1470	1480	10	Yes	Yes	State
20	Santa Ynez Ave/7th St & Carpinteria Ave		C	D	C	D	0	0	21.8	39.5	21.4	43.6	-0.4	4.1	1107	1084	-23	1954	1808	-146	N/A	N/A	City of Carpinteria
21	NB On/Off & Via Real *		E	F	F	F	-1	0	49.4	155.0	165.7	117.3	116.3	-37.7	1289	1610	321	1737	1646	-91	Yes	Yes	State
22	NB On/Off & S. Padaro Ln *	Padaro Ln - Santa Claus Ln I/C	A	C	A	B	0	1	9.5	16.9	9.8	11.7	0.3	-5.2	455	493	38	1069	746	-323	No	No	State
23	Via Real & S. Padaro Ln *		D	F	D	B	0	4	26.0	71.1	27.9	14.7	1.9	-56.4	910	910	0	1237	846	-391	Yes	No	County of Santa Barbara
24	SB On/Off & Santa Claus Ln/S. Padaro Ln *		B	F	B	E	0	1	11.3	245.8	11.9	44.4	0.6	-201.4	276	364	88	800	706	-94	Yes	No	State
25	NB On/Off & N. Padaro Ln *	Padaro Ln - Via Real I/C	A	B	B	B	-1	0	9.4	10.7	11.8	10.5	2.4	-0.2	646	680	34	707	562	-145	No	No	State
26	N. Padaro Ln & Via Real *		C	F	C	B	0	4	24.7	56.4	21.0	11.8	-3.7	-44.6	1008	903	-105	1179	671	-508	Yes	No	County of Santa Barbara
27	SB On/Off & N. Padaro Ln *		B	B	B	B	0	0	10.9	11.6	11.0	12.0	0.1	0.4	250	255	5	335	387	52	No	No	State
28	NB Off & Ortega Hill Rd *	Evans St - Ortega Hill Rd I/C	B	E	B	C	0	2	12.8	35.6	12.1	15.3	-0.7	-20.3	472	423	-49	926	557	-369	No	No	State
29	Evans Ave & Ortega Hill Rd *		B	F	B	B	0	4	11.1	51.3	10.3	10.4	-0.8	-40.9	766	664	-102	1161	726	-435	No	No	County of Santa Barbara
30	NB On & Ortega Hill Rd *		D	E	C	C	1	2	28.7	44.3	19.1	23.2	-9.6	-21.1	621	510	-111	891	520	-371	No	No	State
31	SB Off & Evans Ave *		B	B	A	B	1	0	10.5	13.1	10.0	13.2	-0.5	0.1	214	180	-34	386	393	7	No	No	State
32	NB On/Off & Sheffield *	Sheffield Dr I/C	B	B	B	B	0	0	12.6	10.1	14.4	10.2	1.8	0.1	880	983	103	849	850	1	No	No	State
33	SB On/Off & Sheffield *		C	B	D	B	-1	0	19.9	12.3	29.3	13.7	9.4	1.4	483	579	96	269	319	50	No	No	State
34	Jameson & Sheffield *		C	F	C	B	0	4	16.5	340.7	16.3	12.5	-0.2	-328.2	1128	1105	-23	1325	885	-440	Yes	Yes	County of Santa Barbara
35	NB On/Off & San Ysidro Rd *	San Ysidro I/C	B	C	B	B	0	1	13.7	20.5	13.7	13.6	0.0	-6.9	1051	1124	73	1330	1101	-229	No	No	State
36	San Ysidro Rd & N. Jameson Ln *		F	F	F	E	0	1	57.8	85.6	44.9	35.4	-12.9	-50.2	1509	1390	-119	1706	1318	-388	Yes	No	County of Santa Barbara
37	SB Off & San Ysidro Rd/Eucalyptus Ln *		D	F	E	E	-1	1	30.4	585.3	38.7	37.9	8.3	-547.4	777	789	12	1292	796	-496	Yes	No	State
38	S. Jameson Ln & San Ysidro Rd/Eucalyptus Ln *		B	B	B	B	0	0	10.1	12.8	10.1	10.6	0.0	-2.2	270	270	0	614	353	-261	No	No	County of Santa Barbara
39	Olive Mill Rd I/C *	Olive Mill Rd I/C	F	E	E	E	1	0	77.3	36.9	37.9	47.9	-39.4	11.0	1458	1282	-176	1233	1359	126	Yes	Yes	State
39a	N. Jameson Ln & Olive Mill Rd *		C	B	C	C	0	-1	24.0	12.4	20.1	16.7	-3.9	4.3	1041	993	-48	848	1022	174	No	No	SB City/County
40	SB On & Olive Mill Rd *		D	F	C	E	1	1	33.3	57.2	15.1	38.1	-18.2	-19.1	1259	1116	-143	1559	1483	-76	Yes	Yes	State
41	SB Off & Depot *		B	B	B	A	0	1	11.9	12.2	10.6	9.5	-1.3	-2.7	515	380	-135	555	227	-328	No	No	State
42	Olive Mill & Spring *		C	F	C	B	0	4	22.7	130.4	15.3	13.5	-7.4	-116.9	759	622	-137	1130	592	-538	Yes	No	City of Santa Barbara
43	NB Off & Coast Village Rd/Hermosillo Dr *	Hermosillo Rd Off	D	F	C	E	1	1	29.5	136.2	20.6	45.8	-8.9	-90.4	1044	987	-57	1597	1293	-304	No	No	State
44	SB On/Off & NB Off & Cabrillo Blvd	Cabrillo Blvd I/C	C	D	B	C	1	1	22.8	36.6	17.3	21.0	-5.5	-15.6	1076	1433	357	1365	1659	294	Yes	Yes	State
45	NB On & Cabrillo Blvd		A	C	A	B	0	1	9.8	21.2	7.5	12.7	-2.3	-8.5	1444	1746	302	2018	2140	122	No	Yes	State
107	Cabrillo Blvd/Los Patos *		C	E	D	F	-1	-1	24.8	46.0	26.2	112.4	1.4	66.4	987	1032	45	1146	1325	179	No	Yes	City of Santa Barbara
108	Cabrillo Blvd/Hot Springs & Old Coast Hwy (RAB)		A	D	B	D	-1	0	9.3	37.4	11.9	41.8	2.6	4.4	2168	2160	-8	2886	2823	-63	N/A	N/A	City of Santa Barbara
46	NB On/Off & Salinas St *	Salinas St I/C	A	A	A	A	0	0	8.7	8.1	8.7	8.1	0.0	0.0	639	710	71	698	758	60	N/A	N/A	State
47	NB On/Off & Milpas St (RAB) ~	Milpas St I/C	A	A	A	A	0	0	4.3	5.2	8.7	9.7	4.4	4.5	3090	3583	493	3482	3970	488	N/A	N/A	State
48	SB Off & Milpas St * ~		D	F	F	F	-2	0	28.9	179.9	51.2	286.0	22.3	106.1	2284	2500	216	2828	3089	261	N/A	N/A	State
49	SB On & Milpas St ~		C	E	D	E	-1	0	30.1	67.8	48.4	61.2	18.3	-6.6	1968	2605	637	2615	2862	247	N/A	N/A	State
106	Quinientos St & Milpas St		A	B	B	C	-1	-1	9.7	18.1	10.2	27.0	0.5	8.9	2640	2857	217	3118	3377	259	N/A	N/A	City of Santa Barbara

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection
(RAB) = Roundabout with SIDRA analysis outputs
Changes made after circulation of the Draft Revised EIR are indicated in blue.

2040 HCM and Entering Volume Outputs for all 108 Intersections
(signalized and unsignalized)

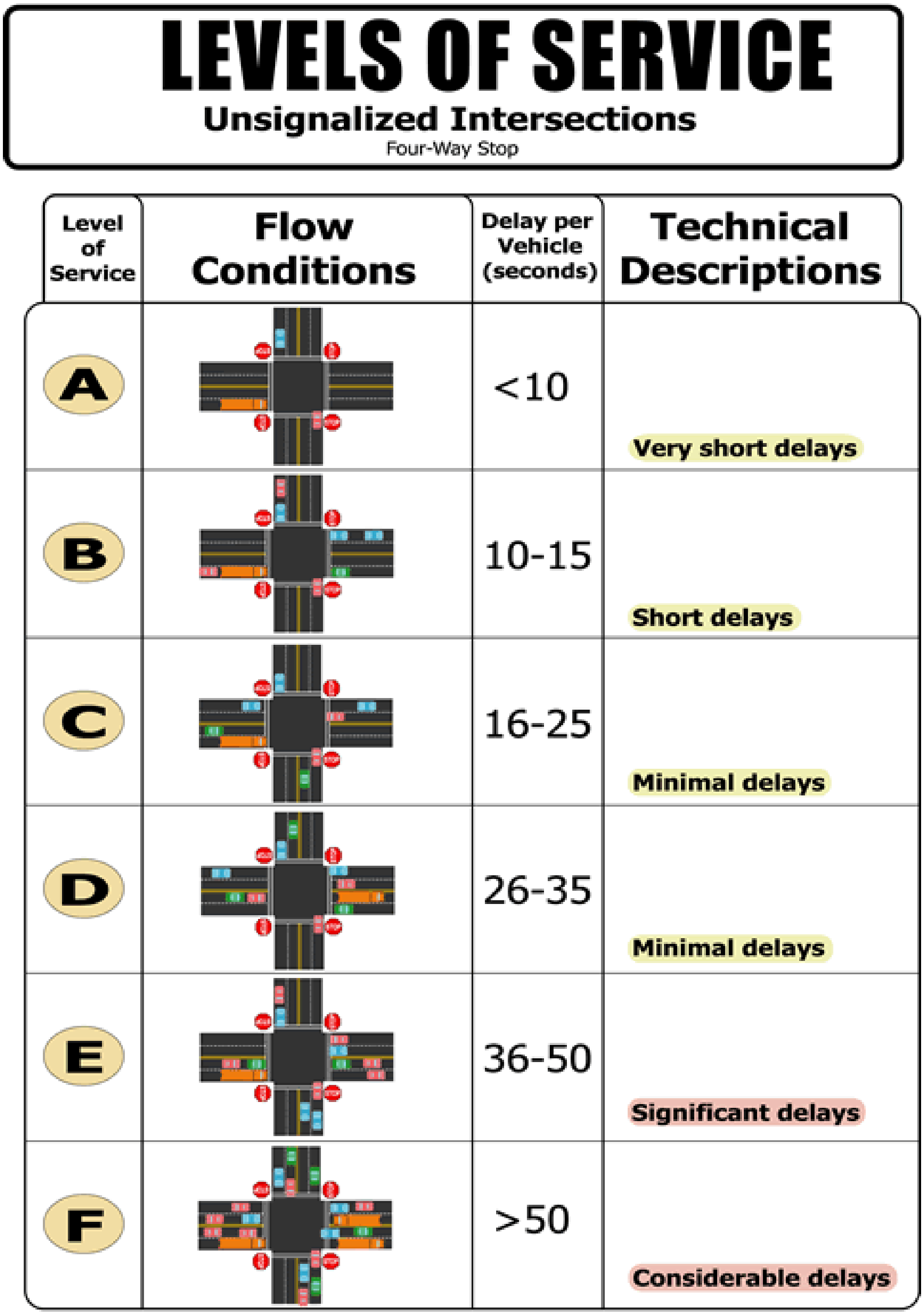
2040 Corridor Intersection Performance			2040 No Build		2040 Build		LOS Points Change		2040 No Build		2040 Build		Delays Change (seconds)		Total Entering AM Traffic Volume			Total Entering PM Traffic Volume			Signal Warrant Met?		Jurisdiction
Int. #	Intersections	Interchange	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	No Build	Build	Delta	No Build	Build	Delta	No Build	Build	
50	NB On/Off & Garden St ~		B	C	B	C	0	0	12.8	25.5	12.6	25.1	-0.2	-0.4	2187	2443	256	2894	2967	73	N/A	N/A	State
51	NB Off & Palm Ave *		B	A	B	B	0	-1	10.2	10.0	10.4	10.2	0.2	0.2	476	531	55	435	469	34	No	No	State
102	Gutierrez St & Garden St	Garden St I/C	C	E	C	E	0	0	21.0	64.4	20.4	61.7	-0.6	-2.7	2792	2742	-50	3315	3294	-21	N/A	N/A	City of Santa Barbara
52	SB On/Off & Garden St ~		C	C	C	B	0	1	23.5	29.2	21.4	19.8	-2.1	-9.4	2128	2343	215	2566	2695	129	N/A	N/A	State
53	Garden St & E. Yanonali St		D	F	C	D	1	2	38.8	104.4	27.7	48.9	-11.1	-55.5	1396	1516	120	1774	1932	158	N/A	N/A	City of Santa Barbara
54	NB Off & Bath St *		B	C	B	C	0	0	12.8	17.1	13.0	17.3	0.2	0.2	453	470	17	694	706	12	No	No	State
55	NB On & Castillo St ~		D	F	D	F	0	0	46.1	129.4	48.1	131.4	2.0	2.0	1814	1806	-8	2571	2605	34	N/A	N/A	State
56	W. Haley St & Bath St	Castillo St I/C	A	B	A	B	0	0	9.8	18.3	9.8	18.1	0.0	-0.2	1097	1094	-3	1591	1586	-5	N/A	N/A	City of Santa Barbara
57	SB On/Off & Castillo St ~		C	D	C	E	0	-1	22.3	52.6	23.1	55.7	0.8	3.1	2186	2185	-1	2788	2813	25	N/A	N/A	State
103	Montecito St & Castillo St ~		E	E	E	E	0	0	69.7	63.7	67.2	63.5	-2.5	-0.2	2691	2674	-17	3323	3326	3	N/A	N/A	City of Santa Barbara
58	NB On/Off & Carrillo St ~		C	C	C	C	0	0	22.8	30.6	22.1	31.9	-0.7	1.3	3510	3534	24	4412	4435	23	N/A	N/A	State
59	SB On/Off & Carrillo St ~		E	C	E	C	0	0	56.8	30.0	62.7	31.9	5.9	1.9	3314	3326	12	3902	3925	23	N/A	N/A	State
60	Carrillo St & Castillo St ~	Carrillo St I/C	C	D	C	D	0	0	21.1	37.9	22.3	35.9	1.2	-2.0	2995	3082	87	4141	4130	-11	N/A	N/A	City of Santa Barbara
61	Carrillo St & San Pascual St *		B	B	B	B	0	0	13.9	13.2	13.7	13.3	-0.2	0.1	2271	2258	-13	2732	2717	-15	Yes	Yes	City of Santa Barbara
104	San Andres & Carrillo St		C	C	C	C	0	0	30.4	34.5	30.3	33.4	-0.1	-1.1	2302	2346	44	2762	2744	-18	N/A	N/A	City of Santa Barbara
62	NB On/Off & Castillo St *	Arreglilaga St I/C	F	F	F	F	0	0	55.6	168.2	58.5	167.5	2.9	-0.7	869	890	21	1087	1099	12	Yes	Yes	State
63	NB On/Off & Mission St ~		C	B	C	B	0	0	27.2	14.0	30.1	18.5	2.9	4.5	2868	2893	25	2939	3063	124	N/A	N/A	State
64	SB On/Off & Mission St ~		C	D	D	D	-1	0	34.5	53.1	35.9	65.0	1.4	11.9	2817	2838	21	2793	2883	90	N/A	N/A	State
65	Mission St & Castillo St	Mission St I/C	A	C	A	D	0	-1	5.9	32.3	6.1	48.2	0.2	15.9	2529	2515	-14	2887	3001	114	N/A	N/A	City of Santa Barbara
66	Mission St & San Andres St *		C	C	C	D	0	-1	15.8	19.8	15.8	25.6	0.0	5.8	1384	1374	-10	1565	1610	45	Yes	Yes	City of Santa Barbara
105	Modoc Rd & Mission St *		E	E	E	F	0	-1	45.8	49.1	48.8	53.7	3.0	4.6	1532	1549	17	1723	1746	23	Yes	Yes	City of Santa Barbara
67	NB Off Pueblo St & Calle Real *	Pueblo St Off	E	F	E	F	0	0	40.4	186.3	40.7	129.7	0.3	-56.6	821	824	3	887	817	-70	Yes	Yes	State
68	NB On & Calle Real ~		C	C	C	C	0	0	24.2	22.2	29.7	22.0	5.5	-0.2	1663	1729	66	1789	1800	11	N/A	N/A	State
69	Calle Real & Las Positas Rd ~	Los Positas Rd I/C	D	D	D	D	0	0	37.1	40.7	36.3	39.8	-0.8	-0.9	3439	3516	77	3842	3811	-31	N/A	N/A	City of Santa Barbara
70	SB On/Off & Las Positas Rd ~		C	D	C	D	0	0	29.8	52.4	30.7	37.8	0.9	-14.6	2955	3027	72	3230	3264	34	N/A	N/A	State
71	Las Positas Rd & Modoc Rd ~		F	E	F	E	0	0	133.2	76.3	127.2	77.3	-6.0	1.0	2722	2687	-35	2769	2712	-57	N/A	N/A	City of Santa Barbara
72	NB On/Off & Calle Real ~	Hope Ave I/C	C	D	C	D	0	0	25.9	35.1	26.5	36.1	0.6	1.0	1719	1811	92	2222	2318	96	N/A	N/A	State
73	SB On/Off & La Cumbre Rd ~	La Cumbre Rd I/C	B	B	B	B	0	0	14.5	18.6	14.5	18.4	0.0	-0.2	2154	2152	-2	2332	2328	-4	N/A	N/A	State
74	La Cumbre Rd & Calle Real ~		A	B	A	B	0	0	10.0	11.7	10.0	11.7	0.0	0.0	2091	2086	-5	2573	2567	-6	N/A	N/A	City of Santa Barbara
75	NB Off & State St & Calle Real	State St I/C	C	C	C	C	0	0	25.3	33.8	25.8	34.9	0.5	1.1	2613	2646	33	3400	3424	24	N/A	N/A	State
76	NB On & State St * ~		A	A	A	A	0	0	0.0	0.0	0.0	0.0	0.0	0.0	1419	1414	-5	1908	1876	-32	N/A	N/A	State
77	Calle Real & SR 154 & San Marcos Pass Rd ~		C	C	C	C	0	0	33.3	31.2	33.9	31.7	0.6	0.5	3021	3051	30	2996	3028	32	N/A	N/A	City of Santa Barbara
78	SB Off & State St ~	US101-Rte154 I/C	C	C	C	C	0	0	20.9	28.9	21.1	29.0	0.2	0.1	1864	1876	12	2010	2000	-10	N/A	N/A	State
79	SB On & State St & SR 154 ~		F	F	F	F	0	0	101.1	96.9	112.4	119.4	11.3	22.5	2054	2081	27	1818	1867	49	N/A	N/A	State
79a	State St & San Marcos Pass Rd ~		C	B	C	B	0	0	25.1	18.2	25.1	18.4	0.0	0.2	1954	1964	10	2183	2197	14	N/A	N/A	County of Santa Barbara
80	NB On/Off & Calle Real & El Sueno Rd *	El Sueno Rd I/C	C	D	C	D	0	0	20.4	30.9	20.5	32.5	0.1	1.6	1047	1052	5	1242	1256	14	No	No	State
81	NB On/Off & Turnpike Rd ~		C	B	C	B	0	0	30.6	17.3	32.2	18.0	1.6	0.7	2476	2568	92	2694	2819	125	N/A	N/A	State
82	SB On/Off & Turnpike Rd ~	Turnpike Rd I/C	C	B	C	C	0	-1	24.3	19.4	25.3	20.6	1.0	1.2	2432	2628	196	2489	2600	111	N/A	N/A	State
83	Turnpike Rd & Calle Real		C	F	C	F	0	0	23.2	238.5	23.3	245.1	0.1	6.6	1745	1822	77	2393	2484	91	N/A	N/A	County of SB
84	NB On/Off & Patterson Ave ~		C	C	C	C	0	0	26.4	21.2	30.6	25.1	4.2	3.9	2684	2911	227	3520	3820	300	N/A	N/A	State
85	SB On/Off & Patterson Ave ~	Patterson Ave I/C	B	C	B	C	0	0	19.2	27.8	19.6	30.9	0.4	3.1	2554	2812	258	3839	3995	156	N/A	N/A	State
86	Patterson Ave & Calle Real		B	C	B	D	0	-1	17.6	32.2	17.6	43.3	0.0	11.1	1935	2008	73	3111	3323	212	N/A	N/A	County of Santa Barbara
87	NB On/Off & Fairview Ave ~		C	B	C	B	0	0	21.8	19.2	21.5	19.4	-0.3	0.2	2836	2886	50	2904	2973	69	N/A	N/A	State
88	Calle Real & Fairview Ave ~	Fairview Ave I/C	D	D	D	D	0	0	36.8	37.7	37.5	37.4	0.7	-0.3	2192	2211	19	3064	3109	45	N/A	N/A	City of Goleta
89	SB On/Off & Fairview Ave ~		B	B	B	B	0	0	16.3	15.9	16.0	16.2	-0.3	0.3	2630	2656	26	2981	3045	64	N/A	N/A	State
90	NB On/Off & Los Carneros Rd ~		C	C	D	C	-1	0	32.9	26.4	40.0	29.1	7.1	2.7	1869	1972	103	2365	2561	196	N/A	N/A	State
91	SB On/Off & Los Carneros Rd ~	Los Carneros I/C	B	C	B	C	0	0	17.7	29.5	17.4	35.0	-0.3	5.5	2232	2351	119	2934	3120	186	N/A	N/A	State
92	Los Carneros Rd & Calle Real		B	B	B	B	0	0	14.2	15.2	14.4	13.0	0.2	-2.2	1034	1028	-6	1481	1588	107	N/A	N/A	City of Goleta
93	NB On/Off & Glen Annie Rd & Calle Real ~		F	F	F	F	0	0	135.7	122.7	135.3	115.2	-0.4	-7.5	3017	3017	0	3724	3716	-8	N/A	N/A	State
94	Glen Annie Rd & Del Norte Rd *	Glen Annie I/C	B	B	B	B	0	0	11.3	10.2	11.3	10.2	0.0	0.0	1121	1121	0	974	987	13	No	No	City of Goleta
95	SB On/Off & Glen Annie Rd ~		F	B	F	B	0	0	134.6	10.7	134.4	10.9	-0.2	0.2	3912	3911	-1	3911	3880	-31	N/A	N/A	State
96	Calle Real & NB On *	Cathedral Oaks	B	B	B	B	0	0	12.2	12.9	12.2	12.9	0.0	0.0	420	419	-1	477	475	-2	No	No	State
97	SB On/Off & Hollister Ave *	Winchester	C	C	C	C	0	0	18.8	18.7	18.8	19.3	0.0	0.6	924	925	1	955	974	19	No	No	State
98	NB Off & Winchester Canyon Rd *	Canyon I/C	A	B	A	A	0	1	8.4	9.7	8.4	9.7	0.0	0.0	439	439	0	590	590	0	No	No	State

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection
(RAB) = Roundabout with SIDRA analysis outputs
Changes made after circulation of the Draft Revised EIR are indicated in blue.



Source: 2000 HCM, Exhibit 16-2, Level of Service Criteria for Signalized Intersections

Figure 2.1 LOS for Intersections with Traffic Signals



LEVELS OF SERVICE

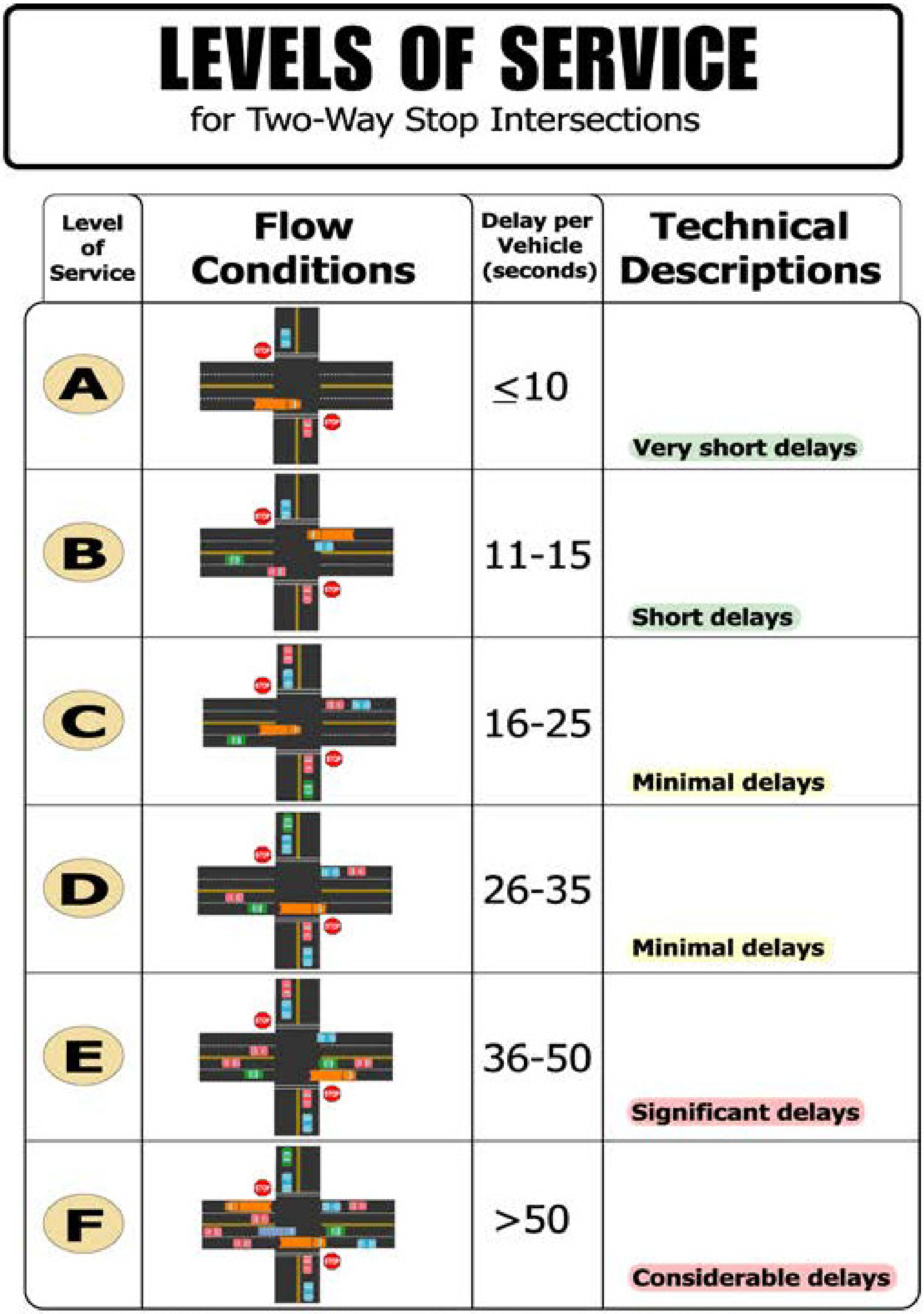
Unsignalized Intersections

Four-Way Stop

Level of Service	Flow Conditions	Delay per Vehicle (seconds)	Technical Descriptions
A		<10	Very short delays
B		10-15	Short delays
C		16-25	Minimal delays
D		26-35	Minimal delays
E		36-50	Significant delays
F		>50	Considerable delays

Source: 2000 HCM, Exhibit 17-22, Level of Service Criteria for AWSC Intersections

Figure 2.2 LOS for Unsignalized Intersections



Source: 2000 HCM, Exhibit 17-2, Level of Service Criteria for TWSC Intersections

Figure 2.3 LOS for Two-Way Stop Intersections

Table 2.3 2020 95th Percentile Queue

Approach #2 Results - 2020 95th Percentile Queue								
No.	Intersection	Direction	Off Ramp	Storage Length (ft)	Weekday AM Peak Hour 95th Queue (ft)		Weekday PM Peak Hour 95th Queue (ft)	
1	NB on/off ramp & Bates Rd	NB	WB App	1,000	0		2	
2	SB on/off ramp & Bates Rd	SB	EB App	1,350	2		1	
3	NB on/off ramp & SR 150	NB	WB App	1,150	30		5	
4	SB on/off ramp & SR 150	SB	EB App	1,050	11		94	
7	NB on/off ramp & Bailard Ave	NB	WB App	1,000	26		19	
8	SB on/off ramp & Bailard Ave	SB	EB App	1,150	286		270	
13	SB on/off ramp & Casitas Pass Rd	SB	EB App	750	71		81	
17	SB off ramp & Linden Ave	SB	EB App	950	103		121	
19	SB on/off ramp & Carpinteria Ave	SB	SB App	700	13		172	
21	NB on/off ramp & Via Real	NB	NB App	700	N/A		N/A	
22	NB on/off ramp & S. Padaro Ln	NB	WB App	1,250	10		6	
24	SB off ramp & Santa Claus Ln/Padaro Ln	SB	EB App	1,050	14		100	
25	NB on/off ramp & N. Padaro Ln	NB	WB App	1,250	10		6	
27	SB on/off ramp & Padaro Ln	SB	EB App	1,000	18		35	
28	NB off ramp & Ortega Hill Rd	NB	NB App	850	8		16	
31	SB off ramp & Evans Ave	SB	EB App	1,000	11		34	
32	NB on/off ramp & Sheffield	NB	WB App	750	30		9	
33	SB on/off ramp & Sheffield	SB	EB App	450	87		25	
35	NB on/off ramp & San Ysidro Rd	NB	WB App	700	12		11	
37	SB off ramp & San Ysidro Rd/Eucalyptus Ln	SB	EB App	650	163		82	
39	NB off ramp & Olive Mill Rd	NB	WB App	750	N/A		N/A	
41	SB off ramp & Depot	SB	EB App	750	0		0	
43	NB off ramp & Coast Village Rd/Hermosillo Dr	NB	NB App	550	24		43	
44	SB on/off ramp & NB off ramp & Cabrillo Blvd	SB	EB App	1,480	202		143	
45	NB on/off ramp & Cabrillo Blvd	NB	NB App	1,040	98		86	
46	NB on/off ramp & S. Salinas St	NB	WB App	850	N/A		N/A	
47	NB on/off ramp & Milpas St	NB	WB App	1,100	N/A		N/A	
48	SB off ramp & Milpas St	SB	EB App	1,100	162		211	
49	SB on/off ramp & Milpas St	SB	WB App	1,250	373	#	382	#
50	NB on/off ramp & Garden St	NB	WB App	1,650	119		177	#
51	NB off ramp & Palm Ave	NB	NB App	450	0		0	
52	SB on/off ramp & Garden St	SB	EB App	850	240	#	151	#
54	NB off ramp & Bath St	NB	NB App	800	0		0	
57	SB on/off ramp & Castillo St	SB	EB App	1,000	304		424	#
58	NB on/off ramp & Carrillo St	NB	WB App	900	256	#	345	#
59	SB on/off ramp & Carrillo St	SB	EB App	950	560	#	399	#
62	NB on/off ramp & Arrellaga St	NB	NB App	800	16		22	
63	NB on/off ramp & Mission St	NB	WB App	750	208	#	193	#
64	SB on/off ramp & Mission St	SB	EB App	1,000	468	#	448	#
67	NB off ramp & Pueblo St & Calle Real	NB	WB App	500	21		26	
70	SB on/off ramp & Las Positas Rd	SB	EB App	1,000	438	#	704	#
72	NB on/off ramp & Calle Real & Hope	NB	NB App	750	272		338	
73	SB on/off ramp & La Cumbre Rd	SB	EB App	900	152		253	
75	NB off ramp & State St & Calle Real	NB	NB App	1,000	283		353	
78	SB off ramp & State St	SB	SB App	1,950	210		321	
80	NB on/off ramp & Calle Real & El Sueno Rd	NB	NB App	550	N/A		N/A	
81	NB on/off ramp & Turnpike Rd	NB	WB App	1,150	307	#	197	#
82	SB on/off ramp & Turnpike Rd	SB	EB App	1,100	175		196	#
84	NB on/off ramp & Patterson Ave	NB	WB App	750	258		212	
85	SB on/off ramp & Patterson Ave	SB	EB App	1,950	167	#	326	#
87	NB on/off ramp & Fairview Ave	NB	WB App	1,000	337		337	
89	SB on/off ramp & Fairview Ave	SB	EB App	1,150	169		180	
90	NB on/off ramp & Los Carneros Rd	NB	WB App	1,250	469	#	289	
91	SB on/off ramp & Los Carneros Rd	SB	EB App	1,800	217		150	
93	NB on/off ramp & Glen Annie Rd & Calle Real	NB	WB App	2,800	570	#	854	#
95	SB on/off ramp & Glen Annie Rd	SB	EB App	1,400	331	#	79	
97	SB on/off ramp & Hollister Ave	SB	EB App	1,450	37		19	
98	NB off ramp/Calle Real & Winchester Canyon	NB	WB App	650	N/A		N/A	
100	NB on/off ramp & Via Real	NB	NB App	900	109		65	

- 95th percentile volume exceeds capacity, queue may be longer
Changes made after circulation of the Draft Revised EIR are indicated in blue.

Table 2.4 2040 95th Percentile Queue

Approach #2 Results- 2040 95th Percentile Queue								
No.	Intersection	Direction	Off Ramp	Storage Length (ft)	Weekday AM Peak Hour		Weekday PM Peak Hour	
					95th Queue (ft)		95th Queue (ft)	
1	NB on/off ramp & Bates Rd	NB	WB App	1,000	0		2	
2	SB on/off ramp & Bates Rd	SB	EB App	1,350	2		1	
3	NB on/off ramp & SR 150	NB	WB App	1,150	31		5	
4	SB on/off ramp & SR 150	SB	EB App	1,050	12		115	
7	NB on/off ramp & Bailard Ave	NB	WB App	1,000	27		25	
8	SB on/off ramp & Bailard Ave	SB	EB App	1,150	806		654	
13	SB on/off ramp & Casitas Pass Rd	SB	EB App	750	96		121	
17	SB off ramp & Linden Ave	SB	EB App	950	141		165	
19	SB on/off ramp & Carpinteria Ave	SB	SB App	700	17		N/A	
21	NB on/off ramp & Via Real	NB	NB App	700	N/A		N/A	
22	NB on/off ramp & S. Padaro Ln	NB	WB App	1,250	11		7	
24	SB off ramp & Santa Claus Ln/Padaro Ln	SB	EB App	1,050	20		153	
25	NB on/off ramp & N. Padaro Ln	NB	WB App	1,250	11		10	
27	SB on/off ramp & Padaro Ln	SB	EB App	1,000	18		35	
28	NB off ramp & Ortega Hill Rd	NB	NB App	850	9		35	
31	SB off ramp & Evans Ave	SB	EB App	1,000	11		39	
32	NB on/off ramp & Sheffield	NB	WB App	750	36		17	
33	SB on/off ramp & Sheffield	SB	EB App	450	190		35	
35	NB on/off ramp & San Ysidro Rd	NB	WB App	700	13		19	
37	SB off ramp & San Ysidro Rd/Eucalyptus Ln	SB	EB App	650	206		136	
39	NB off ramp & Olive Mill Rd	NB	WB App	750	N/A		N/A	
41	SB off ramp & Depot	SB	EB App	750	0		0	
43	NB off ramp & Coast Village Rd/Hermosillo Dr	NB	NB App	550	28		58	
44	SB on/off ramp & NB off ramp & Cabrillo Blvd	SB	EB App	1,480	228	#	184	#
45	NB on/off ramp & Cabrillo Blvd	NB	NB App	1,040	144		105	
46	NB on/off ramp & S. Salinas St	NB	WB App	850	N/A		N/A	
47	NB on/off ramp & Milpas St	NB	WB App	1,100	N/A		N/A	
48	SB off ramp & Milpas St	SB	EB App	1,100	231		813	
49	SB on/off ramp & Milpas St	SB	WB App	1,250	459	#	513	#
50	NB on/off ramp & Garden St	NB	WB App	1,650	161		233	#
51	NB off ramp & Palm Ave	NB	NB App	450	0		0	
52	SB on/off ramp & Garden St	SB	EB App	850	276	#	183	#
54	NB off ramp & Bath St	NB	NB App	800	0		0	
57	SB on/off ramp & Castillo St	SB	EB App	1,000	303		490	#
58	NB on/off ramp & Carrillo St	NB	WB App	900	288	#	387	#
59	SB on/off ramp & Carrillo St	SB	EB App	950	556	#	399	#
62	NB on/off ramp & Arrellaga St	NB	NB App	800	18		24	
63	NB on/off ramp & Mission St	NB	WB App	750	224	#	225	#
64	SB on/off ramp & Mission St	SB	EB App	1,000	482	#	501	#
67	NB off ramp & Pueblo St & Calle Real	NB	WB App	500	21		27	
70	SB on/off ramp & Las Positas Rd	SB	EB App	1,000	438	#	726	#
72	NB on/off ramp & Calle Real & Hope	NB	NB App	750	290		395	
73	SB on/off ramp & La Cumbre Rd	SB	EB App	900	154		266	
75	NB off ramp & State St & Calle Real	NB	NB App	1,000	350		434	
78	SB off ramp & State St	SB	SB App	1,950	242		338	
80	NB on/off ramp & Calle Real & El Sueno Rd	NB	NB App	550	N/A		N/A	
81	NB on/off ramp & Turnpike Rd	NB	WB App	1,150	314	#	208	#
82	SB on/off ramp & Turnpike Rd	SB	EB App	1,100	279m	#	221	#
84	NB on/off ramp & Patterson Ave	NB	WB App	750	365	#	276	
85	SB on/off ramp & Patterson Ave	SB	EB App	1,950	171	#	378	#
87	NB on/off ramp & Fairview Ave	NB	WB App	1,000	345		419	#
89	SB on/off ramp & Fairview Ave	SB	EB App	1,150	222		197	
90	NB on/off ramp & Los Carneros Rd	NB	WB App	1,250	540	#	388	#
91	SB on/off ramp & Los Carneros Rd	SB	EB App	1,800	244		268	
93	NB on/off ramp & Glen Annie Rd & Calle Real	NB	WB App	2,800	592	#	940	#
95	SB on/off ramp & Glen Annie Rd	SB	EB App	1,400	490	#	105	
97	SB on/off ramp & Hollister Ave	SB	EB App	1,450	39		48	
98	NB off ramp/Calle Real & Winchester Canyon	NB	WB App	650	N/A		N/A	
100	NB on/off ramp & Via Real	NB	NB App	900	142		142	

- 95th percentile volume exceeds capacity, queue may be longer
m - 95th percentile queue is metered by upstream signal
Changes made after circulation of the Draft Revised EIR are indicated in blue.

Two Approaches for Evaluating Intersections

The intersection analysis data was evaluated using two successive approaches. The first approach was used to establish whether the project will improve or degrade net LOS and seconds of delay throughout the corridor, and the second identified specific intersections that experience substantial increases in delay.

An impact to intersections will be considered significant if the project would substantially increase delays at particular study intersections, taking into consideration context and intensity. Increased intersection delays and LOS are considered substantial if, overall, they adversely affect traffic flow at study intersections, in light of the magnitude and location of the delays.

The context or setting considers the 108 intersections that were evaluated corridor-wide. All of these intersections were either associated with on-/off-ramps or were one node removed, thus, closely connected with the mainline. Of those 108 intersections, a total of 37 are identified in Santa Barbara County's Congestion Management Plan (CMP), meaning they've been designated by SBCAG as having a higher level of importance in the overall roadway system.

The approaches are described as follows:

- Approach 1 – A corridor-wide assessment of 108 intersections using the HCM analysis to determine net improvement or degradation of LOS and seconds of delay.
- Approach 2 – An analysis using HCM analysis for LOS and seconds of delay for signalized and unsignalized intersections to determine potential impacts to individual intersections. An analysis of 95th percentile queuing was also conducted for state-controlled intersections.

All traffic forecast data was based on the Travel Trends Report for Santa Barbara County prepared by SBCAG in 2007. Baseline conditions were set in 2008, and volumes projected from these studies remain consistent with the Travel Trends Report, which is still currently in use as the basis for traffic forecasting. Additional information has been provided in Appendix H to support the fact that the 2008 Traffic Forecast data remains valid.

For purposes of assessing project impacts for these two approaches, the 2020 analysis provides the basis for identifying opening day project-level conditions, while the 2040 analysis provides the basis for identifying cumulative project conditions. The term "cumulative-plus project" was used in the Forecast Operations Report to identify forecasted conditions with the project in the year 2040, however for the purposes of this discussion, the term "cumulative project conditions" will be used instead. This analysis takes into account all transportation and land use projects included in the Regional Transportation Plan and general plans prepared by local jurisdictions in the project area, including the South Coast 101 HOV Lanes project.

Approach 1

The purpose of this analysis is to identify net corridor-wide improvement or degradation of LOS and seconds of delay for the 108 intersections in the study area. Data was evaluated using the HCM methodology.

An LOS point system was used to measure corridor-wide LOS change. The points are assigned to each intersection LOS output as follows:

LOS A = 1 point	LOS D = 4 points
LOS B = 2 points	LOS E = 5 points
LOS C = 3 points	LOS F = 6 points

After assigning each LOS grade a point value, the change between the No-Build and Build conditions was calculated by subtraction. For example, if the No-Build condition is LOS A and the Build condition is LOS B, then there is a negative one point (-1) change; and if the No-Build condition is LOS B and the Build condition is LOS A, then there is a positive one point (+1) change.

Once the LOS point changes were calculated for each of the 108 intersections, simple addition or subtraction was used to tabulate the change for the morning (AM) and evening (PM) peak traffic periods in both 2020 and 2040. The results of this analysis provide information as to whether the project has an overall net positive or negative change in LOS at intersections within the entire corridor.

The same concept described above was also applied to intersection control delay, which is measured in seconds. The seconds of delay were calculated for each of the 108 intersections, with the total change tabulated for the AM and PM peak traffic periods in both 2020 and 2040. The results of this analysis provide information as to whether the project has an overall net increase or decrease in delay at intersections within the entire corridor. The data used for this analysis is shown in Tables 2.1 and 2.2.

Approach 1 Results

LOS Results

Under the 2020 build condition, which represents opening day project-level conditions, the 108 intersections within the corridor would experience a net negative change of five (-5) LOS points in the AM peak traffic period, and a net positive change of sixteen (+16) LOS points in the PM peak traffic period. This results in a total corridor net positive change of eleven (+11) LOS points.

Under the 2040 build condition, which represents cumulative project conditions, the 108 intersections within the corridor would experience a net negative change of nine (-9) LOS points in the AM peak traffic period, and a net positive change of twenty-seven (+27) LOS points in the PM peak traffic period. This results in a total corridor net positive change of eighteen (+18) LOS points. See Table 2.5 below.

Delay Results

Under the 2020 build condition, which represents opening day project-level conditions, at all intersections within the corridor there would be a net increase in delay of 50 seconds during the AM peak traffic period, and a net decrease in delay of a83 seconds during the PM peak traffic period. This results in a net decrease in delay of 33 seconds throughout the corridor.

Under the 2040 build condition, which represents cumulative project conditions, at all intersections within the corridor there would be a net increase in delay of 155 seconds during the AM peak traffic period, and a net decrease in delay of 862 seconds in the PM peak traffic period. This results in a net decrease in delay of 707 seconds throughout the corridor. See Table 2.5 below.

Table 2.5 Corridor-wide Approach

Approach #1 Results Corridor-wide	2020			2040		
	AM	PM	Net Change	AM	PM	Net Change
LOS (Points)	-5	+16	+11	-9	+27	+18
Delay (Seconds)	+50.3	-83.4	-33.1	+155.4	-862.3	-706.9

Changes made after circulation of the Draft Revised EIR are indicated in blue.

Approach 2

The purpose of this approach is to identify higher-level impacts at individual intersections by considering LOS and seconds of delay at signalized and unsignalized intersections. This approach offers a consistent corridor-wide characterization of the driver’s experience because it reflects whether pronounced delay is experienced at a signal or a stop sign. From the driver’s perspective, waiting for a longer period of time at a signal is tolerated, whereas waiting the same length of time at a stop sign is less tolerated. The HCM methodology for LOS calculations was used at each intersection. The criteria established to determine whether an intersection will experience substantial delay are shown below:

- For signalized intersections: An LOS grade decrease to LOS D or lower with morning or afternoon peak hour delay increased by 20 seconds or more with the project.

- For unsignalized intersections: An LOS grade decrease to LOS D or lower with morning or afternoon peak hour delay increased by 10 seconds or more with the project.

The 10- and 20-second measurements are based on the delay change increment for unsignalized and signalized intersections respectively between LOS C/D cusp and the D/E cusp. The data used for this analysis is shown in Tables 2.1 and 2.2.

An assessment of the 95th percentile queuing at all U.S. 101 off-ramps within the corridor was also completed. The purpose of this analysis was to identify locations where queuing associated with off-ramp intersections could back up onto the highway mainline. This information was taken from the Forecast Operations Report and is shown in Tables 2.3 and 2.4.

Approach 2 Results

When considering the delay and LOS criteria mentioned above, five intersections would experience substantial delays under the 2020 build condition, which represents opening day project-level conditions (Table 2.6):

1. Southbound 101 on- and off-ramps and Bailard Avenue (#8): PM delay increases by 26.6 seconds.
2. Southbound 101 on- and off-ramps and Carpinteria Avenue (#19): PM delay increases by 31.1 seconds.
3. Northbound 101 on- and off-ramps and Via Real/Santa Monica (#21): AM delay increases by 34.7 seconds.
4. Cabrillo Boulevard and Los Patos (#107): PM delay increases by 29.5 seconds.
5. Southbound 101 off-ramp and Milpas Street (#48): PM delay increases by 40.4 seconds.

Eight intersections would experience substantial delays under the 2040 build condition, which represents cumulative project conditions (Table 2.7):

1. Southbound 101 on- and off-ramps and Bailard Avenue (#8): AM delay increases by 15.3 seconds; PM delay increases by 153.3 seconds.

2. Southbound 101 on- and off-ramps and Carpinteria Avenue (#19): PM delay increases by 461.9 seconds.
3. Northbound 101 on- and off-ramps and Via Real/Santa Monica (#21): AM delay increases by 116.3 seconds.
4. Southbound 101 off-ramp and San Ysidro Road/Eucalyptus Lane (#37): AM delay increases by 8.3 seconds.*
5. Olive Mill Road/Coast Village Road (#39): PM delay increases by 11.0 seconds
6. Cabrillo Boulevard and Los Patos (#107): PM delay increases by 66.4 seconds.
7. Southbound 101 off-ramp and Milpas Street (#48): AM delay increases by 22.3 seconds; PM delay increases by 106.1 seconds.
8. Southbound 101 on-ramp and State Street and SR 154 (#79): PM delay increases by 22.5 seconds.

Based on the 95% queuing analysis, shown in Tables 2.3 and 2.4, all projected queues for U.S. 101 off-ramps fall well within the available ramp storage, and no off-ramp queuing issues are expected in the years 2020 and 2040 under the Build condition.

*Note: Due to correction of a data entry error, the AM delay increase has changed from what was reported in the Draft Revised EIR. As a result, this intersection no longer meets the impact criteria established for unsignalized intersections. However, because this intersection was disclosed as being impacted in the Draft Revised EIR and extensive coordination with the County to develop this location as part of the mitigation plan has taken place to date, Caltrans continues to identify this throughout the Final Revised EIR as a location experiencing substantial delay. As a result, it will still be addressed in the mitigation plan in Table 2.8 and Appendix F.

Table 2.6 2020 Intersection Impacts

Approach #2 Results - 2020 Intersection Impacts												
#	Intersection	Level of Service (LOS)				Delay (seconds)				Delay Change		Location
		No Build		Build		No Build		Build		Delta		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
8	SB On/Off & Bailard * ^	E	E	E	F	44.0	45.2	46.3	71.8	2.3	26.6	City of Carpinteria
19	SB On/Off & Carpinteria Ave * ^	C	F	C	F	22.7	59.2	22.5	90.3	-0.2	31.1	City of Carpinteria
21	NB On/Off & Via Real * ^	E	E	F	E	43.7	46.2	78.4	39.6	34.7	-6.6	City of Carpinteria
107	Cabrillo Blvd/Los Patos *	C	D	C	F	17.5	27.4	19.5	56.9	2.0	29.5	City of Santa Barbara
48	SB Off & Milpas St * ^ ~	C	F	D	F	24.6	119.0	31.7	159.4	7.1	40.4	City of Santa Barbara

Notes
* Unsignalized intersection
~ Congestion Management Plan (CMP) designated intersection
^ State (Caltrans) controlled intersection
Analysis based on HCM methodology
Changes made after circulation of the Draft Revised EIR are indicated in blue.

Table 2.7 2040 Intersection Impacts

Approach #2 Results - 2040 Intersection Impacts												
#	Intersection	Level of Service (LOS)				Delay (seconds)				Delay Change		Location
		No Build		Build		No Build		Build		Delta		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
8	SB On/Off & Bailard * ^	F	F	F	F	165.8	80.1	181.1	233.4	15.3	153.3	City of Carpinteria
19	SB On/Off & Carpinteria Ave * ^	D	F	D	F	28.1	537.1	27.4	999.0	-0.7	461.9	City of Carpinteria
21	NB On/Off & Via Real * ^	E	F	F	F	49.4	155.0	165.7	117.3	116.3	-37.7	City of Carpinteria
37	SB Off & San Ysidro Rd/Eucalyptus Ln *	D	F	E	E	30.4	585.3	38.7	37.9	8.3	-547.4	County of Santa Barbara
39	Olive Mill Rd I/C * ~	F	E	E	E	77.3	36.9	37.9	47.9	-39.4	11.0	City of Santa Barbara
107	Cabrillo Blvd/Los Patos * ^	C	E	D	F	24.8	46.0	26.2	112.4	1.4	66.4	City of Santa Barbara
48	SB Off & Milpas St * ^ ~	D	F	F	F	28.9	179.9	51.2	286.0	22.3	106.1	City of Santa Barbara
79	SB On & State St & SR 154 ^ ~	F	F	F	F	101.1	96.9	112.4	119.4	11.3	22.5	City of Santa Barbara

Notes
* Unsignalized intersection
~ Congestion Management Plan (CMP) designated intersection
^ State (Caltrans) controlled intersection
Analysis based on HCM methodology
Changes made after circulation of the Draft Revised EIR are indicated in blue.

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Findings Based on Two Approaches for Evaluating Intersections

The previously discussed approaches identify changes at study intersections from both a corridor-wide perspective and an individual intersection perspective. Approach 1, also known as the collective approach, helped to establish whether the project will improve or decrease net LOS and seconds of delay as well as identified specific locations that will have higher-level impacts. When evaluating the outcome of the first approach, a corridor-wide assessment, both net LOS and delay will improve during certain time periods and degrade during others upon completion of the entire South Coast 101 HOV Lanes project.

Considering all 108 intersections within the study area, the net level of service would slightly degrade during the morning peak period in both 2020 and 2040, and improve during the afternoon peak period in both 2020 and 2040 (Table 2.5). On the whole, there would be a net LOS improvement corridor wide in both 2020 and 2040.

Net delay change for the corridor shows a minor increase in delay during the 2020 morning peak period and a more substantial increase in delay in the 2040 morning peak period. During the 2020 afternoon peak period, there would be a minor decrease or improvement in delay and a substantial decrease or improvement in delay during the 2040 afternoon peak period. On the whole, there would be a net delay reduction, or improvement, corridor wide in both 2020 and 2040.

Approach 2 used HCM standards for evaluating LOS and seconds of delay in combination with an additional criteria of whether the intersection is currently signalized or not. Because this approach applies a consistent corridor-wide approach to identify pronounced changes and combines characteristics most recognized by drivers, this method was used to identify which particular intersections would experience substantial delays.

The results of this approach indicate that five intersections would experience substantial delays when the HOV project is fully constructed (represented by the 2020 analysis), while eight intersections would experience substantial delays in 20 years (represented by the 2040 analysis). Tables 2.6 and 2.7 show which intersections will experience substantial delays and whether these impacts will be triggered in the project completion year or 2040. The basic explanation for these impacts is that when the proposed HOV lane improvements are installed, the improved travel times on the highway causes vehicles to reach their destinations at a quicker rate, with higher traffic volumes arriving at certain intersections. This scenario wouldn’t occur until the 10-mile project is fully complete. It should also be noted that when increased vehicles arrive at a given intersection in the peak hours, resulting in added delay, the number of vehicles arriving at that intersection in the adjacent peak period hours will generally decrease, resulting in delay reduction in the adjacent hours.

Therefore, when looking at all 108 intersections, the project will have a net corridor-wide improvement for the studied intersections, especially in 2040. However, when applying the state-accepted intersection-specific HCM methodology discussed in Approach 2, eight intersections will experience substantial delays with the project. Five intersections will experience substantial delays once the project is fully constructed, and three additional intersections will experience substantial delays by 2040. The affected intersections are listed below.

Impacts would occur by 2020 or when project is completed:
#8 Southbound on-/off-ramps at Bailard
#19 Southbound on-/off-ramps at Carpinteria Avenue
#21 Northbound on-/off-ramps and Via Real/Santa Monica
#107 Cabrillo Boulevard/Los Patos
#48 Southbound off-ramp at Milpas Street

Impacts would occur by 2040:
#37 Southbound off-ramp and San Ysidro/Eucalyptus Lane
#39 Olive Mill Road/Coast Village Road
#79 Southbound on-ramp and State Street and State Route 154

Of the five intersections impacted at the year of project completion, two (#8 and #107) are classified as low volume intersections meaning they serve primarily lower density land uses. Two others (#19 and #21) are classified as medium volume intersections that provide access to residential areas and small business districts. One of the five (#48) is a high volume intersection, which provides connectivity to high density land uses and accommodates cross-town travel.

Of the three additional intersections impacted by 2040, one (#37) is classified as a low volume intersection, one (#39) is a medium volume intersection, and one (#79) is considered a high volume intersection.

In addition, the southbound off-ramp at Milpas (#48) and the southbound on-ramp and State Street and State Route 154 (#79) are currently identified as deficient in the Santa Barbara County CMP. Since these two intersections are listed as deficient, they are currently being monitored by SBCAG in an effort to ensure they remain in conformance with CMP requirements.

Although these two intersections are considered important as a result of their CMP status, the other impacted intersections are also vital to local travel patterns. As an example, although the Carpinteria Avenue southbound on- and off-ramp (#19) is a medium volume intersection, the added seconds of delay will be substantially higher in 2040.

Based on CEQA and taking into account context and intensity, the project will have a significant impact once the project is fully constructed because the project will contribute to a substantial increase in traffic delay at particular study intersections. By applying the HCM standards for LOS and seconds of delay for unsignalized intersections considered in Approach 2, seven intersections will decrease to LOS D or worse and experience a delay increase greater than 10 seconds*. In addition, by applying the HCM standards for LOS and seconds of delay for signalized intersections considered in Approach 2, one intersection will decrease to LOS D or worse and experience a delay increase greater than 20 seconds.

To mitigate this impact below a level of significance, improvements and/or compensatory mitigation would be provided to offset anticipated delays caused by the project. Mitigation measures to bring traffic delays to No-Build conditions in 2040 are outlined in Table 2.8.

It should be noted that in the measures described below Caltrans will be responsible for ensuring that improvements needed will occur prior to the project's completion where feasible. However, because local intersections are outside the state's control, compensation will be provided to the local jurisdictions as indicated in Table 2.8, but Caltrans cannot ensure all of the appropriate improvements will be made. Thus, pursuant to CEQA Guidelines Section 15043, a Statement of Overriding Considerations has been prepared for this project.

*Note: Due to correction of a data entry error, the AM delay increase at Southbound 101 off-ramp and San Ysidro Road/Eucalyptus Lane (#37) has changed from what was reported in the Draft Revised EIR. As a result, this intersection no longer meets the impact criteria established for unsignalized intersections. However, because this intersection was disclosed as being impacted in the Draft Revised EIR and extensive coordination with the County to develop this location as part of the mitigation plan has taken place to date, Caltrans continues to identify this throughout the Final Revised EIR as a location experiencing substantial delay. As a result, it will still be addressed in the mitigation plan in Table 2.8 and Appendix F.

Avoidance, Minimization, and/or Mitigation Measures

As explained above, eight intersections will experience substantial delays with the project (5 in 2020 and 3 in 2040). This number reflects the addition of one intersection, which was not identified in the Draft Revised EIR. Intersection #39 (Olive Mill Road/Coast Village Road) was added after a reassessment of existing traffic data that had previous input errors. The intersection was determined to exceed the criteria for unsignalized intersections established in Approach 2 by one second.

Caltrans proposes to provide compensatory mitigation to fund an equitable-share of the cost of the improvement that will mitigate anticipated delays. Caltrans intends to incorporate the mitigation measures listed in Table 2.8. The mitigation plan in Table 2.8 has been updated to include additional details that further disclose the seconds of delay between the Build and No-Build conditions, as well as the seconds of delay reduction anticipated with mitigation improvements.

Additional meetings were held with the applicable local jurisdictions after the Draft Revised EIR was released (see Chapter 4). The updated Table 2.8 also reflects further refinements subsequent to these meetings.

All of the mitigation measures listed for each intersection will be implemented to the extent feasible prior to completing construction. This is required for all mitigation locations, with the exceptions of intersections #37 Southbound off-ramp and San Ysidro Rd/Eucalyptus Lane, #39 Olive Mill Road/Coast Village Road, and #79 Southbound on-ramp and State Street and SR 154, which experience delay degradation in 2040. Agreements between the local jurisdiction and Caltrans for each mitigation location will be executed prior to beginning construction of the HOV elements in that vicinity or local jurisdiction of where the particular intersection is located. For example, for improvements needed at intersection #21 (Northbound on- and off-ramps at Santa Monica/Via Real) located in the City of Carpinteria, agreements between Caltrans and the City of Carpinteria for completing mitigation improvements will be in place prior to beginning construction of HOV elements in the City of Carpinteria, and the intersection #21 improvements will be implemented before HOV project construction is completed in Carpinteria.

If intersection improvement projects led by local jurisdictions advance in a way that allows construction to occur prior to completion of HOV construction in the vicinity or local jurisdiction of these respective intersections, Caltrans proposes to provide compensatory mitigation once all funding and permits are obtained to construct the HOV elements in this vicinity. This relates to intersections #21, #37 (option 2 only),

#39, #107, and possibly #48 if the City of Santa Barbara wants to implement the improvements to this intersection.

For improvements at state owned intersections with an estimated cost under $5,000, improvements will be constructed by Caltrans prior to completion of phased construction within the applicable local jurisdiction. This relates to intersections #8, #19, #37 (option 1 only), and #79. Please refer to Table 2.8 for full details.

Assumed costs included in Table 2.8 were developed using actual construction capital costs from similar projects that were recently constructed. Finalizing equitable share contributions for each location can only be done once project development advances and final construction capital costs are determined. Caltrans will continue to coordinate with each of the local jurisdictions to ensure final project costs are appropriate to the given improvement.

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Table 2.8 Mitigation Plan

Location	Mitigation Options[1]	2040 Delay Change without Mitigation (seconds)[2]		2040 Delay Change with Mitigation from Build (seconds)[3]		Caltrans Equitable Share (P)[4]	Assumed Cost (C_T)[4]	Compensatory Contribution (to nearest $1000) (C)[4]
		AM	PM	AM	PM			
#8 Southbound On-/Off-ramps and Bailard	Convert from 2-way to 4-way stop control. Improvements will be constructed by Caltrans prior to completion of phased construction within the applicable local jurisdiction.	15.3	153.3	-122.0	-206.3	54.7%	$800	$800[5]
#19 Southbound On-/Off-ramps and Carpinteria Avenue/Reynolds Ave.	Convert from 2-way to 4-way stop control. Improvements will be constructed by Caltrans prior to completion of phased construction within the applicable local jurisdiction.	-0.7	461.9	-17.0	-969.6	2.0%	$800	$800[5]
#21 Northbound On-/Off-ramps and Via Real/Santa Monica	Prior to starting project construction within the City of Carpinteria, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Carpinteria setting forth a schedule and responsibilities for the funding and construction of improvements to the Northbound on-/off-ramp and Via Real/Santa Monica intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies[1]. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.							
	Option 1 - Install signal with dual left-turn lanes for westbound traffic and widen Northbound on-ramp to two receiving lanes which merge back to one before the gore.	116.3	-37.7	-123.6	-45.4	75.9%	$2,500,000	$1,897,000
	Option 2 – Install single-lane roundabout.			-146.0	-103.0		$4,500,000	$3,415,000
#37 Southbound Off-ramp and San Ysidro/Eucalyptus Lane	Prior to starting project construction within the County of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the County of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements at the San Ysidro interchange identified in Option 1 and/or Option 2 below. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2040 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies[1]. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in the vicinity of this intersection.							
	Option 1 – Install 4-way stop control at intersection #37. Delay reduction may not be adequate, however, without additional improvements at the Northbound ramp/N. Jameson/San Ysidro intersection.	8.3	-547.4	-23.9	-26.8	13.5%	$800	$800[5]
	Option 2 – Install 4-way stop control at Southbound off-ramp and San Ysidro/Eucalyptus Lane intersection with single-lane roundabout at the Northbound ramp/N. Jameson/San Ysidro intersection.			-23.9	-26.8		$3,000,000	$405,000

1 The type of improvements needed to bring the traffic levels to No-Build conditions, or better, in 2040.
2 Indicates the changes in delay associated with building the project.
3 Indicates the amount of delay reduction associated with building the project and incorporating the respective mitigation option.
4 Calculations of Caltrans equitable share responsibilities are shown in Appendix G.
5 Caltrans proposes to pay full contribution for items with an improvement cost under $5,000.
6 No capital cost anticipated with this action.

Location	Mitigation Options[1]	2040 Delay Change without Mitigation (seconds)[2]		2040 Delay Change with Mitigation from Build (seconds)[3]		Caltrans Equitable Share (P)[4]	Assumed Cost (C_T)[4]	Compensatory Contribution (to nearest $1000) (C)[4]
		AM	PM	AM	PM			
#39 Olive Mill Road/Coast Village Road	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Olive Mill Road/Coast Village Road intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2040 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Final Revised EIR and supporting technical studies. The agreement shall require the improvements to be in place prior to project completion. The improvements to the intersection shall consist of a one-lane roundabout. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in the vicinity of this intersection.	-39.4	11.0	-27.0	-33.7	34.3%	$4,500,000	$1,545,000
#107 Cabrillo Boulevard/Los Patos	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Cabrillo Boulevard/Los Patos intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Final Revised EIR and supporting technical studies.[1] The agreement shall require the improvements to be in place prior to project completion. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.							
	Option 1 - Install signal.	1.4	66.4	-14.4	-97.8	69.6%	$500,000	$349,000
	Option 2 – Install single-lane roundabout.			-20.3	-104.6		$3,000,000	$2,090,000
#48 Southbound Off-ramp and Milpas	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Southbound off-ramp and Milpas intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies.[1] The agreement shall require the improvements to be in place prior to project completion. Caltrans' preferred option for providing mitigation at this location includes adding a second right-turn lane to Southbound off-ramp and retaining existing stop control at intersection. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.	22.3	106.1	-31.2	-245.3	66.4%	$200,000	$133,000
#79 Southbound On-ramp and State Street and SR 154	Caltrans shall adjust the signal phasing, coordinate signal actuation and delay optimization (in coordination with intersection #79A (San Marcos and Southbound on-ramp node) and ensure that the improvements are constructed by no later than project completion. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in this local jurisdiction.	11.3	22.5	-85.9	-99.1	21.1%	$0[6]	$0[6]

1 The type of improvements needed to bring the traffic levels to No-Build conditions, or better, in 2040.
2 Indicates the changes in delay associated with building the project.
3 Indicates the amount of delay reduction associated with building the project and incorporating the respective mitigation option.
4 Calculations of Caltrans equitable share responsibilities are shown in Appendix G.
5 Caltrans proposes to pay full contribution for items with an improvement cost under $5,000.
6 No capital cost anticipated with this action.

Improvements proposed for each location listed in the mitigation plan found in Table 2.8 have been evaluated by Caltrans Traffic Operations. Each specified location indicates the range of improvements that were considered and determined to be effective in meeting the needed delay reduction between the Build and the No-Build condition. Returning the specified intersection to the No-Build level of delay or better is the performance standard to be achieved by the mitigation at each location. Mitigation options at some locations exist because there are different operational improvements that can meet the same goal of reducing the amount of delay caused by the project, but there may be preferences due to the local community's circulation plans.

After the Draft Revised EIR public comment period concluded, further coordination relative to mitigation options occurred with the three local jurisdictions. More specific information on these coordination efforts is discussed in Chapter 4. Changes to the mitigation plan were made to reflect subsequent discussions regarding mitigation options. After Caltrans Traffic Operations performed subsequent reviews of the traffic data as a result of comments received during the public comment period, one additional impacted intersection was identified and it has been added to Table 2.8.

For locally-owned intersections, Caltrans will provide an equitable share payment to the applicable local jurisdiction based on the project's contribution of traffic volumes to the intersection(s) to assure that adequate levels of delay and/or LOS are improved using signalization, stop control signs, or other control types as specified.

For state-controlled intersections, Caltrans either will take the lead in implementing improvements such as installing signals, four-way stop signs, or roundabouts through initiation of separate projects, or will coordinate with the applicable local jurisdiction to develop an agreement to provide compensatory mitigation that would allow the local jurisdiction to implement needed improvements. As noted above, Caltrans proposes to pay the cost in full at all mitigation locations where the mitigation improvement cost is under $5,000. This relates to intersections #8, #19, #37 (option 1 only), and #79.

Caltrans' equitable share responsibility for traffic impacts was calculated using a formula found in the 2002 Caltrans Guide for Preparation of Traffic Impact Studies. Information from the guide used to calculate equitable share responsibility is shown below:

<u>EQUITABLE SHARE RESPONSIBILITY</u>: Equation C-1

NOTE: $T_E < T_B$, see explanation for T_B below.

$$P = \frac{T}{T_B - T_E}$$

Where:

P = The equitable share for the proposed project's traffic impact.

T = The vehicle trips generated by the project during the peak hour of adjacent State highway facility in vehicles per hour, vph. (20 year build minus 20 year No-Build)

.T_B = The forecasted traffic volume on an impacted State highway facility at the time of general plan build-out (e.g., 20 year model or the furthest future model date feasible), vph.

T_E = The traffic volume existing on the impacted State highway facility plus other approved projects that will generate traffic that has yet to be constructed/opened, vph.

EQUITABLE COST: Equation C-2

$$C = P (C_T)$$

Where:

C = The equitable cost of traffic mitigation for the proposed project ($).

P = The equitable share for the project being considered.

C_T = The total cost estimate for improvements necessary to mitigate the forecasted traffic demand on the impacted facility in question at general plan build-out ($).

Using Intersection #8 as an example of how this calculation works, if the existing volume T_E = 876 vph, the forecasted build volume T_B = 1119 vph and the forecasted No-Build volume = 986 vph, then T = (1119 – 986) vph = 133 vph. The equitable share responsibility is calculated as follows: P = 133 vph. / (1119 - 876) vph. ≈ 0.547 (or 54.7%). Thus, if the estimated improvement cost, C_T = $800, then the equitable cost, C = 0.547 x $800 ≈ $438.

Calculations of Caltrans' equitable share contribution (equitable share) for each of the eight impacted locations are shown in Appendix G. The compensatory mitigation contribution to fund an equitable-share of the cost is also shown in Table 2.8.

To ensure traffic improvements necessary for mitigating the impact to intersections are constructed and developed within a targeted timeline before the project's opening day, a cooperative agreement or other binding agreement with each applicable local jurisdiction will be prepared and put into place prior to initiating construction of HOV elements in that vicinity or local jurisdiction. An agreement between both parties is necessary to ensure the improvements are constructed.

Specified improvement details will be refined through additional coordination between Caltrans and local jurisdiction staff. This coordination will also establish specific agreements and monitoring programs associated with mitigation implementation. Prior to releasing the Draft Revised EIR, Caltrans initiated coordination meetings with the three local jurisdictions where potential impacts were determined. In addition to inviting appropriate staff from each jurisdiction, SBCAG staff were also invited. Caltrans held meetings with the Cities of Santa Barbara and Carpinteria, and the County of Santa Barbara. Additional meetings were held after the Draft Revised EIR was released. These follow-up meetings have focused on specific design modifications necessary to achieve the desired delay reductions and discussion of timing for documents needed to enter into agreements between Caltrans and the applicable local jurisdictions. Summaries of all coordination meetings held to date are provided in Chapter 4.

With the exceptions of intersections #37, #39, and #79, which experience delay degradation in 2040, it is anticipated that any necessary intersection improvements will be in place prior to completing a particular segment of the 101 HOV Lanes project. If improvement projects at intersections #37, #39, and #107, which are being led by local jurisdictions, advance in a way that allows construction to occur prior to completion of HOV construction in the vicinity of these respective intersections, Caltrans proposes to provide compensatory mitigation once all funding and permits are obtained to construct the HOV elements in this vicinity.

Due to the possibility that a local jurisdiction may be unable to successfully complete the recommended mitigation in a timely manner, or they may choose not to participate in an agreement with Caltrans, it is difficult to conclude that the overall significant impact to intersections will be reduced to less than significant. Thus, pursuant to CEQA Guidelines Section 15043, a Statement of Overriding Considerations has been prepared for this project.

2.2 Cumulative Impacts

Note that the section addressing cumulative impacts was identified in Section 2.5 of the 2014 Final EIR. It has been renumbered in this document for organization purposes. Most of the Cumulative Impacts evaluation contained in Section 2.5 beginning on page 487 of the 2014 Final EIR remains intact with the exception of the section specific to Traffic and Transportation/Pedestrian and Bicycle Facilities.

Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

The California Environmental Quality Act (CEQA) Guidelines Section 15130 describes when a cumulative impact analysis is necessary and what elements are necessary for an adequate discussion of cumulative impacts. The definition of cumulative impacts under the California Environmental Quality Act, can be found in Section 15355 of the California Environmental Quality Act Guidelines as follows:

> "Cumulative impacts" refers to two or more individual effects which, when considered together are considerable or which compound or increase other environmental impacts. A cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts.

~~*A definition of cumulative impacts, under the National Environmental Policy Act (NEPA), can be found in 40 Code of Federal Regulations (CFR) Section 1508.7 of the Council on Environmental Quality Regulations.*~~

Section 15130(a) of the CEQA Guidelines requires a discussion of cumulative impacts of a project when the project's incremental effect is "cumulatively considerable," which means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects and the effects of probable future projects. Section 15130(b)(1) of the CEQA Guidelines requires the evaluation of cumulative impacts to be based on either:

a) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those impacts outside the control of the agency, or

b) A summary of projections contained in an adopted plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area-wide conditions contributing to the cumulative impact.

Project-specific Resources Considered in the Cumulative Impact Analysis

~~A cumulative impact analysis is required whenever an environmental document is prepared.~~ The purpose of a cumulative impact analysis is to analyze the potential incremental environmental impacts associated with a project in conjunction with past, present, and reasonably foreseeable future projects. ~~As specified in Caltrans/Federal Highway Administration guidance (Guidance for Preparers of Cumulative Impact Analysis, July 2005), if the proposed project would not result in a substantial direct or indirect impact to a resource, it would not contribute to a cumulative impact on that resource.~~ This cumulative impact analysis includes resources that are substantially affected by the project and resources that are currently in poor or declining health, or that would be at risk even if project impacts would not be substantial.

The 2014 Final EIR provided a discussion of cumulative impacts beginning on page 487. That discussion remains intact for all resources except for information related to traffic in terms of mainline and intersection impacts.

Page 488 of the 2014 Final EIR contained a bulleted list of resources not included in the cumulative impact analysis for the project. The topic of Traffic and Transportation/Pedestrian and Bicycle Facilities was included in this list in the 2012 Draft EIR, but should have been deleted from the list in the 2014 Final EIR since information regarding this topic was added to the section “Resources to Consider” during preparation of the 2014 Final EIR.

The following section includes portions of text taken from the 2014 Final EIR specific to traffic intersections which is shown in italicized font. Any additions to that original text are shown in regular, unformatted strikethrough, and any deletions of that text are shown with a strikethrough. New content is also shown in regular, unformatted font.

Resources to Consider (and their respective study areas)

The 2014 Final EIR included a discussion of cumulative impacts for traffic intersection impacts, which was modified in the Draft Revised EIR in order to give the public opportunity to comment during the Draft Revised EIR stage. No other resources besides Traffic and Transportation and Pedestrian/Bicycle Facilities are discussed in this Final Revised EIR. Further refinements were made where necessary to support the document and provide responses to comments in this Final Revised EIR.

Traffic and Transportation and Pedestrian/Bicycle Facilities

Traffic studies prepared for the project analyzed the U.S. 101 corridor from the Ventura County line to the City of Goleta. The highway includes ramp intersections that would see changes as part of the project. Some secondary intersections that would not be physically affected by the Caltrans project but could see changes in traffic patterns were also included in the study.

A total of ~~104~~ 108 *intersections were analyzed within the 27.5-mile traffic study area***.** *The intersections analyzed generally included ramp junction intersections as well as adjacent intersections near the end of the ramp within the traffic study area. This analysis was completed to ensure that the proposed project would not result in substantial changes to traffic levels at ramp junctions and local intersections. Many of the intersections included in the study were outside of the project limits. The purpose for an expanded study was to determine the current conditions and anticipate changes that could be brought about by the project as a result of shifting traffic patterns.*

Current Health and Historical Context

The following paragraph was taken from page 491 of the 2014 Final EIR. The second paragraph was added to this document to focus solely on the intersections.

Traffic and Transportation and Pedestrian/Bicycle **Facilities—***Circulation on U.S. 101 in the project limits has been declining over the past 30 years as the numbers of vehicles using the facility have been increasing, but the facility itself has seen limited changes and improvements. As a result, heavy traffic conditions already occur several hours each day during the morning and evening commutes. As indicated in*

Table 1.1 (Chapter 1) of the 2014 Final EIR, c*ongested conditions are already occurring for 4.5 hours per day and are predicted to reach 11 hours per day by 2040, without the project. Changes are needed to both the mainline and the Cabrillo Boulevard/Hot Springs Road interchange. The recently constructed 101 Operational Improvement Project from Milpas Street to Hot Springs Road improved highway conditions in the immediate vicinity, but not for the entire 10-mile long ~~length of the traffic study area.~~* project limits. *The* fully constructed *Santa Barbara/Ventura HOV Lane project in northern Ventura County up to the City of Carpinteria ~~will~~* has *improve*d *conditions south of the project limits. The Linden and Casitas Pass Interchanges project will also provide improvements to U.S. 101 and adjacent local roads in the City of Carpinteria.*

As indicated in the Forecast Operations Report and subsequent memos, some intersection delays will occur as a result of the project. Intersection delays can also occur as result of improved highway efficiency. Vehicles will reach their destination more quickly, which can result in delays due to the additional vehicles that would arrive at the ramp intersection during the peak hours. It should also be noted that when increased vehicles arrive at a given intersection in the peak hours, resulting in added delay, the number of vehicles arriving at that intersection in the adjacent peak period hours will generally decrease, resulting in delay reduction in the adjacent hours. New development or changes made to circulation patterns also impact intersections. Projected 2040 cumulative project traffic conditions take into account the SBCAG model, which includes build-out land-use conditions associated with City and County General Plans. The Regional Transportation Plan covers adopted transportation projects for the region in anticipation of proposed development. The proposed project is one of those projects.

Projects to Consider

From page 495 of the 2014 Final EIR:

Table ~~2.50~~ 2.9 *contains projects that are reasonably foreseeable in the near future or have recently been completed. Many are Caltrans-proposed projects, and several are railroad improvement projects. The remainder includes projects authorized by or proposed by local agencies.*

For purposes of discussing the cumulative mainline and traffic intersection analysis it is important to emphasize that rather than relying solely on the list of projects identified in Table 2.50 from the 2014 Final EIR, the basic methodology used for establishing the baseline and travel forecasts for the original study (as described in the

2008 Travel Forecast Report and below) uses the SBCAG travel forecast model which takes into account proposed land-use development included in approved City and County General Plans as well as other programmed transportation-related projects in the SBCAG 2008 Regional Transportation Plan (RTP), which was adopted in 2006. Subsequent to the traffic studies, the SBCAG 2008 RTP was updated in 2013 and became the 2040 Regional Transportation Plan & Sustainable Communities Strategy. Certain projects were added/removed between the two plans. This RTP update does not change the traffic assumptions. Modifications were made to Table 2.50 in the Draft Revised EIR in order to reflect recent project updates (refer to Table 2.9). As a result of comments received during public circulation, further refinements were made to the Potential Cumulative Project List (Table 2.9) that also reflects the addition of the projects from the mitigation plan (see Table 2.8).

Table 2.9[5] Potential Cumulative Project List

Project Name or Applicant	*Project Location (Post Mile)*	*Project Description*	*Impacts*
		Transportation Projects—U.S. 101	
Bailard Overcrossing	*PM 1.6*	*Provide standard clearance at this overcrossing.*	*Impacts unknown; project ~~in preliminary studies~~* is currently on hold due to funding shortfall.
~~U.S. 101 Operational Improvements—Milpas Street to Hot Springs Road~~	*~~U.S. 101 (PM 10.8 to 12.8)~~*	*~~Completed in fall 2012, this project included 2.0 miles of improvements in the City of Santa Barbara. The project included additional northbound and southbound lanes, local road improvements, and bicycle and pedestrian enhancements.~~*	*~~Mitigation reduced potential visual impacts to a less than significant level.~~*
U.S. 101 Linden Avenue to Casitas Pass Road Interchanges Project	*U.S. 101 (PM 2.2 to 3.4)*	*This 1.1-mile-long project includes reconstruction of two interchanges, replacement of Carpinteria Creek Bridge, and a new Via Real connection south to Bailard Avenue. Construction underway; project completion estimated for fall 2020.*	*Mitigation reduced potential visual impacts to a less than significant level.*
~~Ventura/Santa Barbara 101 HOV Project~~	*~~U.S. 101 (PM 39.8 Ven. Co to PM 2.2 SB Co)~~*	*~~The project consists of adding a high occupancy vehicle (HOV) lane in each direction between the Mobile Pier undercrossing in Ventura and Casitas Pass Road in Santa Barbara County. The project began construction in spring 2012 and was completed in 2015.~~*	*~~Mitigation reduced potential visual impacts to a less than significant level.~~*
U.S. 101 Rehabilitation Project	*U.S. 101 (PM 2.6 to 9.2)*	*The project proposes to replace the paved structural section of the highway to correct deficiencies indicated in the Pavement Condition Survey. Outside shoulders would be widened to 10 feet wide where feasible. Ramps would be rehabilitated, including removal of existing concrete curbs and concrete gutters. The work would occur within the existing right-of-way and be performed simultaneously with the South Coast 101 HOV Lanes project.*	*The project would increase ~~impervious coverage and encroach into wetland buffers~~* storm water runoff due to increased pavement and encroachment into wetland buffers. *~~See Table 2.51 for details~~.*

[5] Previously titled Table 2.50 in the 2014 Final EIR

Project Name or Applicant	***Project Location (Post Mile)***	***Project Description***	***Impacts***
Santa Barbara Curb Ramp Project	*U.S. 101 (PM 2.6 to 11.9)*	~~*Construct and/or improve*~~ The recently constructed project improved *43 curb ramps (some with minor sidewalk extensions) at 20 locations along Routes 1, 101, 154, 192 and 246 in Santa Barbara County*.	*The project* does not impact ~~*would not add impervious coverage. There would be no direct/indirect impacts to traffic circulation,*~~ *visual resources, water quality or biological* ~~*impacts*~~ resources. Improves pedestrian access – meets ADA.
Santa Barbara 101 Roadside Safety	U.S 101 (PM 0.4 to 11.7)	Improves Caltrans worker safety along U.S. 101 for 12+ miles by constructing maintenance pullouts, controlling vegetation under guardrails, installing contrasting surface treatment beyond the gore, placing mulch to control weeds, etc. The project was completed in August 2017.	No impacts
Butterfly Pedestrian ADA	*U.S. 101 (PM 11.0)*	*Bring the existing pedestrian overcrossing into compliance with ADA by constructing ramps at each entrance. Some landscaping will be removed, including skyline trees. There is room for some replacement landscaping and perhaps small trees, but unlikely any large varieties would go back at that location.* Start of construction not anticipated until 2020.	Project will include vegetation and tree removal, and minor right-of-way acquisition. ~~*the project adds impervious surface area.*~~
Southbound off-ramp and San Ysidro/ Eucalyptus Lane*	U.S. 101 at San Ysidro	Two options are being considered for improving operations at this location, including 4-way stop control with improvements at the southbound ramp node and S. Jameson/San Ysidro and 4-way stop control with a single-lane roundabout at the northbound ramp/N. Jameson/San Ysidro intersection.	The roundabout option may require additional right-of-way. Actual impacts will not be known until site-specific studies are completed by the County
Olive Mill Road/Coast Village Road*	U.S. 101 at Olive Mill Road	The project would improve operations at the Coast Village Road/Olive Mill/North Jameson intersections by constructing a one-lane roundabout.	Potential for vegetation and tree removal, floodplain impacts, and right-of-way acquisition. Actual impacts will not be known until site-specific studies are completed by the City of SB.
*These projects were not addressed in the 2040 Build or No-Build modeling.			

Project Name or Applicant	***Project Location (Post Mile)***	***Project Description***	***Impacts***
Northbound On-/Off-ramp and Via Real/Santa Monica*	U.S. 101 at Santa Monica	Installation of a signal or a single roundabout option are being considered at this location.	Potential impacts to wetlands and right-of-way acquisition.
Southbound On-/Off-ramp and Bailard*	U.S. 101 at Bailard	Convert from 2-way to 4-way stop control.	No impacts anticipated.
Southbound On-/Off-ramps and Carpinteria Avenue*	U.S. 101 at Carpinteria Avenue	Convert from 2-way to 4-way stop control.	No impacts anticipated.
Southbound Off-ramp and Milpas Street*	U.S. 101 Southbound off-ramp and Milpas Street	Add second right-turn lane to the southbound off-ramp. Retain existing stop control at intersection.	No impacts anticipated.
Local Infrastructure Improvements (parking, access and bike/pedestrian trail)			
Santa Claus Lane: Streetscape, Beach Access, and Parking	*Santa Claus Lane*	*Santa Barbara County is proposing to construct parking along Santa Claus Lane and improve beach access for vehicles and pedestrians.*	*Caltrans design efforts will consider the county's proposal to avoid potential conflicts.*
Santa Claus Lane Bike Path	*Between the Santa Claus Lane on-ramp and the Carpinteria Avenue off-ramp*	*The Santa Claus Lane Class I bike path project would connect Santa Claus Lane to Carpinteria Avenue on the southbound side of U.S. 101. This project would close the coastal trail gap between Santa Claus Lane and the Carpinteria Marsh.*	*The project would likely impact wetlands due to conflicts with Carpinteria Marsh.*
Carpinteria Rincon Trail	*Carpinteria Avenue to Rincon Beach County Park*	*A paved bicycle/pedestrian trail intended to close the coastal trail gap between Carpinteria Avenue and the new Class I trail along U.S. 101 at Rincon.*	*About 0.95 acre of vegetation communities would be permanently impacted (0.41 acre of coastal sage scrub and 0.52 acre of coastal bluff scrub). An additional 0.26 acre of coastal sage scrub and 0.38 acre of coastal bluff scrub would be removed temporarily.*

Project Name or Applicant	***Project Location (Post Mile)***	***Project Description***	***Impacts***
Union Pacific Bridge Replacement (UPPR) at Cabrillo Boulevard and Improve Intersection at Los Patos/Cabrillo Boulevard	Cabrillo Boulevard and railroad	The City of Santa Barbara is leading efforts to replace the bridge structure in order to improve bicycle and pedestrian circulation under the railroad structure and through the Los Patos/Cabrillo Boulevard intersection. This will involve raising the elevation of the structure and widening Cabrillo Blvd and improving the Los Patos/Cabrillo Boulevard intersection. This project includes improvements at Los Patos/Cabrillo Boulevard, which will construct either a signal or a roundabout to replace the nonstandard intersection.	Environmental studies are complete. Impacts to cultural resources impacts will be avoided. There may be adequate right of way to complete improvements.
		Railroad Improvements	
LOSSAN North	Multiple locations	The project consists of 39 individual railroad improvements between the San Luis Obispo train station and the LA Union Station, a total length of 222 miles. The project includes track upgrades, signal upgrades, new sidings and siding extensions, construction of second main tracks, curve realignments, grade separations, and station improvements in order to increase capacity and cost-effectiveness, reduce running time, and improve safety of intercity passenger rail.	Potential impacts will not be known until site-specific studies are completed.
Commuter and Passenger Rail Planning and Service Improvements	Multiple locations	The project will result in a service adjustment to allow one commuter rail trip during the morning and evening peak hours. The project will take advantage of existing rail facilities. Scheduling must be negotiated between Amtrak, LA Metro, and the Los Angeles to San Diego (LOSSAN) rail group. The project is anticipated in spring 2018.	No impacts anticipated.
~~San Luis Obispo - Santa Barbara Track Upgrades~~	*~~Between SLO and Santa Barbara, mile post 248.44 to mile post 355.80~~*	*~~The railroad project would upgrade 107.36 miles of track from Class 3 to Class 4 track standards (per Federal Railroad Administration).~~*	*~~Potential impacts will not be known until site-specific studies are completed.~~*
~~South San Luis Obispo to Goleta Continuous Centralized Traffic Control~~	*~~Between SLO and Goleta~~*	*~~This railroad project would link the previously established Centralized Traffic Control (CTC) between South San Luis Obispo and Goleta, establishing continuous CTC throughout the LOSSAN corridor from San Luis Obispo to San Diego.~~*	*~~Potential impacts will not be known until site-specific studies are completed.~~*

Project Name or Applicant	Project Location (Post Mile)	Project Description	Impacts
~~*Goleta Service Track Extension*~~	~~*Goleta Station*~~	~~*The railroad project would extend the existing service track at Goleta station, add a new power-operated Number 20 turnout at the current stub end, and relocate the existing train wash.*~~	~~*Potential impacts will not be known until site-specific studies are completed.*~~
~~*Ortega Railroad Siding*~~	~~*In the vicinity of Padaro Lane*~~	~~*The south end of the Ortega railroad siding was removed due to disrepair. The remaining portion is now used as a stub track for maintenance equipment. The project would reconstruct and lengthen this siding to 9,240 feet. Power-operated Number 24 turnouts would be installed and control points.*~~	~~*Potential impacts will not be known until site-specific studies are completed.*~~
~~*Sandyland Siding*~~	~~*Mile post 373.25 to Mile post 378.10, north of the existing Carpinteria station*~~	~~*The railroad project would add a new 11,000-feet long siding and would incorporate the Carpinteria siding built earlier. It would involve widening two pre-stressed concrete box bridges, one 36 feet and the other one 65 feet. The siding would feature power-operated Number 24 turnouts and control points.*~~	~~*Potential impacts will not be known until site-specific studies are completed.*~~
~~*Carpinteria Siding*~~	~~*Begin at mile post 377.5 and end at mile post 378.1*~~	~~*The railroad project would construct a new siding at the Carpinteria station. The siding would be 2,640 feet long and would include Number 24 power-operated turnouts, as well as a new passenger platform to facilitate use of both tracks.*~~	~~*Potential impacts will not be known until site-specific studies are completed.*~~
~~*Rincon Siding*~~	~~*Begin at approximately mile post 380.3 south to mile post 381.3*~~	~~*The proposed railroad siding would be constructed to the south of the Carpinteria siding. There appears to be sufficient clearance beneath the U.S. 101 overpass in addition to sufficient right -of-way. The siding would be roughly one-mile long.*~~	~~*Potential impacts will not be known until site-specific studies are completed.*~~
		Residential and Commercial Projects—Carpinteria	
Lagunitas Mixed Use	*6380 Via Real*	*This mixed-use project consists of 85,000 square feet of commercial office building space and 73 residential units (36 condominiums and 37 single-family dwellings.*	*Site design, landscaping, and architectural features as required by permit reduce potential visual impacts.*
~~*Dahlia Court Apartments*~~	~~*1300 Dahlia Court*~~	~~*Construction is underway to add 33 affordable housing units to the existing 54 units.* was completed in August 2013. *A 4,347-square-foot community center is* was *also being added.*~~	~~*Increased local traffic.*~~

Project Name or Applicant	Project Location (Post Mile)	Project Description	Impacts
~~*Casas de las Flores Apartments*~~	~~*4096 Via Real*~~	~~*Forty-three affordable housing units will be*~~ were ~~*constructed on the former Camper Park site (70-space mobile home park).*~~ They opened ~~October 2015.~~	~~*None.*~~
~~Albertsons Expansion~~	~~1013 Casitas Pass~~	~~There is a 20,000-square-foot expansion of the Albertsons Grocery Store.~~	~~Increased local traffic.~~
Green Heron Springs	*1300 and 1326 Cravens Lane*	*Demolition of existing building and construction of 30 new condominiums and renovation of an existing circa-1904 2-story farmhouse.*	*Project is proposed with the balancing of resources approach to create a win-win for housing and resources.*
Via Real Hotel	4110 Via Real	Demolish existing church, construct 110-room hotel	Increased traffic
~~*Mission Terrace Estates*~~	~~*1497 Linden*~~	~~*Construction is underway*~~ completed ~~*on a 27-unit housing project consisting of 24 single-family market rate units and 3 affordable single-family units.*~~	~~*Increased local traffic.*~~
Steadfast Assisted Living	5464 Carpinteria Avenue	Convert existing office building to a 76-bed assisted living facility.	Potential for increased traffic
Island Brewing Co. Expansion	5049 Sixth Street	Convert existing warehouse to brewery/tasting room addition and expand patio.	Increased local traffic
Carpinteria Valley Arts Center	855 Linden Avenue	New 7,911 sq. ft. community art center	Increased local traffic
M3 Mixed Use Building	4819 Carpinteria Avenue	New 6,488 sq. ft. commercial building and two apartments	Increased local traffic
Punto de Vista Mixed Use	6155/6175 Carpinteria Avenue	Demolish 46,044 sq. ft., construct 76,000 sq. ft. commercial and 49 dwelling units	Increased local traffic
Residential and Commercial Projects—Santa Barbara County			
Miramar Hotel	*1555 S. Jameson Way*	*Renovation of an abandoned resort. The project was reduced over the previous approval. Proposal is for* ~~186~~ 161 *rooms,* oceanfront restaurant, two swimming pools, and 6,000 square foot ballroom. ~~*and no tennis court.*~~ ~~*The project was delayed due to the economic downturn.*~~ This project is currently under construction.	*Increased traffic.*

Project Name or Applicant	**Project Location (Post Mile)**	**Project Description**	**Impacts**
Residential and Commercial Projects—City of Santa Barbara			
Beachfront Hotel Development	*433 E. Cabrillo Blvd and 103 S. Calle Cesar Chavez*	*A 50- to 60-room development plan for an upscale hotel and spa accommodations with parking and a working building.*	*Increased local traffic.*
Paseo de la Playa	*101 Garden Street*	*This project consists of 3 sites: a 45,125-square-foot commercial building on one site and 107 residential units on the remaining sites (affordable and market rate).*	*Increased local traffic.*
Sustainable Mixed-Use	*412 Anacapa Street*	*Proposal to subdivide existing 13,500-square-foot lot into 3 lots and build a 3-story sustainable mixed-use building on each new parcel. There will be a total of 4,074 square feet of commercial and 7,113 square feet of residential space and a total of 10 parking spaces.*	*Increased local traffic.*
Mixed-Use Development	*630 Anacapa Street*	*This project proposes to merge 2 lots and build a 3-story mixed-use building with below-grade parking. The project includes 6 separate commercial spaces and 3 studio apartments.*	*Increased local traffic.*
Mixed-Use Development	*528 Anacapa Street*	*This project proposes to demolish an existing 3,300-square-foot commercial building and build a mixed-use building in approximately 20,000 square feet (5,000 commercial/15,000 residential) on a 65,000-square-foot parcel.*	*No impacts.*
Redevelop/Mixed-Use	*617 Bradbury Avenue*	*This revised project proposes to demolish a single-family residence and build a new 5,978-square-foot mixed-use development that includes 918 square feet of commercial area and about 3,400 square feet of residential area.*	*No impacts.*
Mixed-Use Development	*825 De La Vina Street*	*Proposal for a mixed-use project that includes 1,606 square feet of commercial space, a 14,750-square-foot parking lot, and 7 residential condominiums averaging approximately 1,200 square feet each.*	*Increased local traffic.*
Youth Hostel	*12 E. Montecito Street*	*Proposal to build an 11,091-square-foot commercial youth hostel.*	*None.*
McReynolds – City Ventures	*535 E. Montecito Street*	*This project proposes to build 48 residential units on 10,285 square feet of land.*	*Increased local traffic.*

Project Name or Applicant	Project Location (Post Mile)	Project Description	Impacts
Redevelop Gas Station property to mixed-use	*1298 Coast Village Road*	*Demolish existing gas station and build a 17,490-square-foot mixed-use building, including 5,215 square feet of commercial space and 12,275 square feet of residential. A total of 36 parking spaces are proposed.* The project is under construction.	*Potential hazardous waste impacts.*
Commercial Building	*718 E. Mason Street*	*Proposal to build a new 2,414-square-foot commercial building with office and warehouse space.*	*No impacts.*
Residential and Commercial Projects—City of Santa Barbara			
Residential	*1032 E. Mason Street*	*This project proposes to build six 2-story residential complexes on an existing 24,979-square-foot lot.*	*Increased local traffic.*
Small Mixed Use Complex	*517 Chapala*	*This project would build six residential condominiums totaling 10,147 square feet and 2 commercial condominium spaces totaling 2,729 square feet. One residential unit would be affordable.*	*Increased local traffic.*
Cottage Hospital Foundation Workforce Housing	*601 Micheltorena Street*	*This project ~~proposes to~~* demolished *the former St. Francis Hospital and built workforce housing consisting of 115 residential condominiums on 5.94 acres of a 7.39-acre site.* The project is complete.	*Increased local traffic.*
Commercial Buildings	*406/408 Quarantina Street*	*This proposed project would demolish a single-family residence and build a 2,653-square-foot commercial building. Adjacent to that a new 2,717-square-foot commercial building is proposed.*	*Increased local traffic.*
Mixed Use	*116 E. Yanonali Street*	*Project proposes to demolish an existing warehouse/office and build a 13,203-square-foot mixed-use building, including 8,588 square feet of residential use and 4,615 square feet of commercial space.*	*Increased local traffic.*
Mixed Use	*416 E. Cota Street*	*This proposed project would merge three existing lots, demolish a commercial building, and build 57 residential units on 39,603 square feet.*	*Increased local traffic.*
Residential/Daycare Facility	*421 E. Cota Street*	*Proposal to demolish an existing building and build 8 residential apartments and a daycare center.*	*Increased local traffic.*
~~*Redevelopment/Mixed Use*~~	~~*38 W. Victoria Street*~~	~~*Proposal to Demolished existing 20,125-square-foot commercial building on a 1.4-acre site. A 23,125 square-foot public market and 37 residential condominiums were constructed.*~~	~~*None*~~
Residential/Open Space	*900-1100 Las Positas Road*	*This project would subdivide a 50-acre parcel into 30 lots; 15 acres will contain 25 single-family homes, 35 acres will remain open space.*	*Increased local traffic.*

Direct and Indirect Impacts of the Proposed Project that Might Contribute to a Cumulative Impact

Traffic and Transportation/Pedestrian and Bicycle Facilities

The project was proposed in order to address the ever-growing delays on U.S. 101. As stated in both the purpose and need, building the HOV lanes will improve the ability of the mainline to accommodate existing and projected traffic volumes.

Upon consideration of the three mainline analysis measures of effectiveness—peak period delay (vehicle hours and person hours), peak hour trip time, and peak hour average speed discussed in Section 2.1.5 of the 2014 Final EIR, the traffic studies demonstrate that the overall congestion relief on U.S. 101 is achieved by the project. Table 2.15 from the 2014 Final EIR (page 110) anticipates the project will result in nearly 14,000 person hours of delay savings daily by 2040. The project will not have an incremental contribution that is cumulatively considerable and that results in significant cumulative traffic impacts on the mainline.

Intersection analysis was completed separate from the mainline analysis. The intersection analysis provides evidence of an incremental contribution that is cumulatively considerable at specific intersections in the traffic study area. Thus, the emphasis of the cumulative impact analysis for this Final Revised EIR is on traffic-related impacts for the 108 intersections within the traffic study area.

Although the overall project would enable the highway to better accommodate vehicles using the corridor, some intersections will see changes in delays because improved travel times on the highway would allow vehicles to arrive earlier during the peak hour. It should also be noted that when increased vehicles arrive at a given intersection in the peak hours, resulting in added delay, the number of vehicles arriving at that intersection in the adjacent peak period hours will generally decrease, resulting in delay reduction in the adjacent hours. Impacts to intersections are largely due to the project’s basic purpose to provide long-term corridor congestion relief, which causes redistribution of traffic at some intersections at ramp junctions located on the highway system. Other intersection operations would be improved or consistent with the No-Build condition. The project would also encourage future carpooling and facilitate delay reduction for transit services that travel within this corridor.

The Forecast Operations Report reflects “cumulative-plus project” results that were identified using the ICU and CMP methodology adopted by the local jurisdictions (as described in Section 2.1.1 and Appendix B). As previously explained, although Caltrans agreed to analyze intersections as requested by the local jurisdictions using local ICU and CMP methodology in the Forecast Operations Report, Caltrans is not adopting these thresholds as the basis for identifying intersections that will or will not be significantly impacted. Although intersections with 2040 “cumulative-plus project” impacts were identified in the Forecast Operations Report and included in Table 2.51 in the 2014 Final EIR, these 15 intersections do not meet the thresholds identified by Caltrans in this Final Revised EIR. Table 2.51 has been replaced with Table 2.7 in the Final Revised EIR.

As discussed in Section 2.1.1, Approaches 1 and 2 use the Caltrans-accepted HCM methodology to evaluate whether any of the 108 intersections studied for this project will be substantially impacted. Approach 1 found that when looking at the project from a corridor-wide perspective, the net level of service would slightly degrade during the morning peak period in both 2020 and 2040, and improve during the afternoon peak period in both 2020 and 2040. On the whole, there would be a net LOS improvement corridor wide in both 2020 and 2040.

Net delay change for the corridor shows a minor increase in delay during the 2020 morning peak period and a more substantial increase in delay in the 2040 morning peak period. During the 2020 afternoon peak period, there would be a slight decrease or improvement in delay and a substantial decrease or improvement in delay during the 2040 afternoon peak period. On the whole, there would be a net delay reduction corridor wide in both 2020 and 2040.

Approach 2 found that five intersections will experience substantial delays when the HOV project is fully constructed (represented by the 2020 analysis), while eight intersections would experience substantial delays in 20 years following (represented by the 2040 analysis).

As discussed in Section 2.1.1, the analysis of the project’s impact to intersections essentially includes a cumulative impact analysis, because it considers the impact of the project together with all transportation and land use projects included in the Regional Transportation Plan and general plans prepared by local jurisdictions.

The overall cumulative assessment for traffic intersections finds that the South Coast 101 HOV Lanes project will not have a separate cumulatively considerable incremental contribution to a significant cumulative impact, other than the significant impact to intersections identified and discussed in Section 2.1.1, above which considered the impact from a cumulative perspective, based on the following:

1) The term “cumulative project impact” is defined by the traffic analysis community as “existing conditions plus other approved and pending projects plus the proposed project.” Traffic modeling for this project was based on build-out by each jurisdiction’s general plan as well as the 2008 Regional Transportation Plan. The traffic forecast year is 2040. As a matter of practice, the majority of traffic studies consider full build-out of land-use development approved within applicable local General Plans as is true in this case. In other words, the traffic study already considers traffic impacts from a cumulative perspective.

2) The evaluation described in Approach 2 determined five intersections would experience substantial delays in 2020 and eight intersections would experience substantial delays in 2040. All eight of the intersections will be addressed as part of the Avoidance, Minimization and Mitigation measures listed in Table 2.8. The five intersections with opening day project-level substantial delays will be improved prior to opening day with proposed mitigation and minimization measures. Furthermore, as indicated in Section 2.1.3, a cumulative-project impact associated with substantial delays was identified at three additional intersections (#37 Southbound off-ramp and San Ysidro/Eucalyptus Lane, #39 Olive Mill Road/Coast Village Road, and #79 Southbound on-ramp and State Street and SR 154). As previously detailed in Section 2.1.1 and denoted in Table 2.8, the project’s significant impact to intersections will be addressed by a combination of two approaches for the identified intersections: 1) Caltrans will take the lead on implementing improvements such as optimizing signal timing and installing four-way stop signs for locations where costs fall below $5,000. This work will occur prior to the project’s completion, or 2) Caltrans will ensure that improvements for state or locally owned intersections move forward by providing an equitable share compensation to the appropriate local jurisdiction as indicated in Table 2.8. The mitigation measures discussed above with respect to the project’s traffic intersection impact would reduce to at or below the no-build conditions. However, since Caltrans cannot ensure all of the appropriate improvements will be made, a Statement of Overriding Considerations has been prepared for this project, pursuant to CEQA Guidelines Section 15043.

~~*The Forecast Operations Report discusses adding local development to the traffic mix and identifies 2040 cumulative-plus traffic conditions. See Figure 2-8, which shows*~~

~~*the Future Level of Service results for all of the intersections evaluated for the project. The 2040 volumes include anticipated local land use development.*~~

~~*Project impacts were based on measured operations between the future no-build condition and the future build condition. Given that U.S. 101 freeway operations were shown to improve within the study area as a result of the project, project-specific impacts were primarily focused on the freeway interface with the local agency transportation systems (i.e., ramp intersections and local study area intersections adjacent to ramps).*~~

~~*Impact criteria established as part of the traffic study included the use of local jurisdiction traffic impact criteria (which is typically used for determining impacts associated with development projects). For state-operated facilities, the Caltrans Level of Service (LOS) standard of LOS C was the basis for identifying impacts associated with the project. For locally owned intersections, assessments of impacts were analyzed using the Highway Capacity Manual (HCM) method and the ICU method consistent with each respective local agency's policies. This analysis also took into account a number of factors including signal warrant criteria, the preferred methodology of the jurisdiction that owned and operated the intersection, and other factors.*~~

~~*Combining the impact analysis results described above, Table 2.51 lists all intersections identified with cumulative-plus project impacts. A total of 15 intersections are shown to have cumulative-plus project impacts associated with the South Coast 101 HOV Lanes project*~~*.*

~~*The cumulative-plus impacts identified in the Forecast Operations Report are largely due to the project's basic purpose to provide long-term corridor congestions relief. Due to redistribution of traffic, the project would result in some changes to local traffic patterns at some ramp junctions of the highway system. The project would enable the highway to better handle the vehicles currently using the corridor, and some intersections could see added delays because improved travel times on the highway would cause vehicles to enter nearby intersections in higher numbers. Other intersection operations would be consistent with the no-build condition or improved. The project would also encourage future carpooling and facilitate delay reduction for transit services that travel within this corridor.*~~

~~*The final determination by Caltrans was that the impacts identified in the traffic studies do not reach a level of significance that requires mitigation. This*~~

~~*determination is rooted in the fact that the purpose and need for the HOV project is to provide significant daily congestion relief in the larger corridor, and the traffic studies demonstrate that this overall congestion relief is achieved by the project (the project is anticipated to result in nearly 14,000 person hours of delay savings daily in 2040). Intersections outside the project limits where some increases in delay are projected to occur under a build scenario are tradeoffs associated with the project and are not significant in comparison to the overall level of congestion relief achieved by the project*~~*.*

~~*The draft environmental document for the project disclosed that there are some delay increases at a number of local jurisdiction and state-controlled intersections. The amount of added delay associated with these intersections, however, in not significant for two reasons: 1) the added intersection delay is minimal in relation to significant delay reduction benefits associated with the project, and 2) the project is a congestion relief project and is not generating trips (instead it is allows individual motorists to make rational choices to travel at times they may find problematic without the larger corridor congestion relief project). Except for changes proposed at the Hot Springs/Cabrillo Interchange, no additional improvements are proposed as part of this project to address the delay changes associated with future traffic redistribution within or outside the project limits.*~~

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Table 2.51 2040 Cumulative-plus Traffic Conditions

ID	Intersection	Control [1]	Location	Total Entering Traffic Volumes				No Build Results		Build Results		Signal Warrant Met? [5]		Project Impact Threshold Criteria
				Existing	No Build	Build	Delta [2]	Delay (seconds) OR V/C [3]	LOS [4]	Delay (seconds) OR V/C [3]	LOS [4]	No Build	Build	
4	SB on/off ramp & SR 150 ***PM Peak***	TWSC	Study Area	644	644	672	28	30	D	36.3	E	No	No	State
7	NB on/off ramp & Bailard Ave ***PM Peak***	TWSC	Study Area	1,123	1,215	1,390	175	21	C	27	D	No	No	State
14	Carpinteria Ave & Casitas Pass Rd ***PM Peak***	Signal	Study Area	1,805	2,193	2,329	136	29.9	C	37.4	D	N/A	N/A	City of Carpinteria
18	Linden Ave & Sawyer Ave ***AM Peak***	TWSC	Project Area	944	1,066	1,277	211	25.8	D	41.3	E	No	No	State
33	SB on/off ramp & Sheffield ***AM Peak***	TWSC	Project Area	390	483	579	96	19.9	C	29.3	D	No	No	State
49	SB on ramp & Milpas St ***AM Peak*** ***PM Peak***	Signal	Study Area	1,910 2,625	1,968 2,625	2,605 2,862	637 237	30 64.2	C E	48.4 60.6	D E	N/A	N/A	State
55	NB on ramp & Castillo St ***PM Peak***	Signal	Study Area	2,205	2,571	2,605	34	129.4	F	131.4	F	N/A	N/A	State
57	SB on/off ramp & Castillo St ***PM Peak***	Signal	Study Area	2,557	3,092	3,117	25	52.6	D	55.7	E	N/A	N/A	State
59	SB on/off ramp & Carrillo St ***AM Peak*** ***PM Peak***	Signal	Study Area	3,435 3,778	3,677 4,141	3,689 4,164	12 23	56.8 33.6	E C	62.7 35.6	E D	N/A	N/A	State
60	Carrillo St & Castillo St ***AM Peak***	Signal	Study Area	2,742	2,995	3,082	87	0.757	C	0.779	C	N/A	N/A	City of SB
64	SB on/off ramp & Mission St ***AM Peak*** ***PM Peak***	Signal	Study Area	2,705 2,473	2,817 2,793	2,838 2,883	21 90	34.5 53.1	C D	35.9 65	D E	N/A	N/A	State
65	Mission St & Castillo St ***PM Peak***	Signal	Study Area	2,451	2,887	3,001	114	0.787	C	0.849	D	N/A	N/A	City of SB
79	SB on ramp & State St & Rt 154 ***AM Peak*** ***PM Peak***	TWSC	Study Area	1,941 1,635	2,054 1,818	2,081 1,867	27 49	101.1 96.9	F F	112.4 119.4	F F	N/A	N/A	State
90	NB on/off ramp & Los Carneros Rd ***AM Peak***	Signal	Study Area	1,596	1,942	2,045	103	33.9	C	40	D	N/A	N/A	State
106	Milpas St & Quinientos St ***PM Peak***	Signal	Study Area	2,518	3,118	3,181	63	0.866	D	0.909	E	N/A	N/A	City of SB

[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] As defined by difference between 2040 build and 2040 no build volume sets
[3] Delay is based on HCM 2000, Chapter 16 and 17 methodology. V/C based on Transportation Research Board Special Report 209
[4] HCM LOS is reported for the worst movement at TWSC intersections and for the overall intersection at AWSC and signalized intersections
[5] Based on Peak Hour Warrants (Signal Warrant #3) as described in California Manual on Uniform Traffic Control Devices at unsignalized intersections

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Chapter 3 California Environmental Quality Act Evaluation

3.1 Determining Significance under the California Environmental Quality Act

Only information that has changed since public release of the 2014 Final EIR is included below.

3.2 Discussion of Significant Impacts

3.2.1 No Effects

This section remains unchanged from the 2014 Final EIR.

3.2.2 Less than Significant Effects of the Proposed Project

This section remains unchanged from the 2014 Final EIR, except that the topic of Traffic and Transportation/Pedestrian and Bicycle Facilities is now deleted from this section. As a result of identifying an impact to intersections in Chapter 2.1.1, this issue is discussed in Section 3.2.3 and 3.2.4 below. Note that the overall cumulative assessment for traffic intersections finds that the South Coast 101 HOV Lanes project will not have a separate cumulatively considerable incremental contribution to a significant cumulative impact.

3.2.3 Significant Environmental Effects of the Proposed Project

This section remains unchanged from the 2014 Final EIR, except that the topic of Traffic and Transportation/Pedestrian and Bicycle Facilities is now added to this section.

Traffic and Transportation/Pedestrian and Bicycle Facilities—After a subsequent evaluation of the 108 individual intersections and taking into account context and intensity, it was determined that the project will have a significant impact once the project is fully constructed because the project will contribute to a substantial increase in traffic delay at particular study intersections. The project will include the minimization and mitigation measures shown in Table 2.8 and Appendix F in an effort to reduce the impact to less than significant.

3.2.4 Mandatory Findings of Significance

This section remains unchanged from the 2014 Final EIR, except that the topic of Traffic and Transportation/Pedestrian and Bicycle Facilities is now added to this section.

Traffic and Transportation/Pedestrian and Bicycle Facilities— After a subsequent evaluation of the 108 individual intersections and taking into account context and intensity, it was determined that the project will have a significant impact once the project is fully constructed because the project will contribute to a substantial increase in traffic delay at particular study intersections. Due to the possibility that a local jurisdiction may be unable to successfully complete the recommended mitigation in a timely manner, or they may choose not to participate in an agreement with Caltrans, it is difficult to conclude that the overall significant impact to intersections will be reduced to less than significant. Therefore, a Statement of Overriding Considerations has been prepared pursuant to CEQA Guidelines Section 15043.

3.2.5 Unavoidable Significant Environmental Effects

In addition to what was included in the 2014 Final EIR, the following has been added:

Traffic and Transportation/Pedestrian and Bicycle Facilities—After a subsequent evaluation of the 108 individual intersections and taking into account context and intensity, it was determined that the project will have a significant impact once the project is fully constructed because the project will contribute to a substantial increase in traffic delay at particular study intersections. The project will include the minimization and mitigation measures shown in Table 2.8 in an effort to reduce the impact to less than significant. However, since Caltrans cannot ensure all of the appropriate improvements will be made, pursuant to CEQA Guidelines Section 15043, a Statement of Overriding Considerations has been prepared for this project.

3.2.6 Climate Change

This section remains unchanged from the 2014 Final EIR.

3.3 Mitigation Measures for Significant Impacts under the California Environmental Quality Act

To reduce the significant impact to intersections specified above, Caltrans shall provide improvements or provide a compensatory contribution to the appropriate local jurisdiction (City of Santa Barbara, City of Carpinteria, and County of Santa Barbara) to improve traffic conditions to No-Build conditions or better at impacted intersections. In order to address the substantial delays that would occur at particular intersections by either opening day or 2040, a cooperative agreement or other binding agreement would need to be in place with each applicable local jurisdiction prior to initiating construction of HOV elements in that vicinity or local jurisdiction. The improvements that address substantial delays occurring by opening day need to be constructed prior to completion of phased construction within the applicable local jurisdiction. For substantial delays that won't occur until 2040, improvements will also be constructed prior to completion of phased construction within the applicable jurisdiction. The agreement with each applicable jurisdiction will set a schedule and specify responsibilities for funding and constructing improvements. Information relative to mitigation is included in Table 2.8 and Chapter 4 of this document. Subsequent details have been added to Chapter 4 since public circulation of the Draft Revised EIR as a result of ongoing coordination with local jurisdictions.

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Chapter 4 Comments and Coordination

Meetings with Local Jurisdictions Prior to Revised EIR Release

Caltrans staff held meetings with local jurisdictions and SBCAG staff representatives on the following dates:

September 12, 2016 - City of Santa Barbara

October 5, 2016 - County of Santa Barbara

October 13, 2016 - City of Carpinteria

The purpose of these meetings was to provide each jurisdiction with an update on the progress of the Draft Revised EIR preparation, identify Caltrans' proposed mitigation plan, and discuss opportunities for City/County and Caltrans coordination on these topics.

At each meeting, Caltrans staff summarized the Judge's direction related to the local intersection analysis and clarified the process taken to date to prepare the Draft Revised EIR content. Caltrans staff discussed preliminary findings and the proposed mitigation plan specific to impacted intersections located within the respective jurisdiction. Caltrans staff also discussed the anticipated approaches for providing mitigation at city-controlled and state-controlled intersections, and the proposal to provide compensatory mitigation at select intersections.

At the end of each meeting, opportunities for further coordination and communication were discussed. Caltrans also offered to set up a technical meeting with local jurisdiction staff to review and discuss technical details in the weeks following the public release of the Draft Revised EIR.

Traffic Mitigation Coordination Meetings with Local Agencies after Revised EIR Release

Additional meetings were held with each of the local jurisdictions after the release of the Draft Revised EIR. The purpose of these meetings was to review each location within the respective jurisdictions, present and discuss the preliminary options identified in the document, report the associated delay reduction with each option, gain feedback, receive additional ideas to explore, and determine what next steps would be taken to implement the proposals. Summaries of each meeting are below.

January 26, 2017 - City of Carpinteria (three mitigation intersection locations)

Location #8 - Southbound On-/Off-ramps and Bailard – Proposed All-Way Stop control**:**

The City of Carpinteria was in general agreement with the proposed solution. Because the mitigation improvements total less than $5,000, Caltrans proposes to pay for the cost in full and anticipates including this work into the adjacent HOV construction phase. Caltrans will continue to work with the City of Carpinteria during the design phase.

Location #19 - Southbound On-/Off-ramps and Carpinteria Avenue – Proposed All-Way Stop control**:**

The City of Carpinteria was in general agreement with proposed mitigation approach. The City asked Caltrans to confirm that the eastbound queues on Carpinteria Avenue would not affect operations of the nearby signalized intersection at Santa Ynez Avenue. The City also requested that options for channelization techniques such as medians and aesthetic treatments be explored and incorporated into the design concepts where appropriate to help ensure the intersection serves the needs of the community.

Subsequent traffic analysis has shown that the queue length from this intersection does not interfere with operations at Santa Ynez Avenue. The other features desired by the City will continue to be explored as the design of this intersection is refined. The next step for this location will be further design refinement meetings with the City of Carpinteria during the design development phase of the HOV project.

Location #21 Northbound On-/Off-ramps and Via Real/Santa Monica – Signal or Roundabout**:**

The City of Carpinteria expressed interest in both options put forth in the Draft Revised EIR. The City has planned for improvements to address operational deficiencies at this intersection (Identified as Project #TC-03 in the Capital Improvement Project) since 2007. This intersection is included in the City’s latest Public Works Capital Improvement Program approved by the council on September 12, 2016 and there appears to be local support for the proposal. This project is listed in the 2013 RTP.

The Carpinteria City Council recently approved a contract with MNS Engineers to perform a feasibility study to investigate options for the intersection, including signalization, a roundabout and a No-Build option. Traffic analysis for lane configurations, associated operations, and right-of-way requirements were recognized as items needing clarification for the next step of development. The feasibility study and associated Intersection Control Evaluation (ICE) analysis prepared by MNS will provide Caltrans and the City with a more detailed analysis, which will be used to continue development of this project.

December 7, 2016 County of Santa Barbara (one mitigation intersection location)

Location #37 Southbound Off-ramp and San Ysidro/Eucalyptus Lane – All-way stop control at Southbound ramp/Eucalyptus Lane and roundabout at N. Jameson/San Ysidro/Northbound ramps**:**

The County has initiated a project at this location, and an ICE (Intersection Control Evaluation) study was prepared by Kittelson and Associates in 2017. The configuration listed above is the likely preferred alternative. The project is listed in the 2013 RTP as an illustrative project as a total intersection reconstruction and again in the Draft 2018 RTP as a planned project with a revised cost reflective of the roundabout and stop sign alternative. The County of Santa Barbara board of supervisors approved an MOU with SBCAG on June 6, 2017 which identified funds for further development of engineering alternatives. Subsequently, a request for proposals has been advertised for selection of a consultant to advance the design. Interviews with prospective consultants have also been completed.

Caltrans will continue to work with the County to develop the project. The project is anticipated to follow a Preliminary Engineering Evaluation Report (PEER) process for delivery, similar to the encroachment permit process, developed for projects like this with a higher construction cost than typically allowed under an encroachment permit process.

March 17, 2017 City of Santa Barbara (four mitigation intersection locations) installed

#39 Olive Mill Road/Coast Village Road – Roundabout**:**

The City of Santa Barbara has initiated a project at this location and has an ICE study prepared by Kittelson and Associates. The configuration listed above appears to be the preferred alternative. The project is listed in the 2013 RTP as a planned project and again in the Draft 2018 RTP as a planned project. The Santa Barbara City Council approved an MOU with SBCAG on March 21, 2017 which identified funds for further development of engineering alternatives. Subsequently, a request for proposals was advertised for selection of a consultant to advance the design. Interviews with prospective consultants have also been completed. Caltrans will continue to work with the city to develop the project. The project is anticipated to follow a PEER process for delivery, similar to the encroachment permit process, developed for projects like this with a higher construction cost than typically allowed under an encroachment permit process. This project was not discussed at the March 17th meeting with City staff as it had not yet been identified as a mitigation location.

#107 Cabrillo Boulevard/Los Patos – Signal or roundabout:

The City has initiated a project at this location with an ICE study being by Kittelson and Associates (under contract with TYLIN) as a result of an MOU with SBCAG approved in April 2016. The project is listed in the most recent version of the City's capital improvements plan, as well as the 2013 RTP and Draft 2018 RTP. While both configurations appear to mitigate the additional traffic delays created by the project, the roundabout appears to be the alternative preferred by the City. Caltrans will continue to work with the City to develop this project and support the chosen alternative.

#48 Southbound Off-ramp and Milpas Avenue – Dual right-turn lanes**:**

Caltrans presented the option of dual right turns for this location. The City expressed concern with the length of the crosswalk needed to cross both lanes. The City offered a few additional ideas, including signalizing this "T" intersection coordinated with the adjacent signal and Milpas/Cacique, and a pedestrian refuge island located between the two right-turn lanes to decrease the crossing distance. Caltrans has evaluated these ideas as well as a few other options, including a half-roundabout similar to a portion of the northbound off-ramp at Milpas, and flashing beacons activated by pedestrians at the crossing. The signal option creates a queueing that backs up to the Milpas Roundabout, and the half-roundabout creates a queue on the ramp that exceeds the storage capacity. Caltrans Traffic Safety also assessed the dual-right mitigation proposal with respect to pedestrian safety considerations expressed during the public comment period. This resulted in a finding by Caltrans Traffic Safety that pedestrian access can safely be maintained under a dual-right configuration at this intersection. This is a common configuration for off-ramp locations which exists throughout the state. Installing a pedestrian refuge or flashing beacons are additional ideas that could fit into the existing right-of-way and provide the needed mitigation delay reduction but will need to be evaluated further and developed in cooperation with the City as the project design progresses.

#79 Southbound On-ramp and State Street and SR 154 – Signal phasing and optimization:

Caltrans has performed the necessary analysis to confirm that the needed delay reduction is achievable by the methods described. Because the mitigation improvements total less than $5,000, Caltrans proposes to pay for the cost in full and anticipates performing this work as necessary when the improvements are required.

Public Circulation of Draft Revised Environmental Impact Report

The Draft Revised Environmental Impact Report for the South Coast 101 HOV Lanes project was circulated for public review and comment between December 1, 2016 and January 31, 2017.

A public hearing was held to further solicit public comment on the document. The public hearing occurred December 15, 2016 from 5:30 p.m. to 7:30 p.m. at the Chase Palm Park Center, 236 E. Cabrillo Boulevard in Santa Barbara, CA 93101. The meeting was announced in two newspapers: The Santa Barbara News-Press on December 1, 2016 and the Montecito Journal on December 8, 2016.

In January 2017, Caltrans staff attended two City initiated public hearings in addition to the one held at the Chase Palm Park Center where the Draft Revised EIR was discussed. The first hearing was conducted by the City of Santa Barbara Planning Commission on January 12, 2017. The second hearing was conducted by the City of Santa Barbara City Council on January 24, 2017. The item was placed on the agenda of both meetings to inform the governmental bodies before they made formal comment on the Draft Revised EIR.

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Chapter 5 List of Preparers

Hoffmann, Yvonne. Associate Environmental Planner. B.S, Natural Resources Planning, Humboldt State University; 17 years of experience preparing environmental documentation and 12 years of experience in city planning. Contribution: Preparation of Revised Environmental Impact Report

Leichtfuss, Lindsay. Associate Environmental Planner. B.S., Biological Sciences, California Polytechnic State University, San Luis Obispo; 8 years of environmental planning experience and 3 years of program management experience. Contribution: Preparation of Revised Environmental Impact Report

Toh, Sam. Transportation Engineer, P.E., T.E. M.S., Civil and Environmental Engineering, California Polytechnic State University, San Luis Obispo; 5 years of construction management and structural engineering experience and 18 years of traffic engineering experience. Contribution: Validation and analysis of traffic data

Wilkinson, Jason. Senior Environmental Planner. B.S., Natural Resource Management, California Polytechnic State University, San Luis Obispo; 10 years of environmental planning experience. Contribution: Oversaw preparation of Revised Environmental Impact Report

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Chapter 6 Distribution List

State Agencies
State Historic Preservation Officer
California Department of Fish and Wildlife
California Transportation Commission
Department of Boating and Waterways
California Coastal Commission
California Coastal Conservancy
California Energy Commission
Office of Historic Preservation
Department of Fish and Wildlife, Region 5, Habitat Conservation Program
Department of Fish and Wildlife, Environmental Services Division
Department of Housing and Community Development
California Highway Patrol
California Air Resources Board, Transportation Projects
Department of Toxic Substances Control
Central Coast Region (3) Water Quality Control Board
Governor's Office of Planning and Research
State Lands Commission
Governor's Office of Emergency Services
Public Utilities Commission

Local Agencies
Santa Barbara County Association of Governments
City of Carpinteria Planning Commission
Carpinteria City Council
City of Carpinteria Community Development Department
City of Santa Barbara Planning Commission
Santa Barbara City Council
City of Santa Barbara Community Development Department
City of Santa Barbara Transportation and Circulation Committee
City of Santa Barbara Metropolitan Transit District Board
Santa Barbara County Planning and Development Department
Montecito Planning Commission
Santa Barbara County Planning Commission
City of Goleta

Elected Officials
Salud Carbajal, U.S. House of Representatives
Hannah-Beth Jackson, State Senator
Jordan Cunningham, Assembly Member (35^{th} District)
Das Williams, Supervisor (District 1)
Janet Wolf, Supervisor (District 2)
Doreen Farr, Supervisor (District 3)

Local Libraries
Santa Barbara Public Library, Carpinteria Branch
Santa Barbara Public Library, Central Library
Santa Barbara Public Library, Eastside Branch
Santa Barbara Public Library, Montecito Branch

Stakeholder Organizations
Amtrak
Montecito Association
Carpinteria Valley Association
Santa Barbara Region Chamber of Commerce
Carpinteria Valley Chamber of Commerce
Santa Barbara Technology and Industry Association
Santa Barbara Downtown Organization
Coast Village Road Business Association
Santa Barbara County Taxpayers Association
Santa Barbara Bicycle Coalition
COAST (Coalition for Sustainable Transportation)
Cars Are Basic
CAUSE (Central Coast Alliance United for a Sustainable Economy)
Santa Barbara County Action Network
League of Women Voters
Community Environmental Council
Citizens Planning Association of Santa Barbara County
Environmental Defense Center
Santa Barbara Conference and Visitors Bureau
Chambers of Commerce Alliance of Ventura and Santa Barbara Counties
American Institute of Architects, Santa Barbara Chapter
American Legion Post 49
American Legion Post 62
American Society of Civil Engineers Santa Barbara/Ventura Branch
Summerland Citizens Association

List of Technical Studies

Traffic Studies:

South Coast 101 Final Existing Conditions Report (2008, Amended 2011)

South Coast 101 Final Forecast Operations Report (2008, Amended 2011)

South Coast 101 Final Travel Forecast Report (2008, Amended 2011)

South Coast 101 Methodology Report (2008)

Cabrillo Boulevard/Hot Springs Interchange Configuration Memos (2011)

Cabrillo Boulevard I/C Alternative LOS Analysis at Milpas and US 101 SB Ramp Technical Memo (April 20, 2012)

The following studies are included in Appendix E:

Addendum to July 19, 2011 Cabrillo/Hot Springs Interchange Configuration Analysis Technical Memo (March 14, 2014)

Updated ICU Analysis for Garden Street and Yanonali Street (June 27, 2016)

Linden Casitas Area Intersection Performance Updates/Clarification (August 23, 2016)

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Appendix A California Environmental Quality Act Checklist

This CEQA checklist was modified to include only the traffic impact to intersections and cumulative traffic impacts.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVI. TRANSPORTATION/TRAFFIC: Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☒	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☒	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☒	☐

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Appendix B Corridor-wide LOS Figures

The following figures show a graphic representation of LOS measurements at all 108 intersections within the traffic study area. The data used in preparing these figures was taken from Tables 2.1 and 2.2 in Section 2.1.1.

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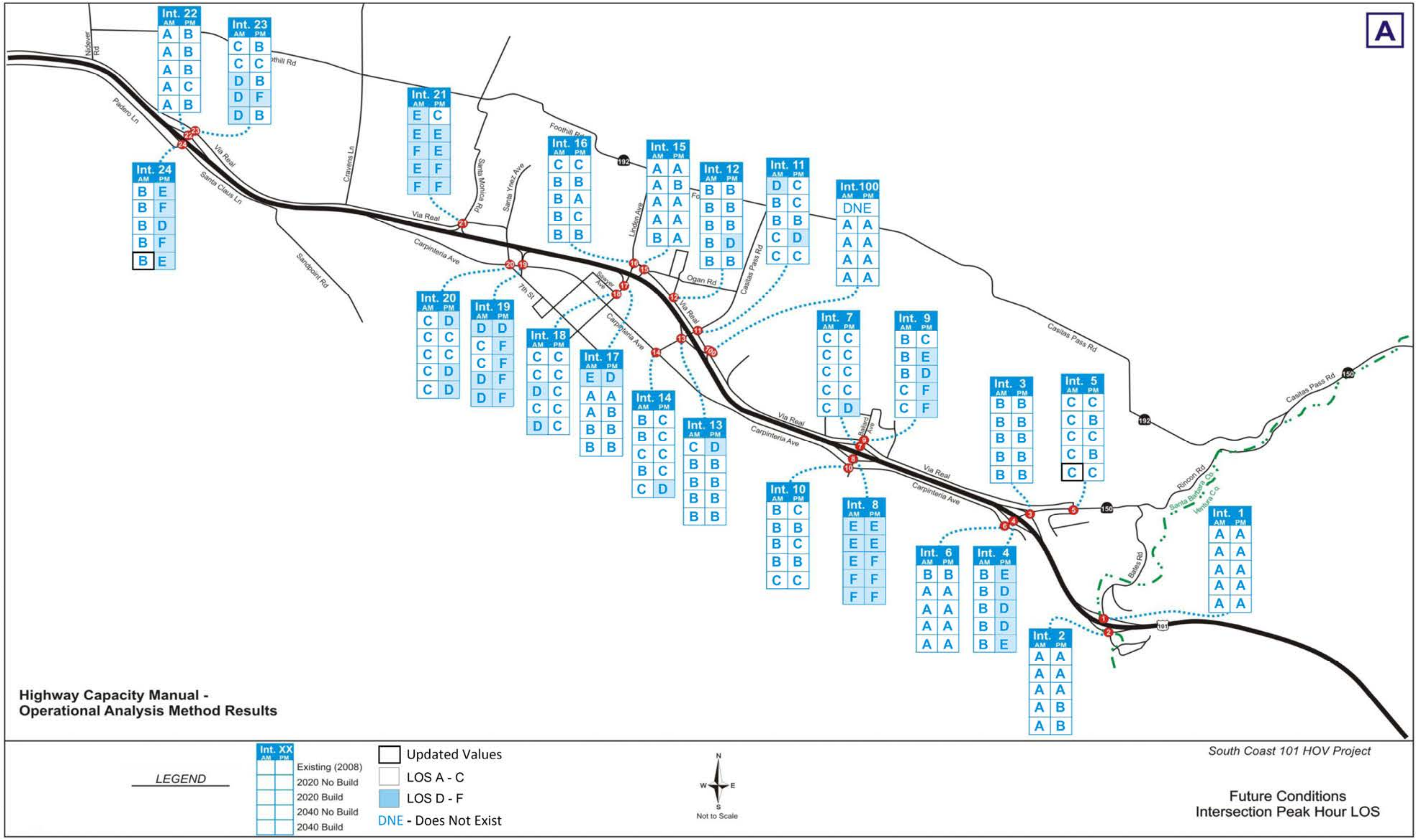

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A B
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A B
A C
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Int. 23 AM PM
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C C
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D F
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Int. 21 AM PM
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E E
F E
E F
F F
Int. 16 AM PM
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B A
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Int. 15 AM PM
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A A
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Padaro Ln
Via Real
Santa Claus Ln
Sandpoint Rd
Cravens Ln
Santa Monica Rd
Santa Ynez Ave
Carpinteria Ave
7th St
Foothill Rd
Linden Ave
Ogan Rd
Casitas Pass Rd
Bailard Ave
Rincon Rd
Bates Rd
Santa Barbara Co.
Ventura Co.
Highway Capacity Manual -
Operational Analysis Method Results
LEGEND
Int. XX AM PM
Existing (2008)
2020 No Build
2020 Build
2040 No Build
2040 Build
Updated Values
LOS A - C
LOS D - F
DNE - Does Not Exist
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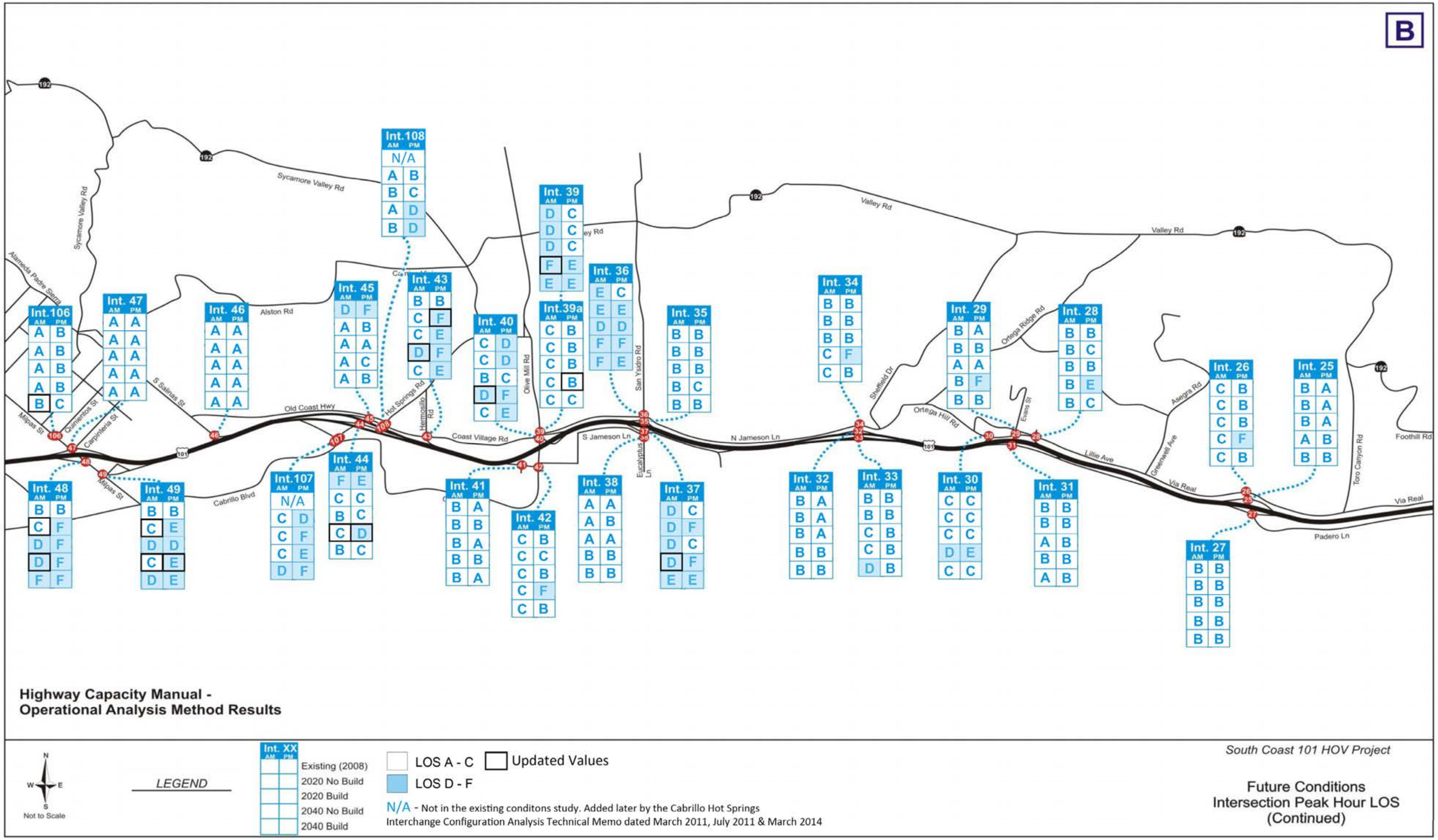
South Coast 101 HOV Project
Future Conditions
Intersection Peak Hour LOS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Alston Rd
Old Coast Hwy
Coast Village Rd
Hot Springs Rd
Hermosillo Rd
Olive Mill Rd
San Ysidro Rd
S Jameson Ln
N Jameson Ln
Eucalyptus Ln
Sheffield Dr
Ortega Hill Rd
Ortega Ridge Rd
Evans St
Lillie Ave
Greenwell Ave
Asegra Rd
Via Real
Padero Ln
Toro Canyon Rd
Foothill Rd
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Quinientos St
Carpinteria St
Milpas St
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Highway Capacity Manual -
Operational Analysis Method Results
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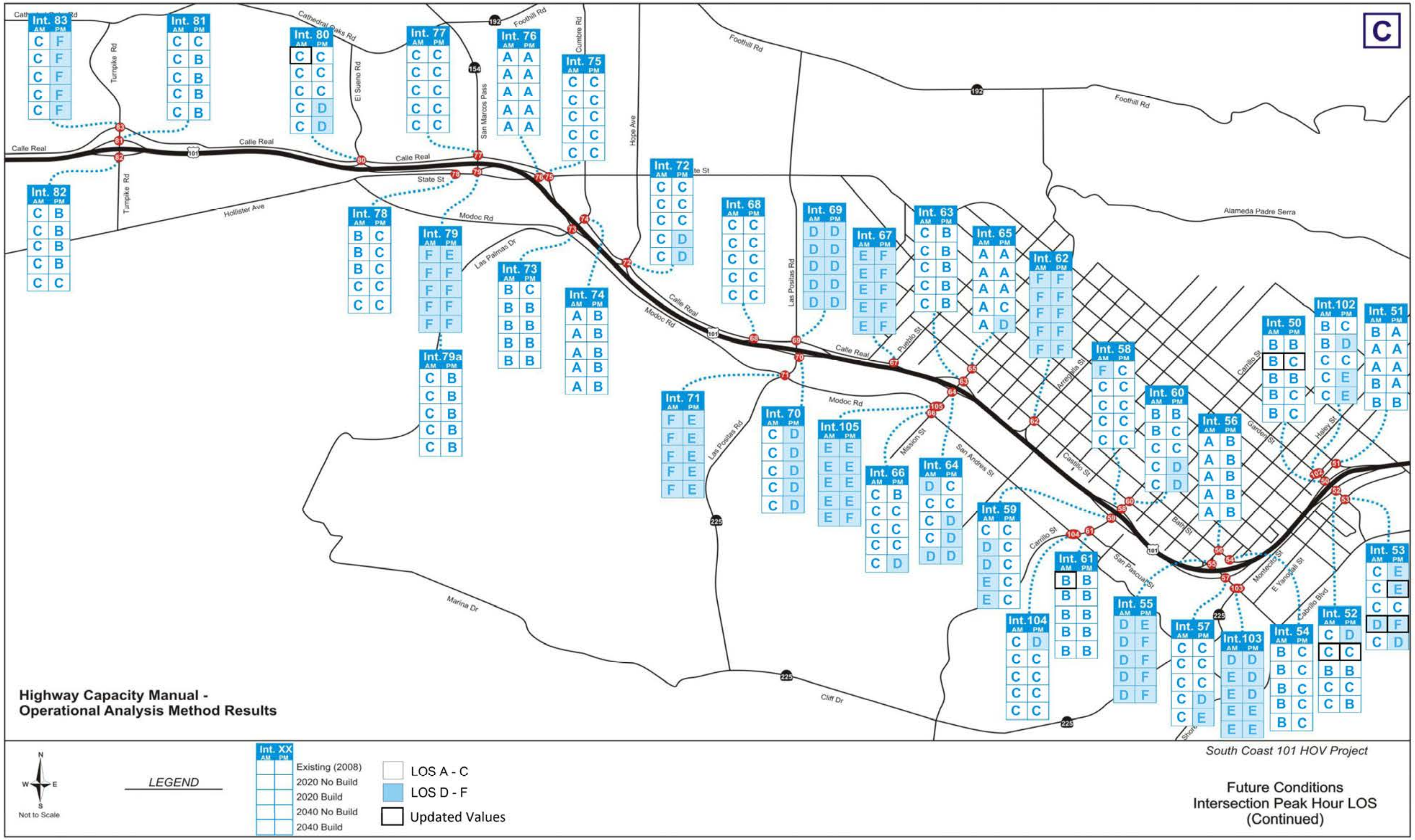
LOS A - C
Updated Values
LOS D - F
N/A - Not in the existing conditons study. Added later by the Cabrillo Hot Springs
Interchange Configuration Analysis Technical Memo dated March 2011, July 2011 & March 2014
South Coast 101 HOV Project
Future Conditions
Intersection Peak Hour LOS
(Continued)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Mission St
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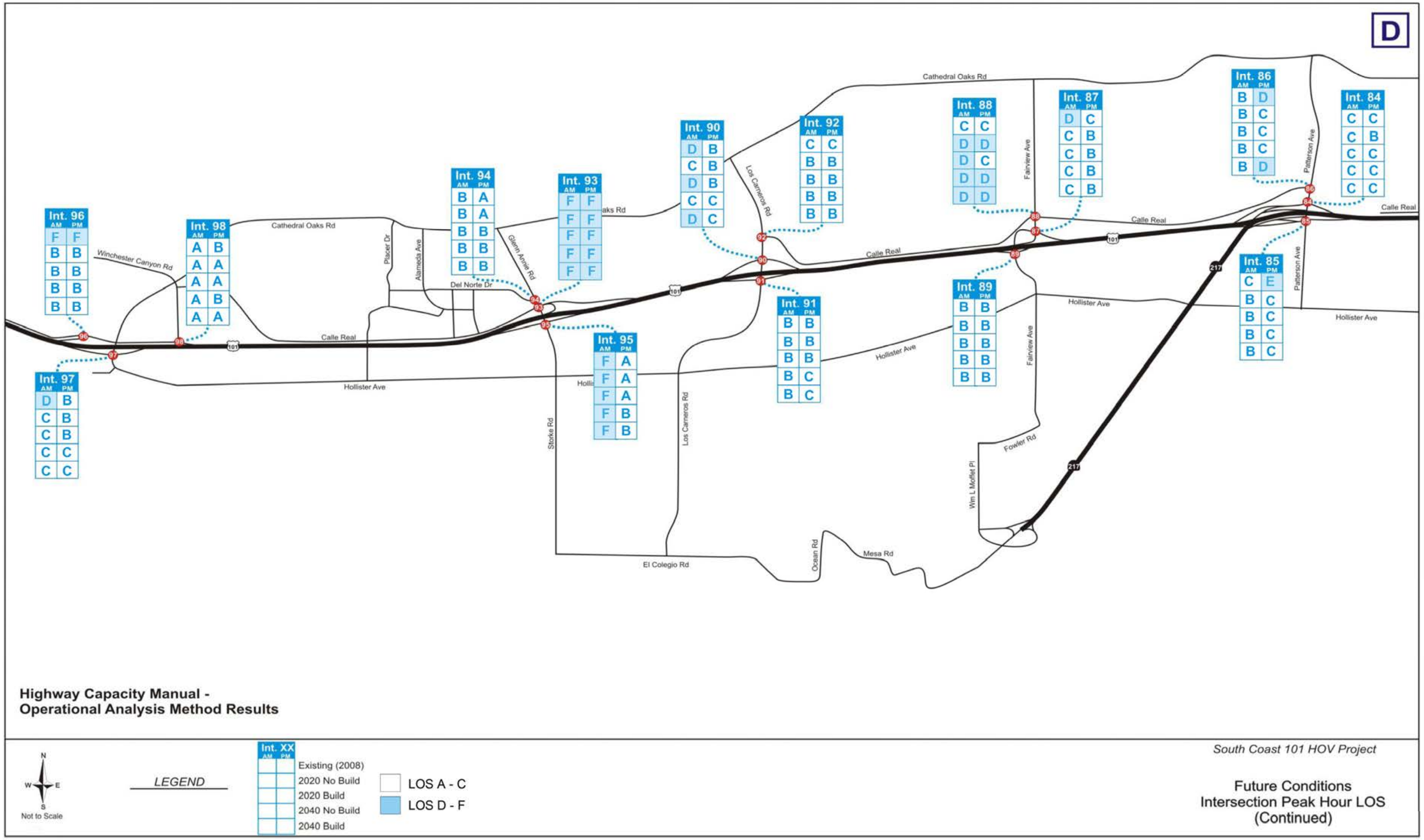
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Del Norte Dr
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Storke Rd
Los Carneros Rd
El Colegio Rd
Ocean Rd
Mesa Rd
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Fowler Rd
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Highway Capacity Manual -
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2040 Build
LOS A - C
LOS D - F
South Coast 101 HOV Project
Future Conditions
Intersection Peak Hour LOS
(Continued)

Appendix C Title VI Policy Statement

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE DIRECTOR
P.O. BOX 942873, MS-49
SACRAMENTO, CA 94273-0001
PHONE (916) 654-5266
FAX (916) 654-6608
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

March 2013

NON-DISCRIMINATION
POLICY STATEMENT

The California Department of Transportation, under Title VI of the Civil Rights Act of 1964 and related statutes, ensures that no person in the State of California shall, on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity it administers.

For information or guidance on how to file a complaint based on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, please visit the following web page: http://www.dot.ca.gov/hq/bep/title_vi/t6_violated.htm.

Additionally, if you need this information in an alternate format, such as in Braille or in a language other than English, please contact the California Department of Transportation, Office of Business and Economic Opportunity, 1823 14th Street, MS-79, Sacramento, CA 95811. Telephone: (916) 324-0449, TTY: 711, or via Fax: (916) 324-1949.

MALCOLM DOUGHERTY
Director

"Caltrans improves mobility across California"

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Appendix D Local and CMP Thresholds Analysis Results

Local agencies in this corridor use the Intersection Capacity Utilization (ICU) method as their preferred tool for signalized intersection analysis. The ICU methodology compares the level of traffic, or volume, during peak hours at an intersection to the amount of traffic that the intersection is able to carry, which is its capacity. It is a planning-level model and is best suited for transportation planning uses such as preparation of Traffic Impact Studies for proposed developments. The ICU method can be used to analyze proposed development to predict how often an intersection will experience congestion.

During preparation of the Forecast Operations Report, Caltrans agreed to incorporate local thresholds into the analysis of the intersections located within the traffic study area. This was done as a courtesy for informational purposes only.

Local ICU thresholds were applied to signalized intersections under local jurisdiction, and the state HCM thresholds were applied to intersections under state jurisdiction as well as locally controlled unsignalized intersections. For locally operated intersections designated as part of the Santa Barbara County Congestion Management Plan (CMP), thresholds from the CMP were applied to identify a change in intersection delay using ICU methodology. For the purposes of the Forecast Operations Report, Caltrans used CMP criteria to identify impacts at state-controlled intersections. That criteria and related findings were provided in the Draft Revised EIR. The information remains in the Final Revised EIR with updates where corrections were made. The data is included for informational purposes only.

The Draft Revised EIR indicated that vehicle delay for determining which intersections classified as Congestion Management Program (CMP) intersections was calculated using HCM. After further research, it was determined that the CMP intersection evaluations were conducted using ICU. However, as previously stated in Chapter 2 (see pages 37 and 38) ICU and CMP thresholds weren't used as the basis for calculating delay impacts. In addition, it's been pointed out that the City of Santa Barbara's CMP thresholds were recently updated. However, this update does not warrant reanalyzing these intersections because Caltrans never adopted CMP thresholds as an evaluation method.

The statement contained in the Draft Revised EIR is still valid. The methodology established by local jurisdiction has been superseded by more specific assessments provided in this document that are being used to develop context and intensity findings.

Results of the local evaluation analysis are shown in the following tables. In addition, pages 149-151 of the Forecast Operations Report that show the detailed criteria for all thresholds are provided after the table information.

2020 ICU Outputs for Locally Controlled Signalized Intersections

Int. #	Intersections	2020 AM								2020 PM								Jurisdiction
		Total Entering Traffic Volume			No Build		Build		Delta	Total Entering Traffic Volume			No Build		Build		Delta	
		No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	
11	Via Real & Casitas Pass Rd	1340	1867	527	0.49	A	0.63	B	-0.13	1639	1860	221	0.58	A	0.54	A	0.04	City of Carpinteria
14	Carpinteria Ave & Casitas Pass Rd	1459	1586	127	0.63	B	0.68	B	-0.05	1844	1980	136	0.73	C	0.77	C	-0.05	City of Carpinteria
16	Linden Ave & Ogan Rd	1271	1568	297	0.55	A	0.67	B	-0.12	1389	1156	-233	0.63	B	0.48	A	0.14	City of Carpinteria
20	Santa Ynez Ave/7th St & Carpinteria Ave	880	870	-10	0.48	A	0.47	A	0.01	1439	1384	-55	0.67	B	0.66	B	0.01	City of Carpinteria
106	Quinientos St & Milpas St	2640	2577	-63	0.58	A	0.59	A	-0.01	2744	2769	25	0.77	C	0.79	C	-0.02	City of Santa Barbara
102	Guteirrez St & Garden St	2672	2697	25	0.69	B	0.69	B	0.00	2977	2981	4	0.75	C	0.76	C	0.00	City of Santa Barbara
53	Garden St & E. Yanonali St	1286	1451	165	0.48	A	0.52	A	-0.04	1642	1838	196	0.59	A	0.68	B	-0.09	City of Santa Barbara
56	W. Haley St & Bath St	1026	1024	-2	0.52	A	0.52	A	0.00	1503	1500	-3	0.77	C	0.77	C	0.00	City of Santa Barbara
103	Montecito St & Castillo St	2471	2464	-7	0.80	D	0.80	D	0.00	2990	2990	0	0.89	D	0.89	D	0.01	City of Santa Barbara
60	Carrillo St & Castillo St	2758	2792	34	0.74	C	0.74	C	-0.01	3684	3679	-5	0.76	C	0.76	C	0.00	City of Santa Barbara
104	San Andres & Carrillo St	2330	2324	-6	0.67	B	0.67	B	0.00	2632	2622	-10	0.75	C	0.75	C	0.00	City of Santa Barbara
65	Mission St & Castillo St	2312	2308	-4	0.58	A	0.58	A	0.00	2512	2555	43	0.66	B	0.68	B	-0.02	City of Santa Barbara
69	Calle Real & Las Positas Rd	3027	3056	29	0.68	B	0.68	B	0.00	3243	3231	-12	0.73	C	0.74	C	-0.01	City of Santa Barbara
71	Las Positas Rd & Modoc Rd	2623	2610	-13	0.87	D	0.87	D	0.01	2626	2627	1	0.71	C	0.71	C	0.00	City of Santa Barbara
74	La Cumbre Rd & Calle Real	1726	1724	-2	0.40	A	0.40	A	0.00	2098	2096	-2	0.48	A	0.48	A	0.00	City of Santa Barbara
77	Calle Real & SR 154 & San Marcos Pass Rd	2577	2590	13	0.60	B	0.61	B	0.00	2194	2207	13	0.53	A	0.54	A	0.00	City of Santa Barbara
79a	State St & San Marcos Pass Rd	1876	1884	8	0.62	B	0.62	B	0.00	2008	2014	6	0.59	A	0.52	A	0.07	City of Santa Barbara
83	Turnpike Rd & Calle Real	1675	1704	29	0.50	A	0.51	A	-0.01	1945	2017	72	0.59	A	0.60	A	-0.01	County of Santa Barbara
86	Patterson Ave & Calle Real	1882	1909	27	0.55	A	0.55	A	-0.01	2592	2665	73	0.65	B	0.66	B	-0.01	City of Goleta
88	Calle Real & Fairview Ave	2155	2163	8	0.66	B	0.67	B	0.00	2807	2823	16	0.69	B	0.69	B	0.00	City of Goleta
92	Los Carneros Rd & Calle Real	873	872	-1	0.43	A	0.43	A	0.00	1292	1310	18	0.59	A	0.60	B	-0.01	City of Goleta

Notes:
v/c ICU Methodology, only for signal intersections
LOS ICU Methodology

2040 ICU Outputs for Locally Controlled Signalized Intersections																		
Int. #	Intersections	2040 AM								2040 PM								Jurisdiction
		Total Entering Traffic Volume			No Build		Build		Delta	Total Entering Traffic Volume			No Build		Build		Delta	
		No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	
11	Via Real & Casitas Pass Rd	1617	2160	543	0.60	A	0.710	C	-0.11	2495	2462	-33	0.90	E	0.76	C	0.15	City of Carpinteria
14	Carpinteria Ave & Casitas Pass Rd	1484	1742	258	0.63	B	0.740	C	-0.11	2088	2224	136	0.80	C	0.87	D	-0.07	City of Carpinteria
16	Linden Ave & Ogan Rd	1512	1769	257	0.62	B	0.716	C	-0.10	1892	1624	-268	0.87	D	0.73	C	0.14	City of Carpinteria
20	Santa Ynez Ave/7th St & Carpinteria Ave	1107	1084	-23	0.51	A	0.503	A	0.01	1954	1808	-146	0.74	C	0.72	C	0.02	City of Carpinteria
106	Quinientos St & Milpas St	2640	2655	15	0.60	B	0.620	B	-0.02	3118	3181	63	0.87	D	0.91	E	-0.04	City of Santa Barbara
102	Guteirrez St & Garden St	2792	2794	2	0.71	C	0.715	C	0.00	3315	3323	8	0.83	D	0.83	D	0.00	City of Santa Barbara
53	Garden St & E. Yanonali St	1446	1590	144	0.52	A	0.574	A	-0.06	1926	2109	183	0.66	B	0.81	D	-0.15	City of Santa Barbara
56	W. Haley St & Bath St	1097	1094	-3	0.55	A	0.535	A	0.01	1591	1586	-5	0.83	D	0.82	D	0.00	City of Santa Barbara
103	Montecito St & Castillo St	2691	2674	-17	0.86	D	0.850	D	0.01	3323	3326	3	0.96	E	0.95	E	0.01	City of Santa Barbara
60	Carrillo St & Castillo St	2995	3082	87	0.76	C	0.779	C	-0.02	4141	4130	-11	0.85	D	0.84	D	0.01	City of Santa Barbara
104	San Andres & Carrillo St	2362	2346	-16	0.68	B	0.680	B	0.00	2762	2744	-18	0.76	C	0.76	C	0.00	City of Santa Barbara
65	Mission St & Castillo St	2529	2515	-14	0.61	B	0.602	B	0.01	2887	3001	114	0.79	C	0.85	D	-0.06	City of Santa Barbara
69	Calle Real & Las Positas Rd	3439	3516	77	0.71	C	0.735	C	-0.03	3842	3811	-31	0.76	C	0.77	C	-0.01	City of Santa Barbara
71	Las Positas Rd & Modoc Rd	2722	2687	-35	0.89	D	0.865	D	0.03	2769	2712	-57	0.74	C	0.74	C	0.00	City of Santa Barbara
74	La Cumbre Rd & Calle Real	2091	2086	-5	0.42	A	0.418	A	0.00	2573	2567	-6	0.49	A	0.48	A	0.01	City of Santa Barbara
77	Calle Real & SR 154 & San Marcos Pass Rd	3021	3051	30	0.64	B	0.652	B	-0.01	2996	3028	32	0.60	A	0.61	B	-0.01	City of Santa Barbara
79a	State St & San Marcos Pass Rd	2048	2058	10	0.64	B	0.638	B	0.00	2183	2197	14	0.54	A	0.54	A	0.00	City of Santa Barbara
83	Turnpike Rd & Calle Real	1940	2017	77	0.51	A	0.528	A	-0.02	2393	2484	91	0.65	B	0.67	B	-0.02	County of Santa Barbara
86	Patterson Ave & Calle Real	2274	2347	73	0.56	A	0.572	A	-0.01	3111	3323	212	0.67	C	0.70	C	-0.03	City of Goleta
88	Calle Real & Fairview Ave	2408	2427	19	0.67	B	0.678	B	-0.01	3064	3109	45	0.72	C	0.72	C	-0.01	City of Goleta
92	Los Carneros Rd & Calle Real	1034	1028	-6	0.47	B	0.467	A	0.00	1481	1588	107	0.62	B	0.65	B	-0.03	City of Goleta

Notes
v/c ICU Methodology, only for signal intersections
LOS ICU Methodology

2020 State, Local, and CMP Designated Intersection Thresholds using HCM and Added Trip Outputs (signalized and unsignalized)

	HCM	2020 AM							2020 PM											
		Total Entering Traffic Volume			No Build		Build		Total Entering Traffic Volume			No Build		Build		Signal Warrant Met?		Jurisdiction	Project Impact Threshold Criteria	Project Impact Statement
Int. #	Intersections	No Build	Build	Delta	Delay	LOS	Delay	LOS	No Build	Build	Delta	Delay	LOS	Delay	LOS	No Build	Build			
8	SB On/Off at Bailard Ave *	883	892	9	44.0	E	46.3	E	918	968	50	45.2	E	71.8	F	Yes	Yes	State	State/CMP	Added 10 or more trips when facility operates at LOS F (PM)
18	Linden Ave & Sawyer Ave *	955	1206	251	17.2	C	26.8	D	976	1058	82	16.6	C	18.8	C	No	No	City of Carpinteria	City of Carpinteria	Project results in LOS D or worse from LOS C (HCM) or better (AM)
21	NB On/Off & Via Real *	1226	1348	122	43.7	E	78.4	F	1347	1314	-33	46.2	E	39.6	E	No	No	State	State/CMP	Added 10 trips or more when facility operates at LOS F (AM)
23	Via Real & S. Padaro Ln *	884	884	0	24.9	C	26.0	D	927	780	-147	17.7	C	13.5	B	No	No	County of SB	County of SB	Project results in LOS D or worse from LOS C (HCM) or better (AM)
48	SB Off & Milpas St * ~	2251	2317	66	27.7	D	31.7	D	2816	2883	67	136.0	F	159.4	F	N/A	N/A	State	State/CMP	Added 20 trips or more when facility operates at LOS D or worse (AM). Added 10 trips or more when facility operates at LOS F (PM)
55	NB On & Castillo St ~	1632	1629	-3	41.1	D	41.9	D	2280	2294	14	103.3	F	104.0	F	N/A	N/A	State	State/CMP	Added 10 trips or more when facility operates at LOS F (PM)
64	SB On/Off & Mission St ~	2593	2600	7	32.0	C	32.5	C	2492	2525	33	33.9	C	36.0	D	N/A	N/A	State	State	Added trips results in LOS D or worse from LOS C or better (PM).
105	Modoc Rd & Mission St *	1514	1521	7	44.3	E	45.3	E	1686	1695	9	46.4	E	48.1	E	Yes	Yes	City of Santa Barbara	City of Santa Barbara	Triggered signal warrant (AM/PM)
79	SB On & State St & SR 154 ~	1984	1994	10	72.2	F	75.5	F	1703	1722	19	53.3	F	58.7	F	N/A	N/A	State	State/CMP	Added 10 or more trips when facility operates at LOS F (AM/PM)
83	Turnpike Rd & Calle Real	1675	1704	29	23.5	C	23.5	C	1945	2017	72	211.0	F	213.5	F	N/A	N/A	County of Santa Barbara	County of Santa Barbara	Added 5 or more trips when facility operates at LOS F (PM)
90	NB On/Off & Los Carneros Rd ~	1652	1692	40	32.3	C	35.0	D	1934	2007	73	18.6	B	19.3	B	N/A	N/A	State	State	Project added traffic results in LOS D or worse from LOS C or better (AM)

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection

2040 State, Local, and CMP Designated Intersection Thresholds using HCM and Added Trip Outputs
(signalized and unsignalized)

Int. #	HCM	2040 AM							2040 PM											
		Total Entering Traffic Volume			No Build		Build		Total Entering Traffic Volume			No Build		Build		Signal Warrant Met?		Jurisdiction	Project Impact Threshold Criteria	Project Impact Statement
	Intersections	No Build	Build	Delta	Delay	LOS	Delay	LOS	No Build	Build	Delta	Delay	LOS	Delay	LOS	No Build	Build			
4	SB On/Off & SR 150 *	378	393	15	12.1	B	12.3	B	642	672	30	30.0	D	36.3	E	No	No	State	State/CMP	Addition of 20 or more trips when LOS D in No-Build (PM)
7	NB On/Off & Bailard *	1117	1185	68	20.8	C	22.7	C	1215	1309	94	21.0	C	27.0	D	No	No	State	State	Added trips results in LOS D or worse from LOS C or better (PM)
8	SB On/Off & Bailard *	1093	1116	23	165.8	F	181.1	F	986	1119	133	80.1	F	233.4	F	Yes	Yes	State	State/CMP	Added 10 or more trips when facility operates at LOS F (AM/PM)
9	Via Real & Bailard *	1273	1338	65	17.6	C	19.0	C	1554	1583	29	91.1	F	83.4	F	Yes	Yes	City of Carpinteria	City of Carpinteria	Added 5 or more trips when facility operates at LOS F (PM)
14	Carpinteria Ave & Casitas Pass Rd ~	1484	1742	258	18.9	B	26.3	C	2088	2224	136	29.9	C	37.4	D	N/A	N/A	City of Carpinteria	City of Carpinteria	Added trips results in LOS D or worse from LOS C or better (PM)
18	Linden Ave & Sawyer Ave (*)	1066	1277	211	18.8	C	26.9	D	1097	1133	36	19.1	C	19.5	C	No	No	City of Carpinteria	City of Carpinteria	Added 20 or more trips when facility results in LOS D or worse from LOS C or better (AM)
19	SB On/Off & Carpinteria Ave *	882	863	-19	28.1	D	27.4	D	1470	1480	10	537.1	F	999.0	F	No	Yes	State	State/CMP	Added 10 trips or more when facility operates at LOS F (PM)
21	NB On/Off & Via Real *	1289	1610	321	49.4	E	165.7	F	1737	1646	-91	155.0	F	117.3	F	No	Yes	State	State/CMP	Added 10 trips or more when facility operates at LOS F (AM)
33	SB On/Off & Sheffield *	483	579	96	19.9	C	29.3	D	269	319	50	12.3	B	13.7	B	No	No	State	State	Added trips results in LOS D or worse from LOS C or better (AM)
37	SB Off & San Ysidro Rd/Eucalyptus Ln *	777	789	12	17.6	C	38.7	E	1292	796	-496	585.3	F	37.9	E	No	No	State	State	Added trips results in LOS E or worse from LOS C or better (AM)
107	Cabrillo Blvd/Los Patos *	987	1032	45	24.8	C	26.2	D	1146	1325	179	46.0	E	112.4	F	No	Yes	City of Santa Barbara	City of Santa Barbara	Triggered Peak hour Signal Warrant (PM)
48	SB Off & Milpas St *~	2399	2500	101	38.9	E	51.2	F	3016	3089	73	246.0	F	286.0	F	N/A	N/A	State	CMP	Added 10 trips or more when facility operates at LOS F from LOS E or worse (AM). Added 10 trips or more when facility operates at LOS F (PM)
55	NB On & Castillo St ~	1814	1806	-8	46.1	D	48.1	D	2571	2605	34	129.4	F	131.4	F	N/A	N/A	State	State/CMP	Added 10 trips or more when facility operates at LOS F (PM)
57	SB On/Off & Castillo St ~	2186	2185	-1	22.3	C	23.1	C	2788	2813	25	52.6	D	55.7	E	N/A	N/A	State	State/CMP	Added 20 or more trips when facility results in LOS E or worse from LOS D or worse (PM)
59	SB On/Off & Carrillo St ~	3314	3326	12	56.8	E	62.7	E	3902	3925	23	30.0	C	31.9	C	N/A	N/A	State	State/CMP	Added 10 trips or more when facility operates at LOS E (AM)
62	NB On/Off & Castillo St *	869	890	21	55.6	F	58.5	F	1087	1099	12	168.2	F	167.5	F	No	Yes	State	State/CMP	Added 10 trips or more when facility operates at LOS F (AM/PM)
64	SB On/Off & Mission St ~	2817	2838	21	34.5	C	35.9	D	2793	2883	90	53.1	D	65.0	D	N/A	N/A	State	State/CMP	Added trips results in LOS D or worse from LOS C or better (AM). Added 20 or more trips when facilities operates at LOS D (PM)
65	Mission St & Castillo St	2529	2515	-14	5.9	A	6.1	A	2887	3001	114	32.3	C	48.2	D	N/A	N/A	City of Santa Barbara	City of Santa Barbara	Project added traffic results in LOS D or worse from LOS C or better (PM)
66	Mission St & San Andreas St *	1384	1374	-10	15.8	C	15.8	C	1565	1610	45	19.8	C	25.6	D	Yes	Yes	City of Santa Barbara	City of Santa Barbara	Triggered signal warrant (AM/PM)
105	Modoc Rd & Mission St *	1532	1549	17	45.8	E	48.8	E	1723	1746	23	49.1	E	53.7	F	Yes	Yes	City of Santa Barbara	City of Santa Barbara	Triggered signal warrant (AM/PM)
72	NB On/Off & Calle Real ~	1719	1811	92	25.9	C	26.5	C	2222	2318	96	35.1	D	36.1	D	N/A	N/A	State	State/CMP	Added 20 or more trips when facility operates at LOS D or worse (PM)
79	SB On & State St & SR 154 ~	2054	2081	27	101.1	F	112.4	F	1818	1867	49	96.9	F	119.4	F	N/A	N/A	State	State/CMP	Added 10 or more trips when facility operates at LOS F (AM/PM)
83	Turnpike Rd & Calle Real	1940	2017	77	23.2	C	23.3	C	2393	2484	91	238.5	F	245.1	F	N/A	N/A	County of Santa Barbara	County of Santa Barbara	Added 5 or more trips when facility operates at LOS F (PM)
86	Patterson Ave & Calle Real	2274	2347	73	17.6	B	17.6	B	3111	3323	212	32.2	C	43.3	D	N/A	N/A	City of Goleta	City of Goleta	Project added traffic results in LOS D or worse from LOS C or better (PM)
88	Calle Real & Fairview Ave ~	2408	2427	19	36.8	D	37.5	D	3064	3109	45	37.7	D	37.4	D	N/A	N/A	City of Goleta	State/CMP	Added 20 trips or more when facility operates at LOS D (PM)
90	NB On/Off & Los Carneros Rd ~	1942	2045	103	32.9	C	40.0	D	2365	2561	196	26.4	C	29.1	C	N/A	N/A	State	State	Project added traffic results in LOS D or worse from LOS C or better (AM)

* = unsignalized Intersection
~ = Congestion Management Plan (CMP) designated intersection

2020 Local ICU Threshold Outputs for Locally Controlled Signalized Intersections																					
Int. #	Intersections	2020 AM								2020 PM								Signal Warrant Met?		Jurisdiction	Project Impact Threshold Criteria	Project Impact Statement
		Total Entering Traffic Volume			No Build		Build		Delta	Total Entering Traffic Volume			No Build		Build		Delta					
		No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build			
106	Quinientos St & Milpas St	2640	2577	-63	0.58	A	0.59	A	-0.01	2744	2769	25	0.77	C	0.79	C	-0.02	N/A	N/A	City of Santa Barbara	City of Santa Barbara	For Intersection operating over a v/c of 0.77, Project added traffic causes v/c to increase by 0.01 or more (PM)

Notes
v/c ICU Methodology, only for signalized intersections
LOS ICU Methodology

2040 Local ICU Threshold Outputs for Locally Controlled Signalized Intersections																					
Int. #	Intersections	2040 AM								2040 PM								Signal Warrant Met?		Jurisdiction	Project Impact Threshold Criteria	Project Impact Statement
		Total Entering Traffic Volume			No Build		Build		Delta	Total Entering Traffic Volume			No Build		Build		Delta					
		No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build	Delta	v/c	LOS	v/c	LOS	v/c	No Build	Build			
14	Carpinteria Ave & Casitas Pass Rd ~	1484	1742	258	0.63	B	0.74	C	-0.11	2088	2224	136	0.80	C	0.87	D	-0.07	N/A	N/A	City of Carpinteria	City of Carpinteria	Project added traffic resutls in ICU LOS D or worse from LOS C or better
106	Quinientos St & Milpas St	2640	2655	15	0.60	B	0.62	B	-0.02	3118	3181	63	0.87	D	0.91	E	-0.04	N/A	N/A	City of Santa Barbara	City of Santa Barbara	For intersection operating over v/c of 0.77, project added traffic increases v/c by 0.01 or more. (PM)
53	Garden St & E. Yanonali St	1446	1590	144	0.52	A	0.57	A	-0.06	1926	2109	183	0.66	B	0.81	D	-0.15	N/A	N/A	City of Santa Barbara	City of Santa Barbara	For intersection operating over v/c of 0.77, project added traffic increases v/c by 0.01 or more. (PM)
60	Carrillo St & Castillo St ~	2995	3082	87	0.76	C	0.78	C	-0.02	4141	4130	-11	0.85	D	0.84	D	0.01	N/A	N/A	City of Santa Barbara	City of Santa Barbara	For Intersection operating at or below v/c of 0.77, Project added traffic causes to exceed v/c of 0.77 (AM)
65	Mission St & Castillo St	2529	2515	-14	0.613	B	0.602	B	0.011	2887	3001	114	0.787	C	0.849	D	-0.062	N/A	N/A	City of Santa Barbara	City of Santa Barbara	For intersection operating over v/c of 0.77, project added traffic increases v/c by 0.01 or more. (PM)

Notes
v/c ICU Methodology, only for signalized intersections
LOS ICU Methodology
~ = CMP

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Pages 149-151 of the Forecast Operations Report

Project Impact Assessment

For purposes of assessing project impacts, the 2020 Opening Day analysis provides the basis for identifying project level impacts while the 2040 Design Year analysis provides the basis for identifying cumulative plus project impacts. Distinguishing between project specific and cumulative impacts under CEQA is necessary in order to establish the financial fair share responsibilities for mitigation improvement projects.

Project impacts were based on measured operations between the future No-Build condition and the future Build condition. If the future with-project condition worsens operations relative to the future no-project condition, a project impact was identified. As stated above, a 2020 impact is considered a project level impact while a 2040 impact is considered a cumulative plus project impact. Given that Highway 101 freeway operations were shown to improve within the study area as a result of the project (see FREQ Freeway Analysis; pp. 34-64), project specific impacts were primarily focused on the freeway interface with the local agency transportation systems i.e., ramp intersections and local study area intersections adjacent to ramps.

All applicable state and local agency traffic impact criteria are described below.

State Facilities

For state operated facilities, the Caltrans LOS standard of LOS C was the basis for identifying impacts associated with the project. For state facilities, any non-signalized or signalized intersections shown to operate at LOS C or better under the No Build analysis whose LOS drops to LOS D or worse under the Build analysis would be identified as an impact.

For facilities shown to operate at LOS D or worse under the No Build analysis that remain at LOS D or worse under the Build analysis - the following CMP criteria were used to define impacts:

LOS	Added Peak Trips
D	20
E	10
F	10

Local Facilities

For locally owned intersections, assessment of impacts was analyzed using the HCM method and the ICU method consistent with each respective local agency's policies. For state operated and locally operated facilities designated as part of the adopted Congestion Management Program for Santa Barbara County, the CMP LOS standards were also analyzed for information purposes.

These definitions for each local agency and SBCAG are provided below.

City of Carpinteria

- For signalized intersections operating at or below LOS C (ICU Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For non-signalized intersections operating at or below LOS C (HCM Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For intersections operating at LOS A, a decrease in v/c of .20 as computed by the ICU Method
- For intersections operating at LOS B, a decrease in v/c of .15 as computed by the ICU Method
- For intersections operating at LOS C, a decrease in v/c of .10 as computed by the ICU Method
- For intersections operating at LOS D, the addition of 15 or more peak hour trips
- For intersections operating at LOS E, the addition of 10 or more peak hour trips
- For intersections operating at LOS F, the addition of 5 or more peak hour trips

City of Santa Barbara

- For signalized intersections operating at or below a v/c of .77 (ICU Method), if the with-project condition causes the location to exceed the v/c of .77, it is considered an impact.
- For signalized intersections operating over a v/c of .77, if the with-project condition causes the v/c to increase by .01 (1%) or more, it is considered an impact.
- For signalized intersections operating at or below a v/c of .77, if the with-project cumulative condition causes the location to exceed the v/c of .77, it is considered an impact.
- For non-signalized intersections, if with-project condition triggers peak hour signal warrants.

County of Santa Barbara

- For signalized intersections operating at or below LOS C (ICU Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For non-signalized intersections operating at or below LOS C (HCM Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For intersections operating at LOS A, a decrease in v/c of .20 as computed by the ICU Method
- For intersections operating at LOS B, a decrease in v/c of .15 as computed by the ICU Method
- For intersections operating at LOS C, a decrease in v/c of .10 as computed by the ICU Method
- For intersections operating at LOS D, the addition of 15 or more peak hour trips
- For intersections operating at LOS E, the addition of 10 or more peak hour trips
- For intersections operating at LOS F, the addition of 5 or more peak hour trips
- Under cumulative conditions, criteria described below will be used to measure impacts.

v/c range	Increase in v/c
0.80 – 0.85	0.03
0.86 – 0.89	0.02
> 0.89	0.01

City of Goleta

- For signalized intersections operating at or below LOS C (ICU Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For non-signalized intersections operating at or below LOS C (HCM Method), if the with-project condition causes the location to exceed LOS C, it is considered an impact.
- For the intersection of Storke/Hollister, if the with-project condition causes this intersection to exceed LOS D (ICU Method), it is considered an impact.

CMP Designated Facilities (includes state owned facilities and some locally owned intersections)

- For intersections operating at LOS A/B, a decrease of two LOS grades from project added traffic.
- For any intersection operating at LOS C, project added traffic that results in LOS D or worse.
- For intersections with existing congestion, the following criteria define an impact:

LOS	Added Peak Trips
D	20
E	10
F	10

Identification of 2020 Project-Level Impact Locations

Based on the 2020 AM/PM HCM LOS results relative to state traffic impact criteria, a total of 11 study area intersections are projected to experience project level impacts (**Table 62**). Six of these intersections are stop-controlled. One of the six stop controlled intersections (Intersection #8 Southbound on/off ramp & Bailard) meets peak hour signal warrants under No Build conditions. Given that warrants are triggered without the project – a project specific impact finding is not justified at this location. This reduces the total number of impacted locations to 10 intersections.

Based on the 2020 AM/PM ICU LOS results relative to local/regional impact threshold criteria, a total five study area intersections are projected to experience project level impacts (**Table 63**). However, given that four of these intersections are state owned and operated, the HCM LOS results supersede local/regional criteria for determining traffic impacts. A single locally operated intersection within the City of Santa Barbara (Intersection #106 Milpas & Quinientos) indicates a project level impact based on the ICU Method.

Combining the HCM and ICU impact analysis results described above, **Table 64** lists all intersections identified with project level impacts. This final list of project level impact locations is based on the application of state and local impact criteria. A total of nine intersections are shown to have project level impacts as a result of the Highway 101 Widening Project (EA 05-0N7000).

Identification of 2040 Cumulative Project-Level Impact Locations

Under 2040 cumulative traffic conditions, 26 intersections are identified where project added traffic contributes to a cumulative impact (**Table 65**). Of these intersections, 14 are stop-controlled of which 9 are shown to meet peak hour signal warrants under the No Build condition. Given that warrants are triggered under cumulative conditions without the project – cumulative plus project impact findings are not justified at these locations. This reduces the total number of cumulative impact locations to 17 intersections.

Based on the AM/PM ICU LOS results relative to local/regional impact threshold criteria described earlier, 2040 cumulative impacts are summarized in **Table 66**. A total of 13 signalized intersections are identified where project added traffic violates local/regional impact criteria under 2040 cumulative conditions. All but three of these intersections are owned by the state – where state criteria would supersede local/regional criteria. The three locally owned/operated intersections shown to experience impacts include: 1) Carpinteria Avenue / Casitas Pass Road (Intersection #14 City of Carpinteria); 2) Cabrillo Blvd / Castillo Street (Intersection #60 City of Santa Barbara); and, 3) Mission Street / Castillo Street (Intersection #65 City of Santa Barbara). Although local agency significance criteria are met at these three intersections, regional CMP thresholds are not exceeded.

Combining the HCM and ICU cumulative plus project impact analysis results described above, **Table 67** lists all intersections identified with cumulative plus project impacts. This final list of cumulative plus project impact locations is based on the application of state and local impact criteria. A total of 15 intersections are shown to have cumulative plus project impacts resulting from the Highway 101 Widening Project (EA 05-0N7000).

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Appendix E Additional Technical Memos used for Traffic Intersection Analysis

The following traffic-related memos/analyses were prepared since release of the 2012 Draft EIR. Note that any Synchro/Sim Traffic information removed to maintain a manageable document size can be found on the Caltrans project website: http://dot.ca.gov/dist05/projects/sb_101hov/reports.html:

- Cabrillo Boulevard I/C Alternative LOS Analysis at Milpas and US 101 SB Ramp Technical Memo (April 20, 2012)
- Addendum to July 19, 2011 Cabrillo/Hot Springs Interchange Configuration Analysis Technical Memo (March 14, 2014)
- Updated ICU Analysis for Garden Street and Yanonali Street (June 27, 2016)
- Linden Casitas Area Intersection Performance Updates/Clarification (August 23, 2016)

KITTELSON & ASSOCIATES, INC./DOWLING
TRANSPORTATION ENGINEERING / PLANNING
428 J Street, Suite 500, Sacramento, CA 95814 P 916.266.2190 F 916.266.2195

MEMORANDUM

Date:	April 20, 2012	Project #: 168840
To:	Sam Toh Caltrans D-5	
From:	Kittelson and Associates, Inc./Dowling	
Project:	EA 05-0N7000	
Subject:	Cabrillo Boulevard I/C Alternative LOS Analysis at Milpas and US-101 SB Ramp	

This memorandum provides supplemental information for the SC101 HOV Traffic Study: Cabrillo/Hot Spring Interchange Configuration Analysis Technical Memorandum (March 21, 2011). Specifically, the operational results are recalculated assuming stop control rather than a yield control at the Milpas and US-101 SB Ramp intersection.

The intersection of Milpas and US-101 SB Ramp (#48) was initially analyzed with "yield" control at its eastbound approach. Given that the SYNCHRO operational software cannot analyze "yield" control, this intersection was first analyzed with signalization to calculate the right-turn-on-red (RTOR) movements. The intersection LOS was then analyzed with "stop" control with the RTOR volume movements removed i.e., volume reduction reflects those vehicles who would move through the "yield" control without conflict.

Given that the LOS results shown in the SC101 HOV Traffic Study: Cabrillo/Hot Spring Interchange Configuration Analysis Technical Memorandum (March 21, 2011) reflect the "yield" control at the intersection of Milpas and US-101 SB Ramp (#48), this memorandum provides alternative LOS analysis for the same intersection with "stop" control and without the RTOR reduction.

This alternative LOS analysis was performed for the selected 8 configurations shown in the SC101 HOV Traffic Study: Cabrillo/Hot Spring Interchange Configuration Analysis Technical Memorandum (March 21, 2011). These include Baseline, Configurations F, H, I, J, L, M, and Q. The right turn volumes for each scenario are shown in the Attachment 2 of the memorandum.

Table 1 and **Table 2** provide the AM/PM LOS results for 2020 for each configuration at the intersection of Milpas and US-101 SB Ramp (#48) with "yield" versus "stop" control respectively. Note that the LOS for PM peak is "F" for both with either control type.

FILENAME: X:\SACRAMENTO PROJECTS\2007 PROJECTS\P07106 CALTRANS DISTRICT 5 - ON-CALL\TASK ORDER 1 US101 WIDENING SB CNTY\CABRILLO IC ANALYSIS\FINAL DOCUMENTS\MEMO ALTERNATIVE LOS ANALYSIS AT INT48.DOCX

With "stop" control (i.e., with the RTOR volumes added back), the LOS for AM peak goes from LOS "C" to "D" for Baseline and all of the selected configurations.

Table 3 and **Table 4** provide the AM/PM LOS results for 2040 for each configuration at the intersection of Milpas and US-101 SB Ramp (#48) with "yield" versus "stop" control respectively. Note that the LOS for PM peak is "F" for both with either control type.

With stop control (i.e., with the RTOR volumes added back), the LOS for AM peak goes from LOS "C" to "E" for Baseline and Configurations H, L, and M. The AM LOS goes from LOS "C" to "F" for Configurations F, I, J, and Q.

Given that the intersection of Milpas and US-101 SB Ramp fails (LOS "F") under all configurations for PM peak hour with a "yield" control and analyzing this intersection with a "stop" control configuration would only depreciate the intersection performance, the LOS change in the AM peak would not govern the intersection design. The PM peak is the more limiting design hour and would therefore drive any design considerations.

Table 1 2020 AM Peak Hour LOS Results for Milpas/US-101 SB Ramp (#48)

AM Peak	Baseline		Configuration F		Configuration H		Configuration I		Configuration J		Configuration L		Configuration M		Configuration Q	
	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop
EBR Volume (vph)	187	341	187	341	187	341	187	341	187	341	187	341	187	341	187	341
EB Delay (sec.)	16.4	27.7	17.5	31.7	16.4	27.7	17.5	31.7	17.5	31.7	16.4	27.7	16.4	27.7	17.5	31.7
EB LOS	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D

Table 2 2020 PM Peak Hour LOS Results for Milpas/US-101 SB Ramp (#48)

PM	Baseline		Configuration F		Configuration H		Configuration I		Configuration J		Configuration L		Configuration M		Configuration Q	
	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop
EBR Volume (vph)	419	505	419	505	419	505	419	505	419	505	419	505	419	505	419	505
EB Delay (sec.)	70.6	136.0	85.1	159.4	70.6	136.0	85.1	159.4	85.1	159.4	70.6	136.0	70.6	136.0	85.1	159.4
EB LOS	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

Table 3 2040 AM Peak Hour LOS Results for Milpas/US-101 SB Ramp (#48)

AM Peak	Baseline		Configuration F		Configuration H		Configuration I		Configuration J		Configuration L		Configuration M		Configuration Q	
	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop
EBR Volume (vph)	190	347	217	347	190	347	217	347	217	347	190	347	190	347	217	347
EB Delay (sec.)	18.9	38.9	23.4	51.2	18.9	38.9	23.4	51.2	23.4	51.2	18.9	38.9	18.9	38.9	23.4	51.2
EB LOS	C	E	C	F	C	E	C	F	C	F	C	E	C	E	C	F

Table 4 2040 PM Peak Hour LOS Results for Milpas/US-101 SB Ramp (#48)

PM	Baseline		Configuration F		Configuration H		Configuration I		Configuration J		Configuration L		Configuration M		Configuration Q	
	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop	Yield	Stop
EBR Volume (vph)	445	536	460	536	445	536	460	536	460	536	445	536	445	536	460	536
EB Delay (sec.)	146.2	246.0	194.4	286.0	146.2	246.0	194.4	286.0	194.4	286.0	146.2	246.0	146.2	246.0	194.4	286.0
EB LOS	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

South Coast 101 HOV Lanes Project

Santa Barbara County, California

05-SB-101-PM 1.4 to 12.3

05-0N7000

Addendum to July 19, 2011
Cabrillo/Hot Spring Interchange
Configuration Analysis Technical Memorandum –
I/C Modified Configuration Analysis

F Modified Preferred Interchange Configuration Operational Outputs

Through a series of technical meetings in the fall of 2013 involving Caltrans, City and SBCAG staff, 2040 conditions for Cabrillo Boulevard were evaluated related to the South Coast 101 HOV lanes "F Modified configuration" features at the northbound and southbound ramp junctions with Cabrillo Boulevard. These assessments have also taken into account lane configuration and bike/pedestrian facility expectations associated with replacement of the UPRR structure over Cabrillo Boulevard. Through this coordination, operational model refinements were made with respect to future year NB on-ramp volumes as well as anticipated pedestrian movements through the interchange. General agreement was reached about these assumptions and related operational outputs at the Nov. 25, 2013 meeting.

In a final technical meeting on Mar. 10, 2014, city staff expressed a clear preference for Option 2B which involved the following changes: 1) dual left lane striping from the southbound off ramp, 2) two eastbound lanes on Cabrillo Boulevard continuing to the Cabrillo/Hot Springs roundabout, and 3) a single right turn lane on Cabrillo Boulevard coming from the roundabout approaching the northbound on ramp. Caltrans subsequently discussed these changes with the Environmental Branch and concurred that these changes could be accommodated. On March 13, 2014, the South Coast 101 HOV Lane Project Development Team (PDT) recommended configuration F Modified as the preferred Interchange Configuration. The PDT recommendation included the recognition that the UPRR railroad structure replacement is moving forward as a parallel and separate project being led by SBCAG and the City of Santa Barbara. The outputs shown below were generated to identify the operations associated solely with the HOV related improvements and do not include the UPRR railroad structure improvements. If the UPRR structure replacement project is completed prior to the construction of the South Coast 101 HOV lanes improvements as currently anticipated, level of service and queuing in this area will be further improved.

Prepared by the
State of California Department of Transportation

Office of Traffic Operations

March 14, 2014

Caltrans & City Hybrid Model Refinement – March 2014

Synchro File Name:

FED F Mod PM Peak Option 2 without UPRR Bridge Widened 10 ped calls Mar 14 2014.syn (Synchro 8)

Model Inputs and Assumptions:

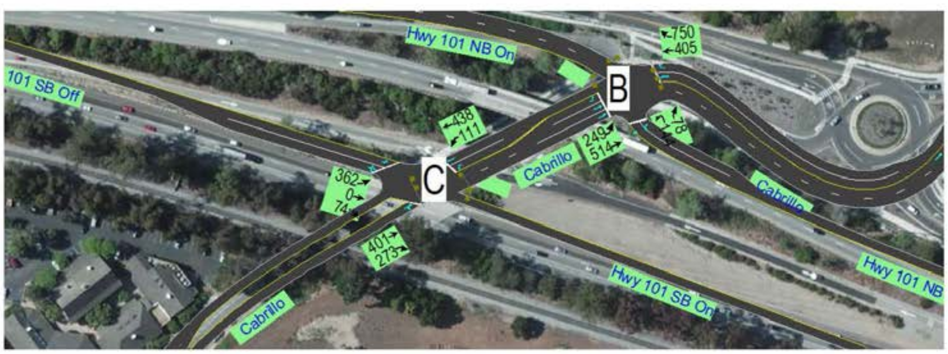
1. HOV Configuration F Modified Option2, UPRR Bridge not Widened, dual left from SB off-ramp, 4 Lane Undercrossing with back-to-back left turn lanes towards NB and SB on-ramp, 2 through lanes continue towards the Hot Spring roundabout & 10 ped calls.
2. The right turn volume of 937 vehicles to NB on-ramp has been updated to City's latest projection of 750 vehicles for the year 2040 PM peak (per D. Bailey 2-3-2014 letter, attached). This resulted in the use of a single westbound right turn lane on Cabrillo approaching the northbound on-ramp in lieu of dual right turn lane at this location.
3. Pedestrian facilities will be provided on both sides of Cabrillo Boulevard. With the completion of all improvements in this vicinity, primary Cabrillo Boulevard pedestrian crossing points will occur at the Hot Springs/Cabrillo Blvd roundabout and at SB ramp node.

Output Configuration and Outputs Summary:

- SimTraffic: 3 minute seed, **60 min run time**, 10 runs.
- **Actuated Cycle length = 73s**
- Right turn modeled using overlap for phases 2 and 4, and stopped during phase 1, with no right turn on red. This should approximately simulate the length of time needed for pedestrian movement.
  - NB ramp intersection delay = 12.7s ("B"), worst movement is WBT = 23.5s ("C")
  - WBR Delay: 12.2s ("B"), WBT Delay: 23.5s ("C")

F Mod, Option 2 – 4 lanes under-crossing configuration

(Picture depicted is for 2040 PM Peak Model)



Level of Service (2040 PM)

		(#45) NB Ramp Node (Signal)						(#44) SB Ramp Node (Signal)					(#107) Los Patos (TWSC)							
		WBT	WBR	NBL	NBR	EBL	EBT	SWL	SWT	NETR	EBL	EBLR	SBL	SBTR	WBL	WBTR	NBL	NBTR	EBL	EBTR
F Mod	By Movement	C	B	C	A	B	A	A	A	C	C	C	A	A	F	B	A	A	F	B
(4 lanes)	By Approach*	B/16.2 s		B/14.4 s		A/6.9 s		A/5.3 s		C/26.6 s	C/34.3 s		A/1.2 s		E/39.8 s		A/0.4 s		F/112.4 s	
	By Intersection*	B/12.7 s						C/21.0 s					F/112.4 s (TWSC) & B/12.1 s (Avg. Int. Delay)**							

** Footnote: LOS/Delay per veh in sec.*

***** Technical Note:***

Two way stop control (TWSC) intersection level of service (LOS) is based on worst approach control delay per vehicle, using the 2000 Highway Capacity Manual (HCM) methodology and therefore provides a single output that does not represent travel conditions for other intersection users. Conversely, all-way stop and signal controlled intersection LOS in the 2000 Highway Capacity Manual is based on weighted average control delay per vehicle. At the Los Patos/Cabrillo intersection, the low LOS value indicated by the TWSC methodology is based on a limited number of vehicles making left turns that would experience a 95th percentile queue of 2-4 vehicles in 2040 from the side streets. Vehicles traveling through the intersection on Cabrillo Blvd, however, would experience little to no control delay. Under F Modified, if no further improvements were made at this intersection apart from this project, the average vehicle control delay in 2040 for vehicles that travel through this intersection would be 3.1 seconds/vehicle in the AM peak hour and 12.1 seconds/vehicle in the PM peak hour. Using a weighted average control delay methodology, this would represent a 2040 LOS value of "A" in the AM peak hour and LOS "B" in the PM peak hour.

Queue Analysis (2040 PM)

		#45: NB Ramp Node (Signal)						#44: SB Ramp Node (Signal)					#107: Los Patos (TWSC)							
		WBT	WBR	NBL	NBR	EBL	EBTT	SWL	SWT	NETR	EBL	EBLR	SBL	SBTR	WBL	WBTR	NBL	NBTR	EBL	EBTR
F Mod	Max Q	275	324	144	46	129	211	124	186	416	199	166	54	5	94	149	60	74	83	56
(4 lanes)	Avg Q	142	158	67	11	95	56	44	51	221	103	67	22	0	43	47	11	5	38	9
	95th Q	237	276	120	36	140	162	100	132	378	168	137	49	3	81	103	41	45	68	37

Footnote: All 95%tile queue are averages based on 10 Simulation runs.

Intersection: 45: Hwy 101 NB Off & Cabrillo & Hwy 101 NB On

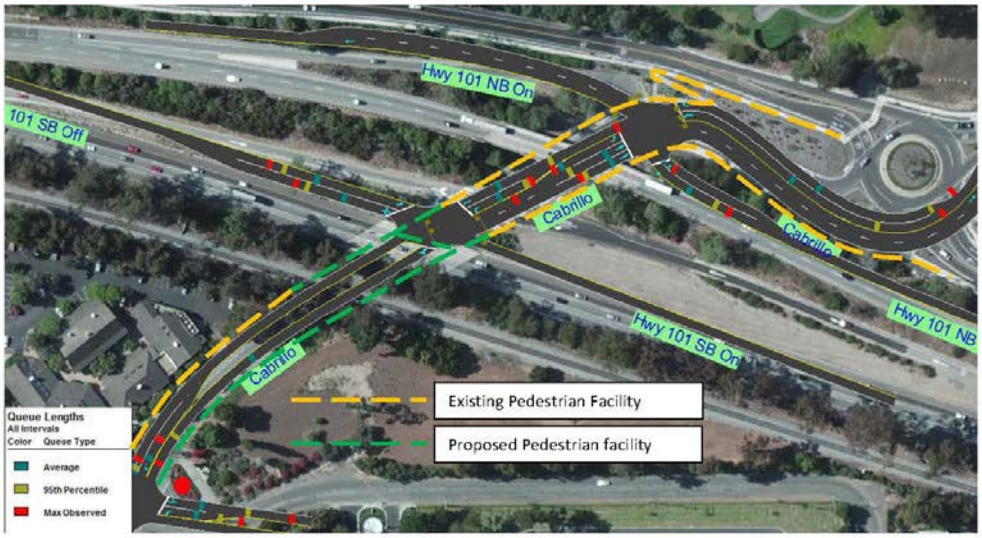
Movement	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	<	R
Maximum Queue (ft)	129	211	152	275	324	144	46
Average Queue (ft)	95	56	34	142	158	67	11
95th Queue (ft)	140	162	90	237	276	120	36
Link Distance (ft)		203	203	391		835	
Upstream Blk Time (%)		1	0	0	0		
Queuing Penalty (veh)		3	0	0	0		
Storage Bay Dist (ft)	70				350		150
Storage Blk Time (%)	18	0		0	0	0	
Queuing Penalty (veh)	45	0		0	0	0	

Intersection: 44: Cabrillo & Hwy 101 SB Off/Hwy 101 SB On

Movement	EB	EB	NE	SW	SW
Directions Served	L	LTR	TR	L	T
Maximum Queue (ft)	199	166	416	124	186
Average Queue (ft)	103	67	221	44	51
95th Queue (ft)	168	137	378	100	132
Link Distance (ft)	928		425		203
Upstream Blk Time (%)			1		0
Queuing Penalty (veh)			5		1
Storage Bay Dist (ft)		200		65	
Storage Blk Time (%)	0	0		5	2
Queuing Penalty (veh)	0	0		21	2

Intersection: 107: Cabrillo & Los Patos/Channel

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	83	56	94	149	60	74	54	5
Average Queue (ft)	38	9	43	47	11	5	22	0
95th Queue (ft)	68	37	81	103	41	45	49	3
Link Distance (ft)		146		182		310		425
Upstream Blk Time (%)		0		1				
Queuing Penalty (veh)		0		0				
Storage Bay Dist (ft)	50		50		100		100	
Storage Blk Time (%)	11	0	13	8		0		
Queuing Penalty (veh)	1	0	12	7		0		



Hwy 101 NB On
101 SB Off
Cabrillo
Cabrillo
Hwy 101 NB
Hwy 101 SB On
Cabrillo
Existing Pedestrian Facility
Proposed Pedestrian facility
Queue Lengths
All Intervals
Color Queue Type
Average
95th Percentile
Max Observed

Synchro & SimTraffic Reports

Cabrillo Boulevard and Highway 101 Traffic Volume Projections

(City of Santa Barbara)

City of Santa Barbara
Public Works Department

DISTRICT 5
14 FEB -6 PM 1:15

www.SantaBarbaraCA.gov

February 3, 2014

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Fax: 805.897.2613

Mr. Sam Toh
Caltrans District 5 Traffic Operations
50 Higuera Street
San Luis Obispo, CA 93405

SUBJECT: Cabrillo Boulevard and Highway 101 Traffic Volume Projections

Dear Mr. Toh:

The City of Santa Barbara has reviewed the traffic volume projections for the Cabrillo Boulevard and Highway 101 interchange. Based on existing traffic volumes and our knowledge of the area and proposed developments, we feel that the traffic volume projections contained in the Highway 101 High-occupancy Vehicle Traffic Study have overestimated the amount of westbound Cabrillo Boulevard to northbound Highway 101 right turns that will occur during the PM peak hour.

Below is a summary of various turning movement counts and projections for this right turn movement.

Existing Traffic Volume Counts and Projections for the Westbound Cabrillo Boulevard to Northbound Highway 101 right turn movement

Scenario	NB to WB Right Turn Movement, PM Peak (vph)	Source
1999 Count	619	Source: 2025 Turning Movement Forecast for Milpas Street and Cabrillo Blvd/Hot Springs Interchanges by SBCAG, February 2001
2013 Count	658	City of Santa Barbara Turning Movement Count
2020 Projection	770	Source: SC101 High-occupancy Vehicle Traffic Study Forecast Operations Report, October 2009.
2025 Projection	716 to 749	Source: 2025 Turning Movement Forecast for Milpas Street and Cabrillo Blvd/Hot Springs Interchanges by SBCAG, February 2001.
2040 Projection	937	Source: SC101 HOV Traffic Study Forecast Operations Report, October 2009.

When the 2025 Turning Movement Forecast study was published in February 2001, the intersection of Coast Village Road/Hot Springs Road/Cabrillo Boulevard was controlled by an all-way stop and was operating at capacity. It was thought that when the intersection was improved to a roundabout, it would "open the tap" and the amount of traffic destined for the Cabrillo Boulevard and Highway 101 interchange would have a noticeable increase.

Based on our turning movement count done in September 2013, there was not a significant increase in westbound to northbound right turns at the interchange, as was expected. The actual increase between 1999 and 2013 amounted to about 43% annually.

The Montecito/Coast Village Road area is built out, and we do not expect any significant intensification of the land uses in the area that would generate more traffic. Based on the growth actually realized during the past 14 years, and knowledge of nearby land uses, the rate of growth is likely to remain fairly constant. This would result in a 2040 volume of 738. For the purposes of design analysis, we suggest assuming the 2040 westbound Cabrillo Boulevard to northbound Highway 101 volume of 750 vehicles per hour during the PM peak.

We are assuming that no changes in access to northbound Hwy 101 occur within the vicinity that could affect the demand on this ramp.

Sincerely,

Derrick Bailey
Supervising Transportation Engineer

DB/mj

Attachments

cc: Rob Dayton, Principal Transportation Planner, City of Santa Barbara

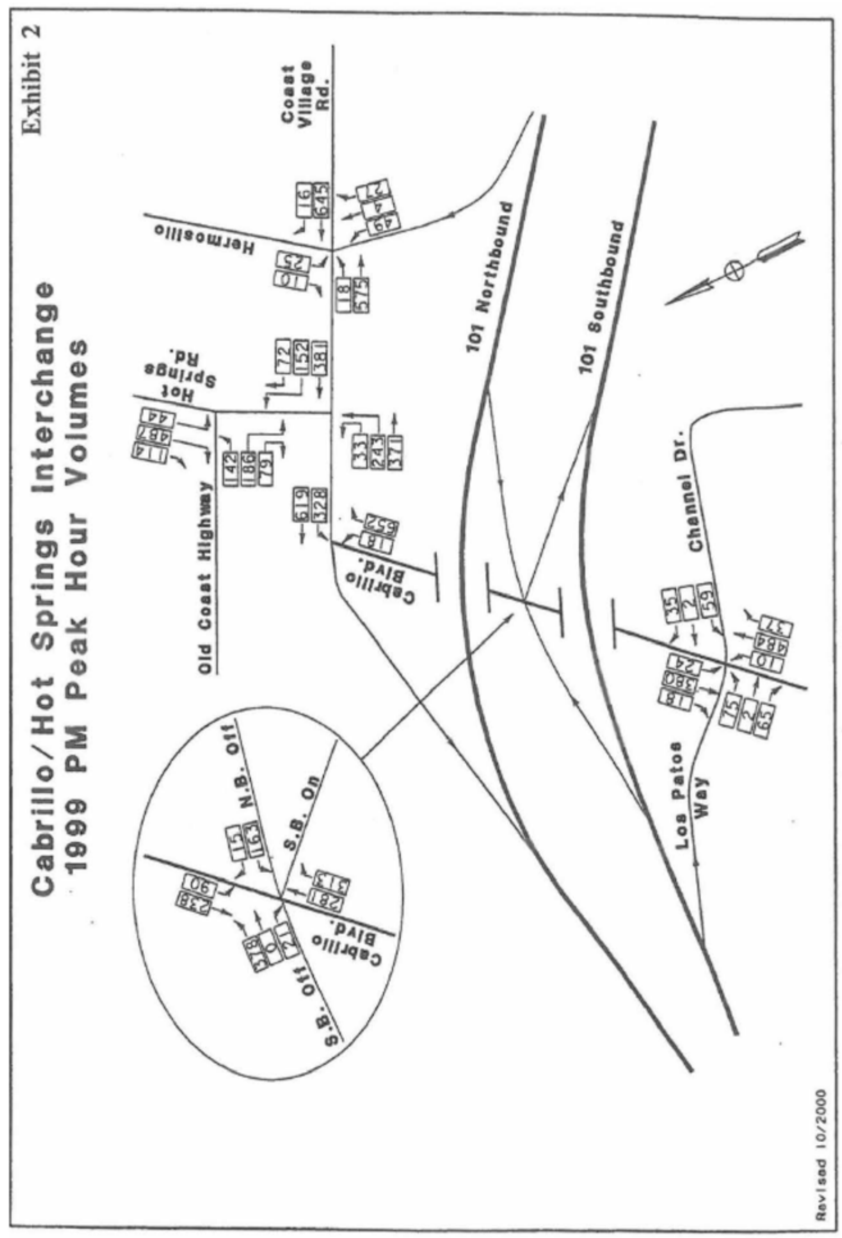


Exhibit 2
Cabrillo/Hot Springs Interchange
1999 PM Peak Hour Volumes
Old Coast Highway
Hot Springs Rd.
Hermosillo
Coast Village Rd.
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
N.B. Off
S.B. On
S.B. Off
Revised 10/2000
14

City of Santa Barbara Traffic Eng
Cabrillo and Hwy 101
PM Peak 9-24-13

File Name : PM Peak 9-24-13
Site Code : 09241302
Start Date : 9/24/2013
Page No : 1

Groups Printed- Unshifted

	Cabrillo From North					From East					Cabrillo From South					Hwy 101 NB On Ramp From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	158	32	0	0	190	0	0	0	0	0	0	198	26	0	224	0	0	0	0	0	414
04:45 PM	162	38	0	0	200	0	0	0	0	0	0	243	23	0	266	0	0	0	0	0	466
Total	320	70	0	0	390	0	0	0	0	0	0	441	49	0	490	0	0	0	0	0	880
05:00 PM	177	40	0	0	217	0	0	0	0	0	0	187	24	0	211	0	0	0	0	0	428
05:15 PM	161	28	0	0	189	0	0	0	0	0	0	164	28	0	192	0	0	0	0	0	381
Grand Total	658	138	0	0	796	0	0	0	0	0	0	792	101	0	893	0	0	0	0	0	1689
Apprch %	82.7	17.3	0	0		0	0	0	0		0	88.7	11.3	0		0	0	0	0		
Total %	39	8.2	0	0	47.1	0	0	0	0	0	0	46.9	6	0	52.9	0	0	0	0	0	

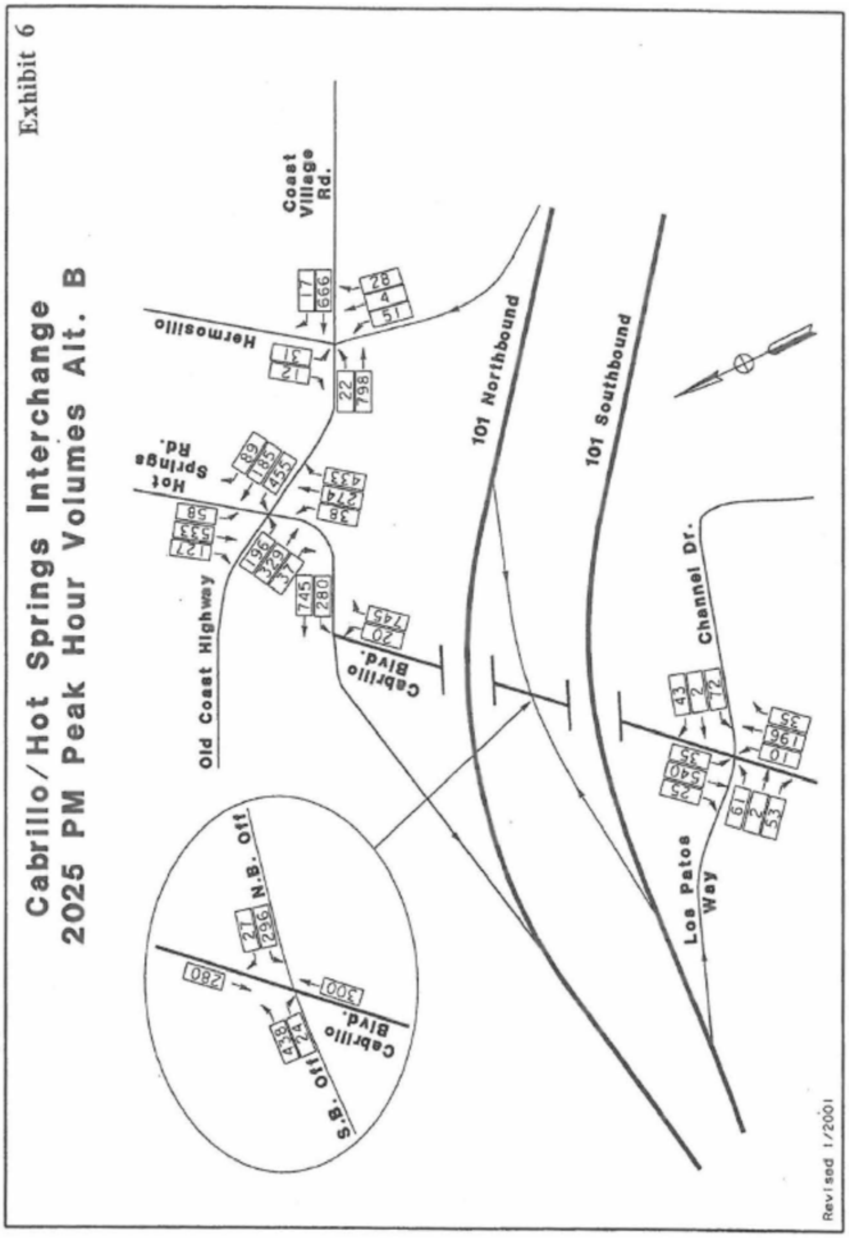


Exhibit 6
Cabrillo/Hot Springs Interchange
2025 PM Peak Hour Volumes Alt. B
Coast Village Rd.
Hermosillo
Hot Springs Rd.
Old Coast Highway
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
S.B. Off
N.B. Off
Revised 1/2001

18

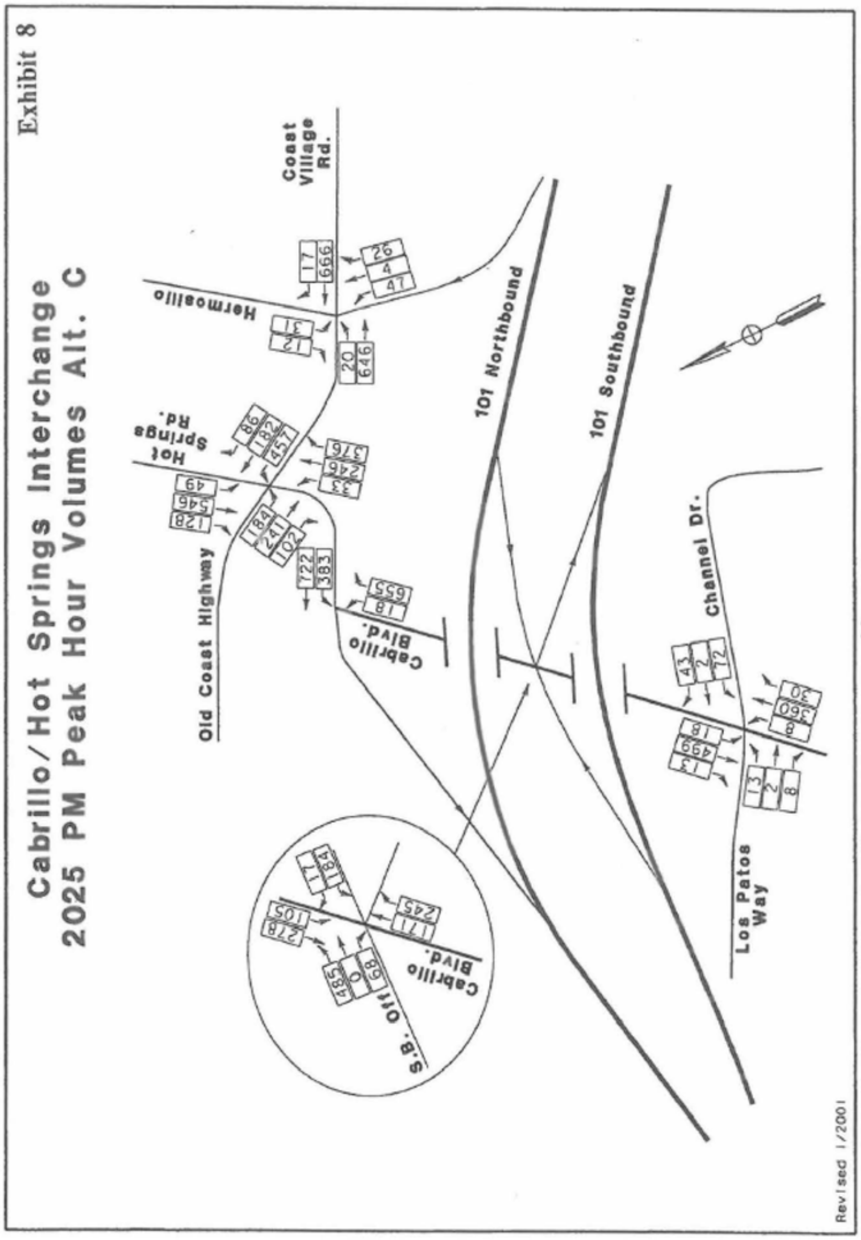


Exhibit 8
Cabrillo/Hot Springs Interchange
2025 PM Peak Hour Volumes Alt. C
Coast Village Rd.
Hermosillo
Hot Springs Rd.
Old Coast Highway
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
S.B. Off
Revised 1/2001
20

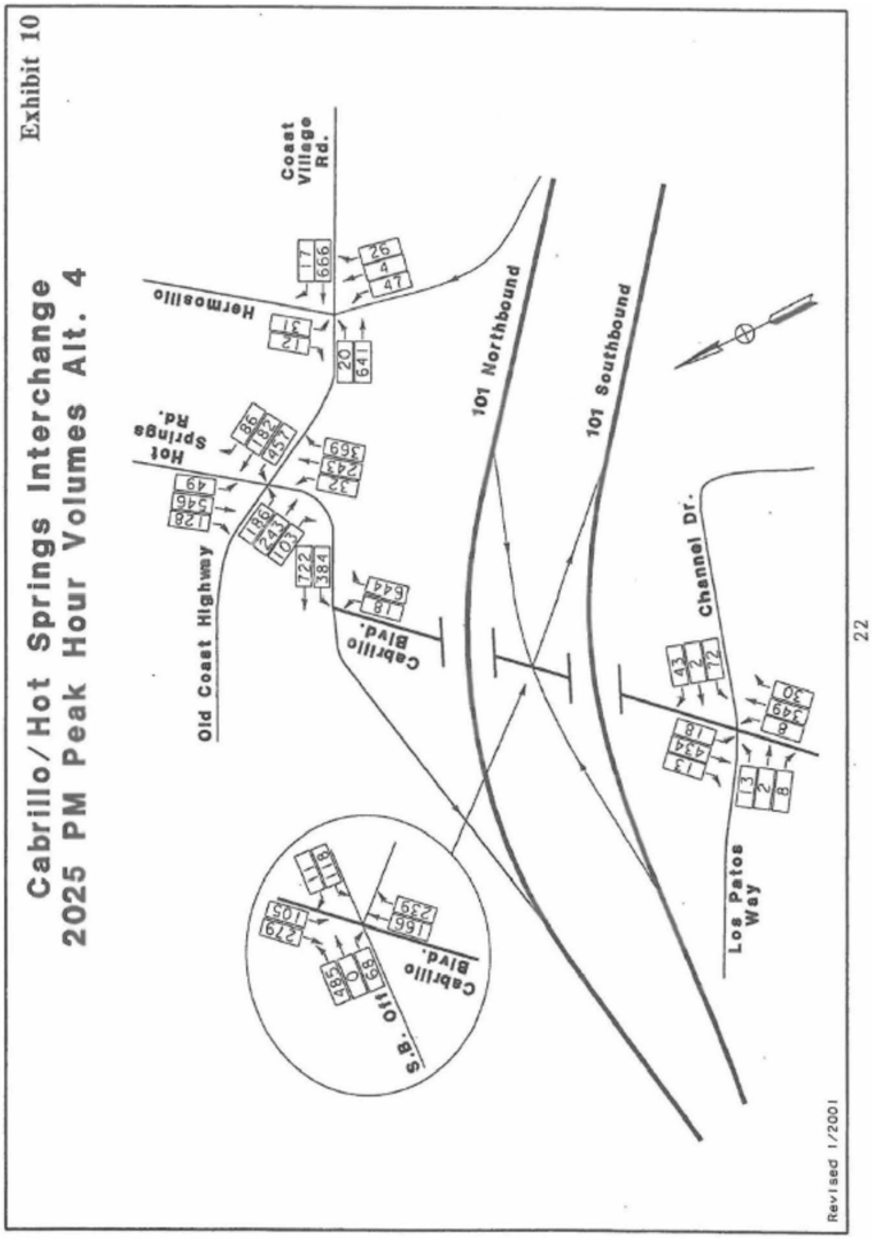


Exhibit 10
Cabrillo/Hot Springs Interchange
2025 PM Peak Hour Volumes Alt. 4
Coast Village Rd.
Hermosillo
Hot Springs Rd.
Old Coast Highway
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
S.B. Off
Revised 1/2001
22

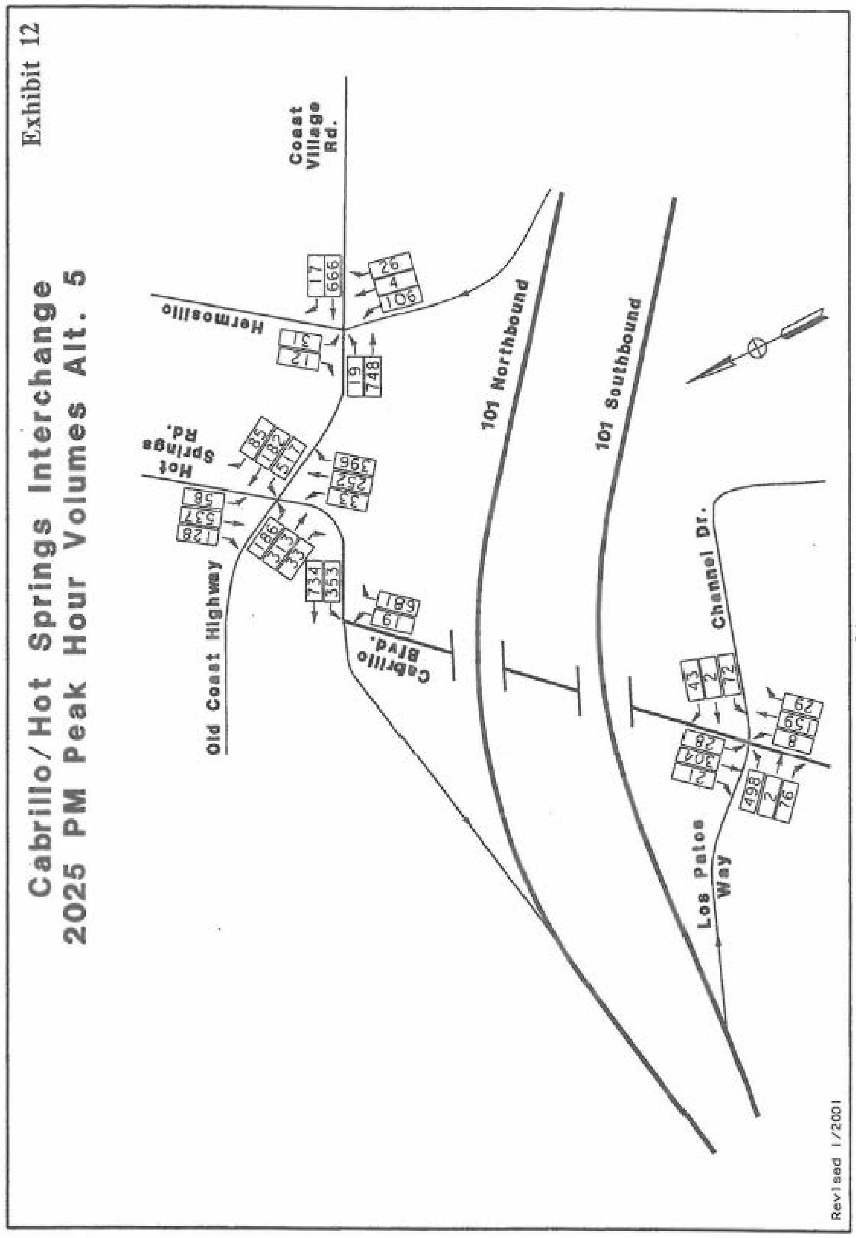


Exhibit 12
Cabrillo/Hot Springs Interchange
2025 PM Peak Hour Volumes Alt. 5
Coast Village Rd.
Hermosillo
Hot Springs Rd.
Old Coast Highway
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
Revised 1/2001

24

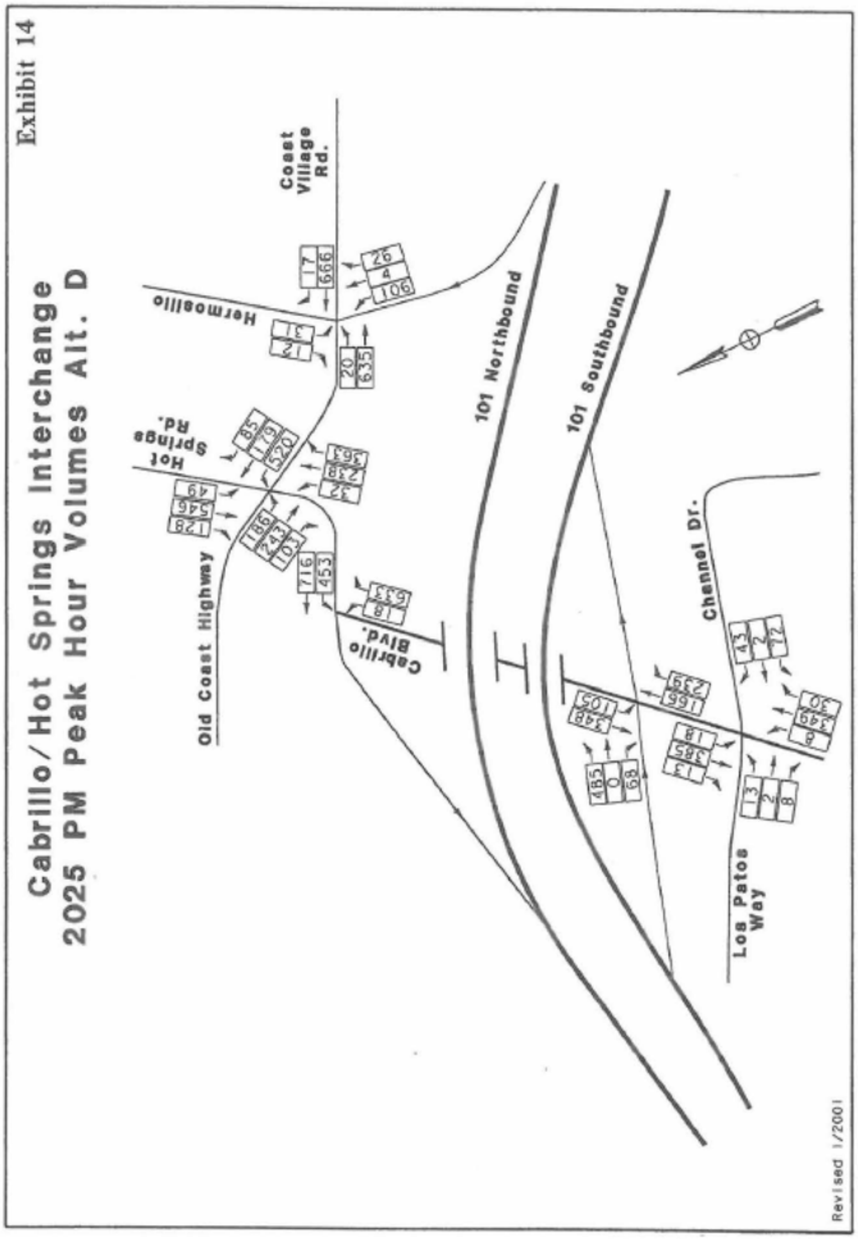
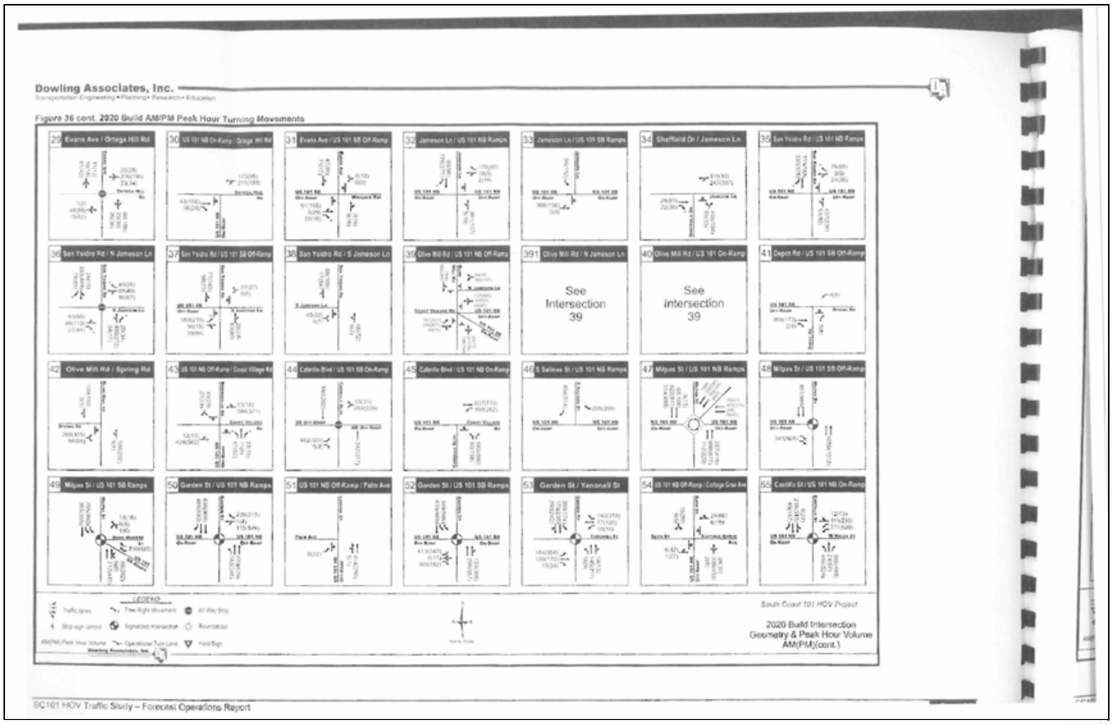
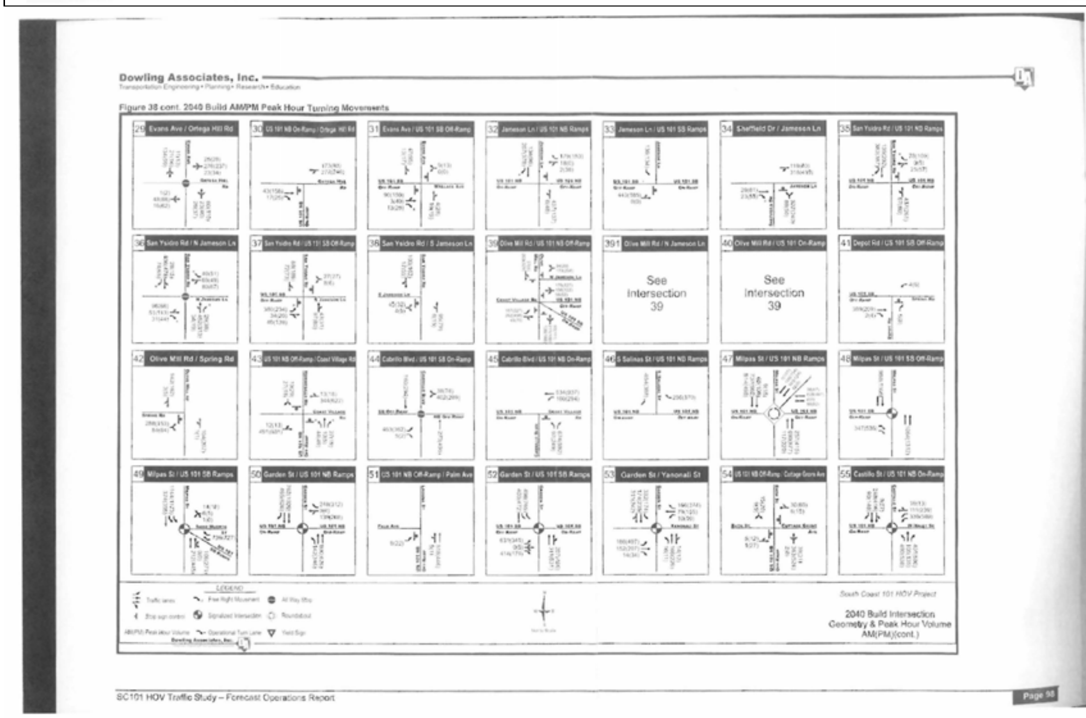


Exhibit 14
Cabrillo/Hot Springs Interchange
2025 PM Peak Hour Volumes Alt. D
Coast Village Rd.
Hermosillo
Hot Springs Rd.
Old Coast Highway
Cabrillo Blvd.
101 Northbound
101 Southbound
Channel Dr.
Los Patos Way
Revised 1/2001
26


Dowling Associates, Inc.
Figure 36 cont. 2020 Build AM/PM Peak Hour Turning Movements
See Intersection 39
See Intersection 39
South Coast 101 HOV Project
2020 Build Intersection Geometry & Peak Hour Volume AM(PM)(cont.)
SC101 HOV Traffic Study – Forecast Operations Report


Dowling Associates, Inc.
Figure 36 cont. 2040 Build AM/PM Peak Hour Turning Movements
See Intersection 39
See Intersection 39
South Coast 101 HOV Project
2040 Build Intersection Geometry & Peak Hour Volume AM(PM)(cont.)
SC101 HOV Traffic Study – Forecast Operations Report

FEHR PEERS

MEMORANDUM

Date: June 27, 2016

To: Rob Himes and Zach Siviglia, Mark Thomas & Company

From: Sarah Brandenberg and Jeremiah LaRose

Subject: ***Updated ICU Analysis for Garden St & Yanonali St***

Ref: LA16-2830

Attached is a PDF package of the ICU analysis and Modified F assumptions for the Garden Street intersections requested by Caltrans. Below is a summary of the results.

1. **Modified F Traffic Forecasts**: The Garden Street intersections were not previously analyzed under Modified F conditions. The difference between Option F and Modified F is that a new Northbound Off-Ramp at Cabrillo would be built to replace the closed median off-ramp. Therefore, the planned northbound diversions of off-ramp traffic to Garden Street would not occur. There would be no change to southbound diversions.

Below is an overview of original Option F forecasts:

- The northbound diversions under Option F sent additional vehicles to the Garden Street ramp (#50), and vehicles then continued south through Garden/Yanonali (#53)
- The southbound diversions under Option F had no effect on Garden Street
- Option F provided a southbound on-ramp at Cabrillo (#44), which diverts traffic away from northbound Garden Street

Based on the traffic shifts under Option F, the forecasts for Modified F are as follows:

- The southbound through volume on Garden Street would revert back to the Baseline levels (WBL at #50, SBT at #52 and 53)
- The northbound volumes on Garden Street at the Garden St/101 SB Ramps would remain as-is in Alternative F (NBT #53 and NBR at #52)

LOS Results: The ICU LOS results are attached.

600 Wilshire Boulevard, Suite 1050, Los Angeles, CA 90017 (213) 261-3050
www.fehrandpeers.com

Original ICU Results

Excerpt from *SC101 HOV Traffic Study Forecast Operations Report, Appendix D*

```
2020 AM                 Wed Dec 23, 2009 16:47:41                 Page 13-1
-------------------------------------------------------------------------------
                          US 101 WIdening Project
                          2020 Build Conditions
                               AM Peak Hour
-------------------------------------------------------------------------------
                   Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
*******************************************************************************
Intersection #53 Garden St and Yanonali St
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.486
Loss Time (sec):       10              Average Delay (sec/veh):     xxxxxx
Optimal Cycle:         60              Level Of Service:                 A
*******************************************************************************
Street Name:              Garden St                     Yanonali St
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
-------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     16  145     7  305  173   179  144  130     7   10   77    93
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  16  145     7  305  173   179  144  130     7   10   77    93
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  16  145     7  305  173   179  144  130     7   10   77    93
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   16  145     7  305  173   179  144  130     7   10   77    93
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  16  145     7  305  173   179  144  130     7   10   77    93
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  16  145     7  305  173   179  144  130     7   10   77    93
-------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      1.00 1.91  0.09 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Sat.: 1600 3053   147 1600 1600  1600 1600 1600  1600 1600 1600  1600
-------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.01 0.05  0.05 0.19 0.11  0.11 0.09 0.08  0.00 0.01 0.05  0.06
Crit Moves:      ****       ****            ****                         ****
*******************************************************************************
```

```
2020 PM                 Wed Dec 23, 2009 16:48:00                 Page 13-1
-------------------------------------------------------------------------------
                          US 101 WIdening Project
                          2020 Build COnditions
                               PM Peak Hour
-------------------------------------------------------------------------------
                   Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
*******************************************************************************
Intersection #53 Garden St and Yanonali St
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.625
Loss Time (sec):       10              Average Delay (sec/veh):     xxxxxx
Optimal Cycle:         60              Level Of Service:                 B
*******************************************************************************
Street Name:              Garden St                     Yanonali St
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
-------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      9  211     5  174  235   128  354  170    22   10  120   204
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   9  211     5  174  235   128  354  170    22   10  120   204
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   9  211     5  174  235   128  354  170    22   10  120   204
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    9  211     5  174  235   128  354  170    22   10  120   204
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   9  211     5  174  235   128  354  170    22   10  120   204
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:   9  211     5  174  235   128  354  170    22   10  120   204
-------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      1.00 1.95  0.05 1.00 1.29  0.71 1.00 1.00  1.00 1.00 1.00  1.00
Final Sat.: 1600 3126    74 1600 2072  1128 1600 1600  1600 1600 1600  1600
-------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.01 0.07  0.07 0.11 0.11  0.11 0.22 0.11  0.01 0.01 0.08  0.13
Crit Moves:      ****       ****            ****                         ****
*******************************************************************************
```

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```
2040 AM                 Wed Dec 23, 2009 16:47:05                 Page 13-1
-------------------------------------------------------------------------------
                          US 101 WIdening Project
                          2040 Build Conditions
                               AM Peak Hour
-------------------------------------------------------------------------------
                   Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
*******************************************************************************
Intersection #53 Garden St and Yanonali St
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.550
Loss Time (sec):       10              Average Delay (sec/veh):     xxxxxx
Optimal Cycle:         60              Level Of Service:                 A
*******************************************************************************
Street Name:              Garden St                     Yanonali St
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
-------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     16  166     7  332  174   200  186  152     8   10   79   116
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  16  166     7  332  174   200  186  152     8   10   79   116
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  16  166     7  332  174   200  186  152     8   10   79   116
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   16  166     7  332  174   200  186  152     8   10   79   116
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  16  166     7  332  174   200  186  152     8   10   79   116
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  16  166     7  332  174   200  186  152     8   10   79   116
-------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      1.00 1.92  0.08 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Final Sat.: 1600 3071   129 1600 1600  1600 1600 1600  1600 1600 1600  1600
-------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.01 0.05  0.05 0.21 0.11  0.13 0.12 0.10  0.01 0.01 0.05  0.07
Crit Moves:      ****       ****            ****                         ****
*******************************************************************************
```

```
2040 PM                 Wed Dec 23, 2009 16:47:23                 Page 13-1
-------------------------------------------------------------------------------
                          US 101 WIdening Project
                          2040 Build Conditions
                               PM Peak Hour
-------------------------------------------------------------------------------
                   Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
*******************************************************************************
Intersection #53 Garden St and Yanonali St
*******************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):        0.753
Loss Time (sec):       10              Average Delay (sec/veh):     xxxxxx
Optimal Cycle:         60              Level Of Service:                 C
*******************************************************************************
Street Name:              Garden St                     Yanonali St
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
-------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
-------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     11  226     4  174  235   128  497  207    22   10  155   259
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  11  226     4  174  235   128  497  207    22   10  155   259
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  11  226     4  174  235   128  497  207    22   10  155   259
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   11  226     4  174  235   128  497  207    22   10  155   259
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  11  226     4  174  235   128  497  207    22   10  155   259
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  11  226     4  174  235   128  497  207    22   10  155   259
-------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      1.00 1.97  0.03 1.00 1.29  0.71 1.00 1.00  1.00 1.00 1.00  1.00
Final Sat.: 1600 3144    56 1600 2072  1128 1600 1600  1600 1600 1600  1600
-------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.01 0.07  0.07 0.11 0.11  0.11 0.31 0.13  0.01 0.01 0.10  0.16
Crit Moves:      ****       ****            ****                         ****
*******************************************************************************
```

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Modified F ICU Analysis

Traffix 8.0

#53 Garden Street & Yanonali Street Volume Comparison

AM Peak

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
2020	Original Alt. F (Dowling)	16	145	7	305	173	179	144	130	7	10	77	93
	Modified F (F&P)	16	136	14	305	173	290	144	130	13	10	77	143
	Difference	*0*	*-9*	*7*	*0*	*0*	*111*	*0*	*0*	*6*	*0*	*0*	*50*
2040	Original Alt. F (Dowling)	16	166	7	332	174	200	186	152	8	10	79	116
	Modified F (F&P)	16	136	14	332	174	311	186	152	14	10	79	166
	Difference	*0*	*-30*	*7*	*0*	*0*	*111*	*0*	*0*	*6*	*0*	*0*	*50*

PM Peak

		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR
2020	Original Alt. F (Dowling)	9	211	5	174	235	128	354	170	22	10	120	204
	Modified F (F&P)	9	158	13	174	235	242	354	170	34	10	120	319
	Difference	*0*	*-53*	*8*	*0*	*0*	*114*	*0*	*0*	*12*	*0*	*0*	*115*
2040	Original Alt. F (Dowling)	11	226	4	174	235	128	497	207	22	10	155	259
	Modified F (F&P)	11	158	12	174	235	242	497	207	34	10	155	374
	Difference	*0*	*-68*	*8*	*0*	*0*	*114*	*0*	*0*	*12*	*0*	*0*	*115*

```
2020 Mod F AM              Thu Jun 23, 2016 14:47:53                 Page 3-1
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
                     Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)
*****************************************************************************
Intersection #1
*****************************************************************************
Cycle (sec):          100                Critical Vol./Cap.(X):         0.517
Loss Time (sec):       10                Average Delay (sec/veh):      xxxxxx
Optimal Cycle:         34                Level Of Service:                  A
*****************************************************************************
Street Name:                Garden St                         Yanonali
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:AM peak hour
Base Vol:      16  136    14   305  173   290   144  130    13    10   77   143
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   16  136    14   305  173   290   144  130    13    10   77   143
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    16  136    14   305  173   290   144  130    13    10   77   143
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   16  136    14   305  173   290   144  130    13    10   77   143
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   16  136    14   305  173   290   144  130    13    10   77   143
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.81  0.19  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:  1600 2901   299  1600 1600  1600  1600 1600  1600  1600 1600  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.05  0.05  0.19 0.11  0.18  0.09 0.08  0.01  0.01 0.05  0.09
Crit Moves:       ****        ****             ****                        ****
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2020 Mod F PM              Thu Jun 23, 2016 14:48:21                  Page 3-1
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                      Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)
********************************************************************************
Intersection #1
********************************************************************************
Cycle (sec):           100               Critical Vol./Cap.(X):          0.683
Loss Time (sec):        10               Average Delay (sec/veh):        xxxxxx
Optimal Cycle:          48               Level Of Service:                   B
********************************************************************************
Street Name:                 Garden St                       Yanonali
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:PM peak hour
Base Vol:      9  158    13   174  235   242   354  170    34    10  120   319
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   9  158    13   174  235   242   354  170    34    10  120   319
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    9  158    13   174  235   242   354  170    34    10  120   319
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   9  158    13   174  235   242   354  170    34    10  120   319
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   9  158    13   174  235   242   354  170    34    10  120   319
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.85  0.15  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:  1600 2957   243  1600 1600  1600  1600 1600  1600  1600 1600  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.05  0.05  0.11 0.15  0.15  0.22 0.11  0.02  0.01 0.08  0.20
Crit Moves:       ****        ****             ****                         ****
********************************************************************************
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2040 Mod F AM              Thu Jun 23, 2016 14:50:03                    Page 3-1
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--------------------------------------------------------------------------------
                     Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)
********************************************************************************
Intersection #1
********************************************************************************
Cycle (sec):          100              Critical Vol./Cap.(X):         0.574
Loss Time (sec):       10              Average Delay (sec/veh):      xxxxxx
Optimal Cycle:         38              Level Of Service:                  A
********************************************************************************
Street Name:               Garden St                         Yanonali
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       1  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      16  136    14   332  174   311   186  152    14    10   79   166
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   16  136    14   332  174   311   186  152    14    10   79   166
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    16  136    14   332  174   311   186  152    14    10   79   166
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   16  136    14   332  174   311   186  152    14    10   79   166
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   16  136    14   332  174   311   186  152    14    10   79   166
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.81  0.19  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:  1600 2901   299  1600 1600  1600  1600 1600  1600  1600 1600  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.05  0.05  0.21 0.11  0.19  0.12 0.10  0.01  0.01 0.05  0.10
Crit Moves:       ****        ****              ****                        ****
********************************************************************************
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2040 Mod F PM              Thu Jun 23, 2016 14:50:56                   Page 3-1
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--------------------------------------------------------------------------------
                   Level Of Service Computation Report
       ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)
********************************************************************************
Intersection #1
********************************************************************************
Cycle (sec):         100                 Critical Vol./Cap.(X):         0.806
Loss Time (sec):      10                 Average Delay (sec/veh):      xxxxxx
Optimal Cycle:        68                 Level Of Service:                  D
********************************************************************************
Street Name:               Garden St                          Yanonali
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:        1  0  1  1  0    1  0  1  1  0    1  0  1  0  1    1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:PM peak hour
Base Vol:      11  158    12   174  235   242   497  207    34    10  155   374
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   11  158    12   174  235   242   497  207    34    10  155   374
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    11  158    12   174  235   242   497  207    34    10  155   374
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   11  158    12   174  235   242   497  207    34    10  155   374
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   11  158    12   174  235   242   497  207    34    10  155   374
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       1.00 1.86  0.14  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Sat.:  1600 2974   226  1600 1600  1600  1600 1600  1600  1600 1600  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.01 0.05  0.05  0.11 0.15  0.15  0.31 0.13  0.02  0.01 0.10  0.23
Crit Moves:       ****        ****             ****                         ****
********************************************************************************
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State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: Yvonne Hoffman
Associate Environmental Planner
Caltrans District 5

Date: August 23, 2016

File:

From: Sam Toh
Transportation Engineer
Traffic Operations

Subject: **Linden Casitas area intersection performance updates due to Final Linden Casitas Traffic Report**

This memo is to inform the Department Environmental Branch that there was a Linden Avenue 3-lane Bridge Traffic Analysis dated March 5, 2010, Technical memo by Kittelson Assosiates (formerly Dowling Associates). This study covers the intersections that the HOV had studied within the City of Carpinteria. Findings of these intersections in this study shall supercedes the findings in the HOV Forecast Operations Report dated October 19, 2009 [Amended December 9, 2011].

The intersections that were superceded are:

Intersection #15 – NB on/off & Ogan Rd (RAB)
Intersection #16 – Linden Ave & Ogan Rd
Intersection #17 – SB off Linden Ave
Intersection #18 – Linden Ave & Sawyer Ave

The conclusion from this study has shown that the Linden 3-lane Bridge interchange project improves these intersections performance from the HOV studied performance slightly but did not affects the conclusion that intersection #18 at Linden Ave & Sawyer Ave still experience project impacts as shown in the 2020 & 2040 Final Project plus Cumulative Worksheet prepared by our office.

Attachment(s)
(1) Updated Linden 3-Lane Bridge Traffic Analysis Memo.pdf
(2) Corridor Intersections Performance Changes Updated to Alt F and F-Mod-EIR Final-v1.xlsx

c: Jason Wilkinson, Senior Environmental planner, Caltrans, Environmental
Linsay Leichtfuss, Associate Environmental Planner, Caltrans, Environmental
Paul McClintic, Senior Transportation Engineer, Traffic Operations
Scott Eades, South Coast HOV Corridor Manager, Caltrans, Project Management

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

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Oakland, CA 94612
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Dowling Associates, Inc.

Memorandum

Date: March 5, 2010

To: Scott Eades and Roger Barnes, Caltrans District 5

cc: Project File

From: Jim Damkowitch and Chirag Safi, Dowling Associates

Reference #: EA 05-0N7000 – SC101 HOV Traffic Study

Subject: Linden Avenue 3-lane Bridge Traffic Analysis

Dowling Associates has prepared this memorandum to re-evaluate traffic operations on the Linden Avenue bridge overpass assuming a 3-lane cross-section instead of the previously proposed 4-lane bridge. Traffic operations at the following five intersections were analyzed:

- Int #15 – Hwy 101 NB on-ramp/Ogan Road/Via Real
- Int #16 – Linden Avenue/Via Real/Ogan Road
- Int #17 – Linden Avenue/Hwy 101 SB off-ramp
- Int #18 – Linden Avenue/Sawyer Avenue
- Int #133 – Linden Avenue/Carpinteria Avenue

It should be noted that intersections #16 and #17 are more critical in evaluating effect of bridge structure on traffic operations. Therefore, queuing analysis was performed for only these two intersections. LOS analysis was conducted for all of above listed study intersections.

Level of Service (LOS) for intersections is estimated using Transportation Research Board's Special Report 209, Highway Capacity Manual, 2000. At signalized intersections, LOS is determined by the weighted average delay for all vehicles entering the intersection. At roundabouts, LOS is determined in TRAFFIX software using methodology described in FHWA publication *Roundabouts: An Informational Guide*. 95th percentile queues are estimated using SYNCHRO-7 software.

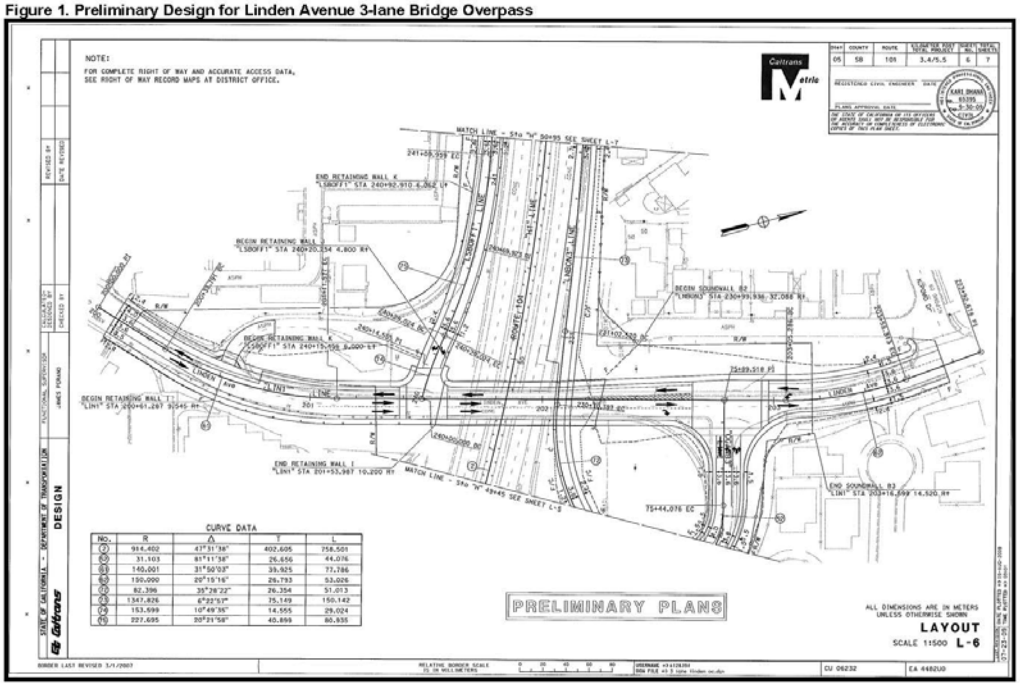
Peak Hour Traffic Volumes

Preliminary lane configuration and geometries for the two bridge termini intersections were provided by Caltrans District 5 and are shown in **Figure 1**.

Forecast AM/PM peak hour turning movements were based on SC101 HOV Traffic Study. Analysis years are consistent with those of SC101 HOV Traffic Study, i.e. 2020 opening day and 2040 Design Year.

Linden Avenue 3-lane Bridge Traffic Analysis Memo
March 5, 2010

Figure 1. Preliminary Design for Linden Avenue 3-lane Bridge Overpass



2

Both the SC101 HOV Traffic Study and the *Final Traffic Operations Report for U.S 101 / Linden Avenue and U.S 101 / Casitas Pass Road Interchange Improvement Project* (referred as Linden-Casitas Pass Study) prepared by Fehr & Peers in June 2007 includes as part of the future baseline, the VEN/SB 101 HOV project located south of the Linden interchange. The SC101 HOV project which meshes with the VEN/SB HOV project is also included in the future baseline in the Linden-Casitas Pass Study but is only included as part of the Build scenario in the SC101 HOV Traffic Study.

The intersection of Linden Avenue and Carpinteria Avenue was not analyzed as part of SC101 HOV Traffic Study. Turning movement forecasts at this intersection were performed using SBCAG's peak hour models and 2006 traffic counts performed for Linden-Casitas Pass Study.

Differences in travel demand between a 3-lane bridge structure versus the 4-lane bridge structure are not anticipated i.e., future turning movements are assumed to be identical under both bridge structure options.

Peak hour forecasts were compared to the Linden-Casitas Pass Study for consistency. The SC101 HOV Traffic Study generally shows lower volumes on study area roadways. The following observations should be noted regarding the difference between these two studies:

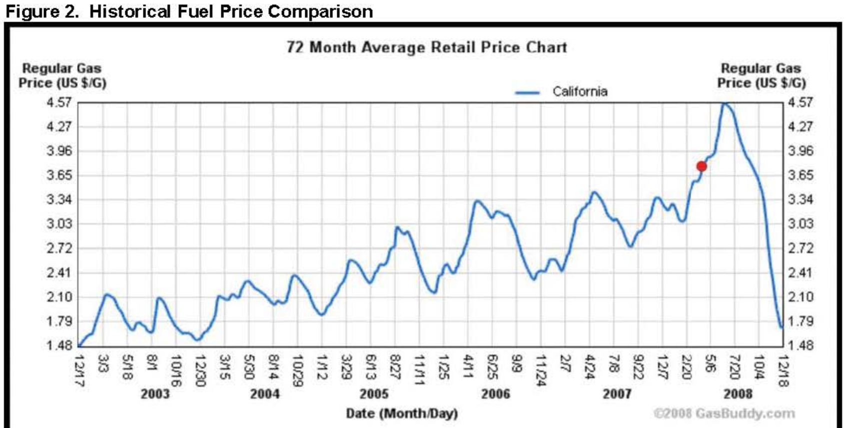
- Analysis years for the Linden-Casitas Pass Study include a: 2016 opening day; and, a 2036 design year. The SC101 HOV Traffic Study includes a 2020 opening day and a 2040 design year.
- "No Build" and "Build" conditions represent the without and with interchange improvement scenarios for the Linden-Casitas Pass Study and the without and with HOV lane in the SC101 HOV Traffic Study.
- Forecasts for the Linden-Casitas Pass Study are based on SBCAG's 2002 Regional Growth Forecast (RGF-2002), whereas SC101 HOV Traffic Study traffic forecasts are based on SBCAG's 2007 RGF (RGF-2007). This is a significant difference given that the 2040 population, housing and employment forecasts of the RGF-2007 are lower than the 2030 projections reported in the RGF-2002. This difference is exacerbated by the extrapolation of growth based on RGF-2002 growth rates out another 6 years (2030 to 2036) in the Linden-Casitas Pass Study. This results in generally higher future baseline growth projections that result in higher traffic volumes across all study area roadways in the Linden-Casitas Pass Study relative to the SC101 HOV Traffic Study.
- Although Via Real extension carries significant volumes as a result of trip diversion, no concurrent decrease on other roadways appear in the Linden-Casitas Pass Study. Diversion onto Via Real as a result of the proposed extension is also shown in the SC101 HOV Traffic Study but with concurrent reductions on other facilities.
- Although both study's travel demand forecasts are based on the SBCAG regional travel model, the Linden-Casitas Pass Study employed a sub-area model in VISUM to provide more refined zonal and zone loading characteristics. Within VISUM, the SBCAG model OD matrix was modified in order to better match ground counts performed for the study (called the Origin Destination Matrix Estimation process). The ground counts used for this purpose were collected in Summer 2002. These 2002 counts were shown to be higher than the January 2006 traffic counts used to establish the existing conditions for the Linden-Casitas Pass Study (see following bullet). The SC101 HOV Traffic Study used SBCAG's regional model directly while performing off model adjustments to

intersection turning movements based on NCHRP-255 principles, the FURNESS method and turn movement counts collected in April 2008.

- Traffic counts performed for the respective studies occurred at different times but also under vastly different socio-economic conditions. As shown in **Figure 2**, fuel prices were significantly higher during 2008 than previous years. Traffic count data collected indicate generally lower than historical traffic volumes (**Table 1**). For the Linden-Casitas Pass Study, peak season Summer 2002 counts were used to adjust SBCAG's existing OD Matrix for travel forecasting purposes. The 2002 counts were found to be higher than the January 2006 counts collected for the study. Fuel prices were approximately 63% lower in 2002 relative to 2006 prices ($1.48 vs. $2.41 per gallon). The SC101 HOV traffic counts were performed in April 2008 – a time of relatively higher fuel costs ($3.75 per gallon). April 2008 fuel prices were over 150% higher than Summer 2002 fuel prices and 56% higher than January 2006 fuel prices. The higher Linden-Casitas Pass Study baseline counts combined with even higher counts for the model ODME adjustment would both tend to generate higher peak hour forecasts relative to the SC101 HOV Traffic Study.

Due to above differences, exact forecast results should not be expected in both studies.

Figure 2. Historical Fuel Price Comparison



Retrieved Dec. 18, 2008 from http://www.columbusgasprices.com/retail_price_chart.aspx

Table 1. Comparison of Highway 101 Mainline Traffic Counts with Historical Data

Location	Published Caltrans Data [1]				Estimated	Change in 2008 Compared to			
	2000 ADT [2]	2003 ADT [2]	2005 ADT [2]	2007 ADT [2]	2008 ADT [3]	2000	2003	2005	2007
Hwy 101 from SR 150 to Bailard	58,540	67,670	63,880	66,860	60,210	2.9%	-11.0%	-5.7%	-9.9%
Hwy 101 from Cabrillo to Salinas	97,560	106,050	95,320	95,220	93,260	-4.4%	-12.1%	-2.2%	-2.1%
Hwy 101 @ Las Positas	138,650	137,360	143,990	138,780	138,260	-0.3%	0.7%	-4.0%	-0.4%

[1] Summarized from the readily available data at Traffic Data Branch of Caltrans
[2] Indicates adjusted ADT after applying year specific seasonal factor derived from the historical monthly VMT data
[3] As reflected by spring 2008 conditions. Derived by DA's seeding spreasheet

Traffic Operation Results

AM/PM peak hour LOS results for 2020 and 2040 traffic conditions are shown in **Table 2** and **Table 3** respectively. For comparison, LOS results are presented for both 3-lane and 4-lane bridge overpass. All study intersections are projected to operate at overall LOS C or better (Caltrans LOS threshold) during the AM/PM peak hours for both bridge overpass options with exception of two. Under 2020 and 2040 with HOV lane conditions, the non-signalized Intersection of Linden Avenue and Sawyer Avenue (#18) would function at LOS D during the AM peak hour. The signalized intersection of Linden Avenue and Carpinteria Avenue (#133) is projected to operate at LOS D under 2040 without HOV lane conditions during the PM peak hour.

With a 3-lane bridge overpass, study intersections are projected to operate at the same overall LOS as with 4-lane bridge overpass. Therefore, 3-lane bridge overpass is not anticipated to worsen traffic operations at the study intersections during the AM/PM peak hours. With the exception of Intersections #16 and #17, all other study intersections are shown to operate similarly, i.e. delays for the 4-lane and 3-lane bridge structures.

The 95th percentile queue results under 2020 and 2040 traffic conditions as estimated by SYNCHRO-7 are depicted in **Table 4** and **Table 5** respectively. Given that the 3-lane bridge overpass will reduce the southbound Linden Avenue lanes to one lane, queuing analysis was only performed for the northbound and westbound approaches at Linden Avenue/Ogan Road (#16), and the southbound approach at Linden Avenue/Hwy 101 SB-ramp (#17) intersection. The available storage on Linden Avenue between the Hwy 101 SB off-ramp and Ogan Road is estimated to be approximate 350 ft. Available storage on Ogan Road between the Hwy 101 NB on-ramp roundabout and Linden Avenue is 250 ft.

Under a 3-lane bridge overpass assumption, 95th percentile queues at the southbound approach of Linden Avenue/Hwy 101 SB off-ramp (#17) are projected to be longer than those experienced under the 4-lane analysis. However, estimated AM/PM peak hour queues under both designs would be easily accommodated within the available storage of 350 ft. Queue spill-back is not projected at the southbound Linden Avenue between Ogan Road and Hwy 101 SB off-ramp. As anticipated, peak hour queuing results for the northbound and westbound approaches of Linden Avenue/Ogan Road intersection (#16) are identical under the 3-lane and 4-lane bridge structures. For either bridge design, the 2040 without HOV lane PM peak hour 95th percentile queues at the northbound approach may exceed the available storage and block the upstream intersection #17. The 95th percentile queue results indicate that the westbound Ogan Road approach will provide sufficient storage between the Linden Avenue and Hwy 101 NB on-ramp roundabout.

Detailed LOS results by each movement and SYNCHRO-7 worksheets are provided in **Attachment 1**.

Table 2. 2020 Linden Avenue Build LOS Results

ID	Intersection	Control [1]	4-lane Linden Avenue Build Results				3-lane Linden Avenue Build Results			
			Without HOV Lane		With HOV Lane		Without HOV Lane		With HOV Lane	
			Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]
15	Ogan Rd/Via Real & NB on-ramp	Roundabout								
	AM Peak		4.8	A	7.9	A	4.8	A	7.9	A
	PM Peak		4.9	A	4.3	A	4.9	A	4.3	A
16	Linden Ave & Ogan Rd/Via Real	Signal								
	AM Peak		10.8	B	12.4	B	10.8	B	12.4	B
	PM Peak		13.7	B	8.6	A	13.7	B	8.6	A
17	SB off ramp & Linden Ave	Signal								
	AM Peak		8.9	A	8.7	A	9.1	A	8.9	A
	PM Peak		8.8	A	10.9	B	9	A	11.1	B
18	Linden Ave & Sawyer Ave	TWSC								
	AM Peak		17.2	C	**26.8**	**D**	17.2	C	**26.8**	**D**
	PM Peak		16.6	C	18.8	C	16.6	C	18.8	C
133	Carpinteria Ave & Linden Ave	Signal								
	AM Peak		24.8	C	28.9	C	24.8	C	28.9	C
	PM Peak		29.4	C	29.8	C	29.4	C	29.8	C

[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] Delay is based on HCM 2000, Chapter 16 and 17 methodologies for intersections and FHWA Roundabout Guilde for roundabouts.
[3] HCM LOS is reported for the worst movement at TWSC intersections and for the overall intersection at AWSC, roundabout and signalized intersections

Table 3. 2040 Linden Avenue Build LOS Results

ID	Intersection	Control [1]	4-lane Linden Avenue Build Results				3-lane Linden Avenue Build Results			
			Without HOV Lane		With HOV Lane		Without HOV Lane		With HOV Lane	
			Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]	Delay (sec) [2]	LOS [3]
15	Ogan Rd/Via Real & NB on-ramp	Roundabout								
	AM Peak		6.3	A	13.8	B	6.3	A	13.8	B
	PM Peak		10.5	B	6.2	A	10.5	B	6.2	A
16	Linden Ave & Ogan Rd/Via Real	Signal								
	AM Peak		11.5	B	14.5	B	11	B	14.5	B
	PM Peak		22.2	C	17.3	B	22.1	C	17.2	B
17	SB off ramp & Linden Ave	Signal								
	AM Peak		10	B	10.2	B	10.2	B	10.4	B
	PM Peak		12.6	B	12.1	B	13.3	B	12.5	B
18	Linden Ave & Sawyer Ave	TWSC								
	AM Peak		18.8	C	**26.9**	**D**	18.8	C	**26.9**	**D**
	PM Peak		19.1	C	19.5	C	19.1	C	19.5	C
133	Carpinteria Ave & Linden Ave	Signal								
	AM Peak		30.8	C	31.7	C	30.8	C	31.7	C
	PM Peak		**35.1**	**D**	30.4	C	**35.1**	**D**	30.4	C

[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] Delay is based on HCM 2000, Chapter 16 and 17 methodologies for intersections and FHWA Roundabout Guilde for roundabouts.
[3] HCM LOS is reported for the worst movement at TWSC intersections and for the overall intersection at AWSC, roundabout and signalized intersections

Table 4. 2020 Linden Avenue Build Queue Results

ID	Intersection	Control [1]	95th Percentile Queues (ft) [2]			
			4-lane Linden Avenue Build		3-lane Linden Avenue Build	
			Without HOV Lane	With HOV Lane	Without HOV Lane	With HOV Lane
16	Linden Ave & Via Real/Ogan Rd - Westbound Approach	Signal				
	AM Peak		42	43	42	43
	PM Peak		64	50	64	50
16	Linden Ave & Via Real/Ogan Rd - Northbound Approach	Signal				
	AM Peak		124	113	124	113
	PM Peak		157	119	157	118
17	SB off ramp & Linden Ave - Southbound Approach	Signal				
	AM Peak		19	31	37	62
	PM Peak		34	37	91	72

[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] 95th percentile queues based on SYNCHRO-7 program

Table 5. 2040 Linden Avenue Build Queue Results

ID	Intersection	Control[1]	95th Percentile Queues (ft)[2]			
			4-lane Linden Avenue Build		3-lane Linden Avenue Build	
			Without HOV Lane	With HOV Lane	Without HOV Lane	With HOV Lane
16	Linden Ave & Via Real/Ogan Rd - Westbound Approach	Signal				
	AM Peak		42	44	42	44
	PM Peak		115	81	115	81
16	Linden Ave & Via Real/Ogan Rd - Northbound Approach	Signal				
	AM Peak		149	131	155	131
	PM Peak		#396	#221	#395	#222
17	SB off ramp & Linden Ave - Southbound Approach	Signal				
	AM Peak		44	43	75	97
	PM Peak		77	63	147	125

\# 95th percentile volumes exceed capacity. Queue may be longer. Queue shown in maximum after two cycles of simulation.
[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] 95th percentile queues based on SYNCHRO-7 program

Given the disparity in the future volume forecasts between the SC101 HOV Traffic Study (Dowling Associates, December 2009) and Linden-Casitas Pass Study (Fehr & Peers, June 2007), traffic operations were re-evaluated for the forecasts used in the later study assuming a 3-lane bridge overpass. LOS and queuing results are provided in **Table 6** and **Table 7** respectively along with the 4-lane bridge results as reported in the Linden-Casitas Pass study. Only critical intersections, i.e. #16 and #17 were analyzed for 2036 Build traffic conditions as presented in the Linden-Casitas Pass Study.

Overall operational results are very similar to those produced by SC101 HOV Traffic Study forecasts. LOS results indicate that both intersections will operate at LOS B or better - meeting the Caltrans LOS threshold. Queuing analysis shows that 95th percentile queues will be accommodated within the available storage except for the northbound Linden Avenue approach where queues are projected to exceed the available storage and block upstream intersection during the PM peak hour.

Table 6. 2036 Linden Avenue LOS Results – Linden/Casitas Pass Study Traffic Forecasts

ID	Intersection	Control[1]	4-lane Linden Avenue No Build With HOV Results[2]		4-lane Linden Avenue Build With HOV Results[2]		3-lane Linden Avenue Build With HOV Results	
			Delay (sec)[3]	LOS[4]	Delay (sec)[3]	LOS[4]	Delay (sec)[3]	LOS[4]
16	Linden Ave & Ogan Rd/Via Real	Signal						
	AM Peak		> 50	F	14	B	14.3	B
	PM Peak		> 50	F	16	B	12.6	B
17	SB off ramp & Linden Ave	Signal						
	AM Peak		> 50	F	15	B	17.4	B
	PM Peak		> 50	F	17	B	13	B

[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] As reported in Linden-Casitas Pass Study prepared by Fehr & Peers in June 2007 for 2036 traffic conditions & Alternative 3
[3] Delay is based on HCM 2000, Chapter 16 and 17 methodologies for intersections and FHWA Roundabout Guilde for roundabouts.
[4] HCM LOS is reported for the worst movement at TWSC intersections and for the overall intersection at AWSC, roundabout and signalized intersections

Table 7. 2036 Linden Avenue Queues Results – Linden/Casitas Pass Study Traffic Forecasts

ID	Intersection	Control [1]	95th Percentile Queues (ft) [2]		
			Linden Avenue No Build With HOV [3]	4-lane Linden Avenue Build With HOV [3]	3-lane Linden Avenue Build With HOV
16	Linden Ave & Via Real/Ogan Rd - Westbound Approach	Signal			
	AM Peak		216	53	50
	PM Peak		210	130	89
16	Linden Ave & Via Real/Ogan Rd - Northbound Approach	Signal			
	AM Peak		0	467	185
	PM Peak		0	482	#417
17	SB off ramp & Linden Ave - Southbound Approach	Signal			
	AM Peak		0	77	86
	PM Peak		0	90	140

\# 95th percentile volumes exceed capacity. Queue may be longer. Queue shown in maximum after two cycles of simulation.
[1] TWSC - Two Way Stop Control, AWSC - All Way Stop Control
[2] 95th percentile queues based on SYNCHRO-7 program
[3] Linden-Casitas Pass Study prepared by Fehr & Peers in June 2007 for 2036 traffic conditions & Alternative 3

Conclusion

LOS and queue results indicate that 3-lane bridge structure is not anticipated to generate adverse traffic-related implications. The study intersections will experience acceptable operating conditions (LOS C or better) under both design options during the AM/PM peak hours. The salient differences between the Linden-Casitas Pass and the SC101 HOV Traffic studies include the use of significantly different socio-economic projections as well the use of traffic counts that were collected during vastly different economic conditions.

Appendix F Minimization and/or Mitigation Summary

As discussed on pages 45-46 of this document, eight intersections will experience substantial delays with the project, which requires Caltrans to provide compensatory mitigation to offset anticipated delays. The additional intersection does not change the significance determination from the Draft Revised EIR since the project already identified a significant traffic impact associated with delays at particular study intersections. Caltrans proposes to incorporate the following mitigation plan listed in Table 2.8 below and on page 49. This mitigation plan has been updated to include additional details that further disclose the seconds of delay between the Build and No-Build conditions, as well as the seconds of delay reduction anticipated with mitigation improvements. The updated table also reflects further refinements subsequent to additional meetings held with local jurisdictions since public release of the Draft Revised EIR (also refer to Chapter 4).

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Table F-1 Mitigation Plan

Location	Mitigation Options[1]	2040 Delay Change without Mitigation (seconds)[2]		2040 Delay Change with Mitigation from Build (seconds)[3]		Caltrans Equitable Share (P)[4]	Assumed Cost (C_T)[4]	Compensatory Contribution (to nearest $1000) (C)[4]
		AM	PM	AM	PM			
#8 Southbound On-/Off-ramps and Bailard	Convert from 2-way to 4-way stop control. Improvements will be constructed by Caltrans prior to completion of phased construction within the applicable local jurisdiction.	15.3	153.3	-122.0	-206.3	54.7%	$800	$800[5]
#19 Southbound On-/Off-ramps and Carpinteria Avenue/Reynolds Ave.	Convert from 2-way to 4-way stop control. Improvements will be constructed by Caltrans prior to completion of phased construction within the applicable local jurisdiction.	-0.7	461.9	-17.0	-969.6	2.0%	$800	$800[5]
#21 Northbound On-/Off-ramps and Via Real/Santa Monica	Prior to starting project construction within the City of Carpinteria, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Carpinteria setting forth a schedule and responsibilities for the funding and construction of improvements to the Northbound on-/off-ramp and Via Real/Santa Monica intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies[1]. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.							
	Option 1 - Install signal with dual left-turn lanes for westbound traffic and widen Northbound on-ramp to two receiving lanes which merge back to one before the gore.	116.3	-37.7	-123.6	-45.4	75.9%	$2,500,000	$1,897,000
	Option 2 – Install single-lane roundabout.			-146.0	-103.0		$4,500,000	$3,415,000
#37 Southbound Off-ramp and San Ysidro/Eucalyptus Lane	Prior to starting project construction within the County of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the County of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements at the San Ysidro interchange identified in Option 1 and/or Option 2 below. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2040 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies[1]. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in the vicinity of this intersection.							
	Option 1 – Install 4-way stop control at intersection #37. Delay reduction may not be adequate, however, without additional improvements at the Northbound ramp/N. Jameson/San Ysidro intersection.	8.3	-547.4	-23.9	-26.8	13.5%	$800	$800[5]
	Option 2 – Install 4-way stop control at Southbound off-ramp and San Ysidro/Eucalyptus Lane intersection with single-lane roundabout at the Northbound ramp/N. Jameson/San Ysidro intersection.			-23.9	-26.8		$3,000,000	$405,000

1 The type of improvements needed to bring the traffic levels to No-Build conditions, or better, in 2040.
2 Indicates the changes in delay associated with building the project.
3 Indicates the amount of delay reduction associated with building the project and incorporating the respective mitigation option.
4 Calculations of Caltrans equitable share responsibilities are shown in Appendix G.
5 Caltrans proposes to pay full contribution for items with an improvement cost under $5,000.
6 No capital cost anticipated with this action.

Location	Mitigation Options[1]	2040 Delay Change without Mitigation (seconds)[2]		2040 Delay Change with Mitigation from Build (seconds)[3]		Caltrans Equitable Share (P)[4]	Assumed Cost (C_T)[4]	Compensatory Contribution (to nearest $1000) (C)[4]
		AM	**PM**	**AM**	**PM**			
#39 Olive Mill Road/Coast Village Road	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other type of binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Olive Mill Road/Coast Village Road intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2040 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Final Revised EIR and supporting technical studies. The agreement shall require the improvements to be in place prior to project completion. The improvements to the intersection shall consist of a one-lane roundabout. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in the vicinity of this intersection.	-39.4	11.0	-27.0	-33.7	34.3%	$4,500,000	$1,545,000
#107 Cabrillo Boulevard/Los Patos	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Cabrillo Boulevard/Los Patos intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Final Revised EIR and supporting technical studies.[1] The agreement shall require the improvements to be in place prior to project completion. Options for the improvements to the intersection that shall be considered for inclusion in the agreement, include the two options below. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.							
	Option 1 - Install signal.	1.4	66.4	-14.4	-97.8	69.6%	$500,000	$349,000
	Option 2 – Install single-lane roundabout.			-20.3	-104.6		$3,000,000	$2,090,000
#48 Southbound Off-ramp and Milpas	Prior to starting project construction within the City of Santa Barbara, Caltrans shall make all reasonable efforts to enter into a cooperative agreement or other binding agreement with the City of Santa Barbara setting forth a schedule and responsibilities for the funding and construction of improvements to the Southbound off-ramp and Milpas intersection. The improvements identified in the agreement shall ensure levels of service at the intersection do not exceed 2020 No-Build conditions at the intersection as set forth in the South Coast 101 HOV Lanes Project Draft Revised EIR and supporting technical studies.[1] The agreement shall require the improvements to be in place prior to project completion. Caltrans' preferred option for providing mitigation at this location includes adding a second right-turn lane to Southbound off-ramp and retaining existing stop control at intersection. Improvements must be made prior to completion of phased construction within the applicable local jurisdiction.	22.3	106.1	-31.2	-245.3	66.4%	$200,000	$133,000
#79 Southbound On-ramp and State Street and SR 154	Caltrans shall adjust the signal phasing, coordinate signal actuation and delay optimization (in coordination with intersection #792 (San Marcos and Southbound on-ramp node) and ensure that the improvements are constructed by no later than project completion. Although the delay impacts won't occur until 2040, Caltrans intends to ensure improvements will be in place by the time the HOV features are constructed in this local jurisdiction.	11.3	22.5	-85.9	-99.1	21.1%	$0[6]	$0[6]

1 The type of improvements needed to bring the traffic levels to No-Build conditions, or better, in 2040.
2 Indicates the changes in delay associated with building the project.
3 Indicates the amount of delay reduction associated with building the project and incorporating the respective mitigation option.
4 Calculations of Caltrans equitable share responsibilities are shown in Appendix G.
5 Caltrans proposes to pay full contribution for items with an improvement cost under $5,000.
6 No capital cost anticipated with this action.

Appendix G Equitable Share Calculations Table

This appendix was added to show how Caltrans' equitable share responsibilities were calculated.

EQUITABLE SHARE RESPONSIBILITY: **Equation C-1**

NOTE: $T_E < T_B$, see explanation for T_B below.

$$P = \frac{T}{T_B - T_E}$$

Where:

P = The equitable share for the proposed project's traffic impact.

T = The vehicle trips generated by the project during the peak hour of adjacent State highway facility in vehicles per hour, vph. (20 year build minus 20 year No-Build)

T_B = The forecasted traffic volume on an impacted State highway facility at the time of general plan build-out (e.g., 20 year model or the furthest future model date feasible), vph.

T_E = The traffic volume existing on the impacted State highway facility plus other approved projects that will generate traffic that has yet to be constructed/opened, vph.

EQUITABLE COST: **Equation C-2**

$$C = P\,(C_T)$$

Where:

C = The equitable cost of traffic mitigation for the proposed project ($).

P = The equitable share for the project being considered.

C_T = The total cost estimate for improvements necessary to mitigate the forecasted traffic demand on the impacted facility in question at general plan build-out ($).

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Equitable Share Calculations							
Location	Mitigation Options[1]	Total Entering Traffic Volume		Delta (T)	Equitable Share (P)	Assumed Cost (C_T)	Compensatory Contribution (to nearest $1000) (C)
		Existing (TE)	2040 Build (T_B)				
#8 Southbound On-/Off-ramps and Bailard	Convert from 2-way to 4-way stop control.	876	1119	133	54.7%	$800	$800[2]
#19 Southbound On-/Off-ramps and Carpinteria Avenue/Reynolds Avenue	Convert from 2-way to 4-way stop control..	979	1480	10	2.0%	$800	$800[2]
#21 Northbound On-/Off-ramps and Via Real/Santa Monica	Option 1 - Install signal with dual left-turn lanes for westbound traffic and widen Northbound on-ramp to two receiving lanes which merge back to one before the gore.	1187	1610	321	75.9%	$2,500,000	$1,897,000
	Option 2 - Install single-lane roundabout.					$4,500,000	$3,415,000
#37 Southbound Off-ramp and San Ysidro Road/Eucalyptus Lane	Option 1 – Install 4-way stop control at intersection #37. Delay reduction may not be adequate, however, without additional improvements at the Northbound ramp /N. Jameson/San Ysidro intersection.	700	789	12	13.5%	$800	$800[2]
	Option 2 – Install 4-way stop control at Southbound off-ramp and San Ysidro/Eucalyptus Lane intersection with single-lane roundabout at the Northbound ramp/N. Jameson/San Ysidro intersection.					$3,000,000	$405,000
#39 Olive Mill Road/Coast Village Road	Construct one-lane roundabout.	992	1359	126	34.3%	$4,500,000	$1,545,000
#107 Cabrillo Boulevard/Los Patos	Option 1 – Install signal.	1068	1325	179	69.6%	$500,000	$349,000
	Option 2 – Install single-lane roundabout.					$3,000,000	$2,090,000
#48 Southbound Off-ramp and Milpas Street	Add second right-turn lane to Southbound off-ramp; retain existing stop control at intersection.	2696	3089	261	66.4%	$200,000	$133,000
#79 Southbound On-ramp and State Street and SR 154	Adjust signal phasing, coordinate signal actuation and delay optimization (in coordination with intersection #79A - San Marcos and Southbound on-ramp node).	1635	1867	49	21.1%	$0[3]	$0[3]

[1] The type of improvements needed to bring the traffic levels to No-Build conditions, or better, in 2040.
[2] Caltrans proposes to pay full contribution for items with an improvement cost under $5,000
[3] No capital cost anticipated with this action.

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Appendix H Traffic Data Validation and Analysis Summary Memos

The memos contained within this appendix were prepared after public circulation of the Draft Revised EIR in order to clarify and provide backup data for use in the responses to comments.

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: Jason Wilkinson
Senior Environmental Planner
Caltrans District 5

Date: April 21, 2017

File: **EA# 0N7000**
Proj# 0500000225

From: Sam Toh, P.E., T.E
Transportation Engineer
Traffic Operations

Subject: SC101-HOV Traffic Forecast Growth Projection Validation

This memo establish the validity of the forecast growth projections used in the Forecast Operations Report (October 2009, Amended December 2011). The growth projections were validated as follows:

The Department maintains five (5) physical count stations within the South Coast 101 HOV project traffic study limits which were used to validate the forecast projection growth rate outlined in the Travel Forecast Report (February 2009). Four count stations were located along US 101 and one on SR154. Along US101, one count station is located at the southern end of project near US101/SR150, one at the northern end of the project near US101/Glen Annie interchange, and two are located in between US101/SR154 interchange and US101/Las Positas interchange. The one on SR154 is located near SR154/Colina Rd under-crossing (see table and chart on page 4 of this memo). The four count stations collect daily traffic counts continuously, 365 days a year, the one at SR154/Colina Rd collects daily for a full month at quarterly intervals. The traffic volume data collected are known as Annual Average Daily Traffic (AADT). Outputs from these count stations were compared using the 2040 No-Build and Build forecast growth projection shown in Table 7 & 8 reported in the Travel Forecast Report (see attachments).

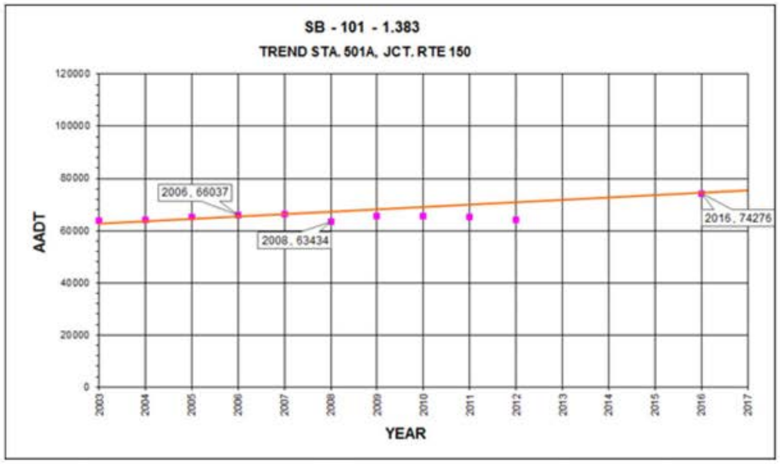
Below are the results after comparing the projected 2015/2016 AADT count based on the forecasted growth rate to the latest actual traffic count available from each count station along the US101 corridor.

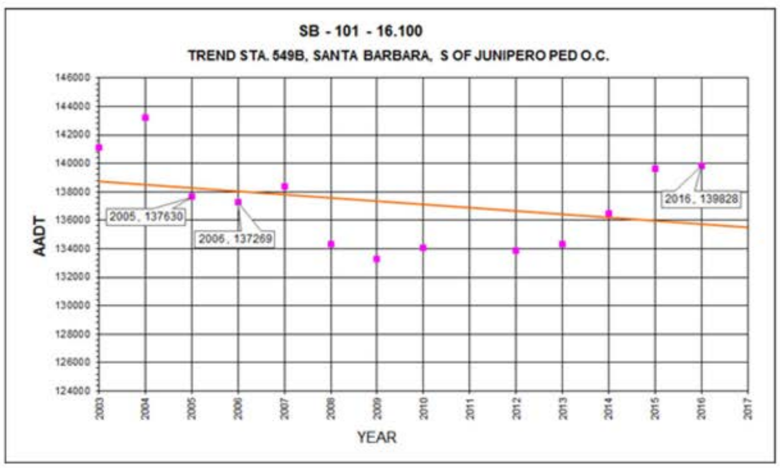
	Trend Station I.D.	Actual Post Miles	2008 AADT Count	Projection Source *	Forecast AAGR	2016 AADT Projection based on Travel Forecast	Trend Station count year	Actual Trend Station AADT count	% Diff. between Projection and Station count ~	
101 / SR150 I.C.	501	1.383	65300	Table 8	1.25%	72123	2016	74276	-2.99%	(HOV section completed, Sept 2014)
Las Positas I.C.	549	16.100	143200	Table 7	0.31%	146790	2016	139828	4.74%	
101 / SR154 I.C.	502	16.812	138700	Table 7	0.42%	143429	2016	137516	4.12%	
Storke/Glen Annie I.C.	120	23.911	66400	Table 7	1.03%	71338	2015	65566	8.09%	

Footnotes:
AAGR : Average Annual Growth Rate
** Source: SC101-HOV Travel Forecast Report, Feb 2009. Table 7. for No-Build Forecast, Table 8. for Build Forecast.*
~ -ve value means the forecast model is under-projecting compared to latest real available count data
~ +ve value means the forecast model is over-projecting compared to latest real available count data

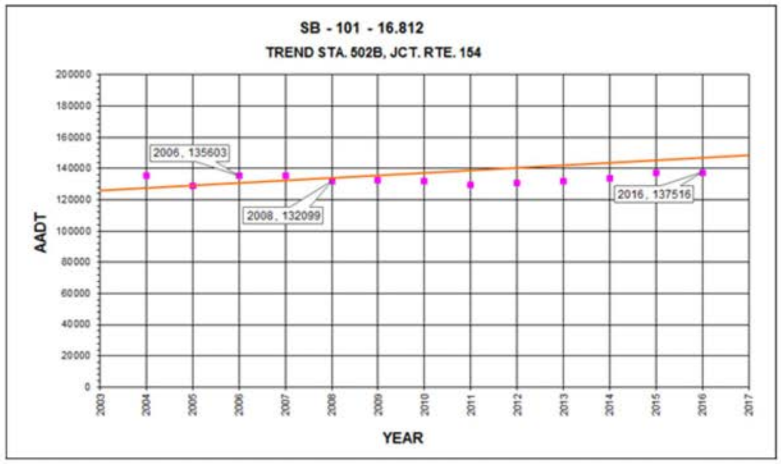
"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

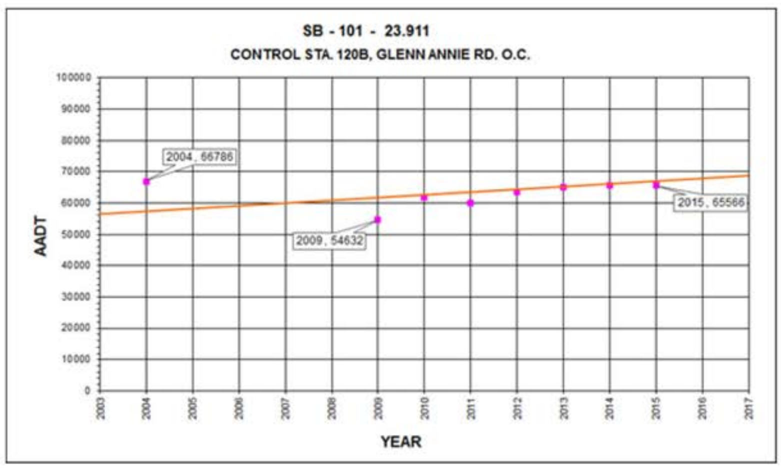
Trend lines were also generated from these count stations between available 2003 to 2015/2016 data and the results are presented below.





"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

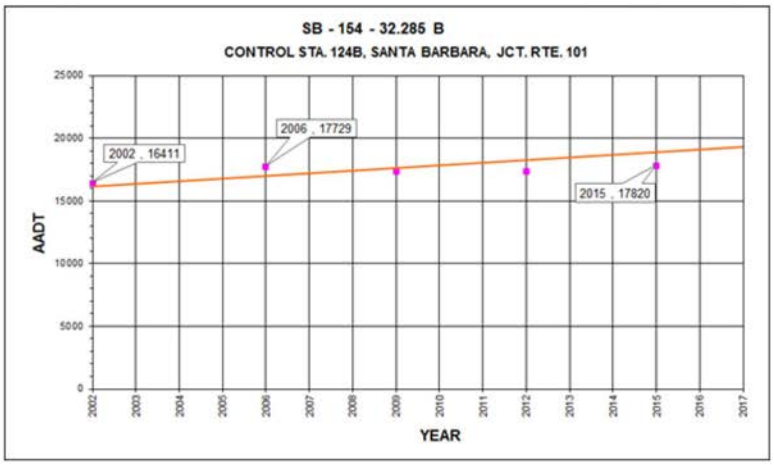




From the table and trend graphs presented above, they shows that the forecast projection falls between -2.99% to +8.09%, well within the expected margin of deviation (±10%). Therefore, it is appropriate to conclude that traffic volumes in the corridor will continue to grow as forecasted and that the traffic forecast analysis continues to be valid. Furthermore, from the trend graphs, they also show that the traffic trend entering and leaving the corridor remain stable. This indicates that inter-regional traffic passing through the corridor are as predicted. Also of note is the finding that growth rates within the City of Santa Barbara are the highest as predicted compared with those entering and leaving the corridor. This indicates the growth patterns are likely be attributed to local development approvals within the City of

Santa Barbara (see trend graphs for Station 549B & 502B and compare the AADT on both ends of the corridor, Station 501 & 120). This finding was further reinforced by count Station 124 shown below, located near SR154/Colina Rd under-crossing, south of SR192 (Cathedral Oaks Rd/Foothill Rd) that inter-regional growth on SR154 is also very stable. The calculated growth from year 2006 to year 2015 was at +0.06%, a 100 vehicles increase in 9 years.

	Trend Station I.D.	Actual Post Miles	2006 AADT Count	Projection Source	Forecast AAGR	2015 AADT Forecast matching actual count	Trend Station count year	Actual Trend Station AADT count	% Diff. between Projection and Station count ~
SR 154 / Colina Rd U.C.	124	32.070	17729	To match actual count	0.06%	17820	2015	17820	0.00%



Attachment(s)
(1) Table 7 & 8, from Travel Forecast Report(Feb 2009)

c: Paul McClintic, P.E., T.E., Senior Transportation Engineer, Traffic Operations
Scott Eades, South Coast 101 Corridor Manager, Project Management

Dowling Associates, Inc.
Transportation Engineering • Planning • Research • Education

Table 8. 2040 Build Forecast vs. Historical Growth for Highway 101

Post Mile, Station	Caltrans 1980 AADT	Caltrans 2007 AADT	% Change 1980-2007	Annual % Change	2008 Count	% Change 1980-2008	Annual % Change	2040 Forecast Build	% Change 2007-2040 Build	Annual % Change Build	% Change 2008-2040 Build	Annual % Change Build
County Line												
	35,500	65,000	83.10	2.27	61,000	71.83	1.95	89,200	37.23	0.96	46.23	1.19
1.12 End Freeway												
	35,500	66,000	85.92	2.32	61,300	72.68	1.97	89,200	35.15	0.92	45.51	1.18
1.22 Begin Freeway												
	36,500	70,000	91.78	2.44	65,300	78.90	2.10	97,300	39.00	1.00	49.00	1.25
2.64 Carp. W. Casitas I/C												
	36,000	70,000	94.44	2.49	63,800	77.22	2.06	99,400	42.00	1.07	55.80	1.40
3.06 Carp. Linden Ave. I/C												
	39,000	75,000	92.31	2.45	69,500	78.21	2.08	105,200	40.27	1.03	51.37	1.30
3.77 Carp. Santa Monica Rd. I/C												
	40,500	75,000	85.19	2.31	73,300	80.99	2.14	113,900	51.87	1.27	55.39	1.39
5.28 South Pardaro Ln. I/C												
	40,000	79,000	97.50	2.55	74,000	85.00	2.22	118,300	49.75	1.23	59.86	1.48
8.26 Evans Ave. I/C												
	42,000	83,000	97.62	2.55	78,200	86.19	2.24	123,600	48.92	1.21	58.06	1.44
9.00 Mont. Shelfield Dr. I/C												
	44,000	86,000	95.45	2.51	81,000	84.09	2.20	127,600	48.37	1.20	57.53	1.43
10.02 San Ysidro I/C												
	47,000	91,000	93.62	2.48	87,200	85.53	2.23	134,200	47.47	1.18	53.90	1.36
10.54 Olive Mill Rd. I/C												
	45,000	86,000	91.11	2.43	84,600	88.00	2.28	129,000	50.00	1.24	52.48	1.33
11.41 Montecito Jct. 225												
	52,000	94,000	80.77	2.22	95,500	83.65	2.19	140,600	49.57	1.23	47.23	1.22
12.75 Milpas St.												
	52,000	98,000	88.46	2.37	109,400	110.38	2.69	134,000	36.73	0.95	22.49	0.64
14.19 Castillo St.												
	57,000	111,000	94.74	2.50	109,900	92.81	2.37	131,500	18.47	0.51	19.65	0.56
14.76 Carrillo St.												
	68,000	126,000	85.29	2.31	135,300	98.97	2.49	156,500	24.21	0.66	15.67	0.46
15.73 Mission St.												
	76,000	138,000	81.58	2.23	143,200	88.42	2.29	160,300	16.16	0.45	11.94	0.35
16.55 Las Positas Rd.												
	76,000	137,000	80.26	2.21	138,700	82.50	2.17	159,600	16.50	0.46	15.07	0.44
17.78 La Cumbre Rd.												
	67,000	132,000	97.01	2.54	137,600	105.37	2.60	157,300	19.17	0.53	14.32	0.42
18.36 Rte. 154												
	66,000	120,000	81.82	2.24	121,400	83.94	2.20	140,200	16.83	0.47	15.49	0.45
18.92 El Sueno Rd.												
	66,000	120,000	81.82	2.24	127,900	93.79	2.39	146,700	22.25	0.61	14.70	0.43
20.06 Turnpike Rd.												
	64,000	113,000	76.56	2.13	123,600	93.13	2.38	142,000	25.66	0.69	14.89	0.43
21.41 Rte. 217												
	48,000	90,000	87.50	2.36	90,400	88.33	2.29	104,400	16.00	0.45	15.49	0.45
22.53 Fairview Rd.												
	39,000	77,000	97.44	2.55	78,100	100.26	2.51	92,500	20.13	0.56	18.44	0.53
23.71 Los Cameros Rd.												
	32,000	63,000	96.88	2.54	66,400	107.50	2.64	88,000	39.68	1.02	32.53	0.88
24.79 Glen Annie Rd.												
	19,600	33,000	68.37	1.95	31,800	62.24	1.74	65,800	99.39	2.11	106.92	2.30
26.91 Hollister Avenue												

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Table 7. 2040 No-Build Forecast vs. Historical Growth for Highway 101

Post Mile, Station	Caltrans 1980 AADT	Caltrans 2007 AADT	% Change 1980-2007	Annual % Change	2008 Count	% Change 1980-2008	Annual % Change	2040 Forecast No Build	% Change 2007-2040 No Build	Annual % Change No Build	% Change 2008-2040 No Build	Annual % Change No Build
County Line												
	35,500	65,000	83.10	2.27	61,000	71.83	1.95	82,700	27.23	0.73	35.57	0.96
1.12 End Freeway												
	35,500	66,000	85.92	2.32	61,300	72.68	1.97	82,600	25.15	0.68	34.75	0.94
1.22 Begin Freeway												
	36,500	70,000	91.78	2.44	65,300	78.90	2.10	87,200	24.57	0.67	33.54	0.91
2.64 Carp. W. Casitas I/C												
	36,000	70,000	94.44	2.49	63,800	77.22	2.06	85,800	22.57	0.62	34.48	0.93
3.06 Carp. Linden Ave. I/C												
	39,000	75,000	92.31	2.45	69,500	78.21	2.08	88,500	18.00	0.50	27.34	0.76
3.77 Carp. Santa Monica Rd. I/C												
	40,500	75,000	85.19	2.31	73,300	80.99	2.14	93,200	24.27	0.66	27.15	0.75
5.28 South Pardaro Ln. I/C												
	40,000	79,000	97.50	2.55	74,000	85.00	2.22	93,200	17.97	0.50	25.95	0.72
8.26 Evans Ave. I/C												
	42,000	83,000	97.62	2.55	78,200	86.19	2.24	98,400	18.55	0.52	25.83	0.72
9.00 Mont. Shelfield Dr. I/C												
	44,000	86,000	95.45	2.51	81,000	84.09	2.20	100,600	16.98	0.48	24.20	0.68
10.02 San Ysidro I/C												
	47,000	91,000	93.62	2.48	87,200	85.53	2.23	105,400	15.82	0.45	20.87	0.59
10.54 Olive Mill Rd. I/C												
	45,000	86,000	91.11	2.43	84,600	88.00	2.28	105,300	22.44	0.62	24.47	0.69
11.41 Montecito Jct. 225												
	52,000	94,000	80.77	2.22	95,500	83.65	2.19	122,900	30.74	0.82	28.69	0.79
12.75 Milpas St.												
	52,000	98,000	88.46	2.37	109,400	110.38	2.69	130,400	33.06	0.87	19.20	0.55
14.19 Castillo St.												
	57,000	111,000	94.74	2.50	109,900	92.81	2.37	128,600	15.86	0.45	17.02	0.49
14.76 Carrillo St.												
	68,000	126,000	85.29	2.31	135,300	98.97	2.49	151,700	20.40	0.56	12.12	0.36
15.73 Mission St.												
	76,000	138,000	81.58	2.23	143,200	88.42	2.29	158,300	14.71	0.42	10.54	0.31
16.55 Las Positas Rd.												
	76,000	137,000	80.26	2.21	138,700	82.50	2.17	158,400	15.62	0.44	14.20	0.42
17.78 La Cumbre Rd.												
	67,000	132,000	97.01	2.54	137,600	105.37	2.60	157,300	19.17	0.53	14.32	0.42
18.36 Rte. 154												
	66,000	120,000	81.82	2.24	121,400	83.94	2.20	139,700	16.42	0.46	15.07	0.44
18.92 El Sueno Rd.												
	66,000	120,000	81.82	2.24	127,900	93.79	2.39	146,100	21.75	0.60	14.23	0.42
20.06 Turnpike Rd.												
	64,000	113,000	76.56	2.13	123,600	93.13	2.38	142,300	25.93	0.70	15.13	0.44
21.41 Rte. 217												
	48,000	90,000	87.50	2.36	90,400	88.33	2.29	109,700	21.89	0.60	21.35	0.61
22.53 Fairview Rd.												
	39,000	77,000	97.44	2.55	78,100	100.26	2.51	98,800	28.31	0.76	26.50	0.74
23.71 Los Cameros Rd.												
	32,000	63,000	96.88	2.54	66,400	107.50	2.64	92,300	46.51	1.16	39.01	1.03
24.79 Glen Annie Rd.												
	19,600	33,000	68.37	1.95	31,800	62.24	1.74	70,100	112.42	2.31	120.44	2.50
26.91 Hollister Avenue												

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State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: Jason Wilkinson
Senior Environmental Planner
Caltrans District 5

Date: September 07, 2017

File: **EA# 0N7000**
Proj# 0500000225

From: Sam Toh, P.E., T.E
Transportation Engineer
Traffic Operations

Subject: Technical Errata Memo

This memo provides information regarding tasks performed to address comments received during public circulation of the Draft Revised Environmental Impact Report (RDEIR). The methodology as well as resulting data and findings are included. The following tasks were performed:

1. Comparison of volume data in figures and Synchro 7 outputs taken from the Forecast Operations Report
2. Balancing of traffic volumes
3. An analysis using balanced volumes
4. An ICU analysis performed for Intersection #83 (Turnpike/Calle Real) and #86 (Patterson Ave and Calle Real)

Methodology

A comparison of data contained in the SC101 HOV Traffic Study Forecast Operations Report (FOR) and the SC101 HOV Traffic Study Forecast Operations Report Technical Appendices (FOR Appendices). This data comparison included the following:

1. **2040/2020 Traffic Volumes**
Traffic volumes from the FOR (Figures 37/38)for the 2040 Build/No Build AM and PM peak hours at all intersections were compared to the FOR Appendices. Intersections identified in the 2040 Build/No Build volume comparison were also reviewed for the 2020 Build/No Build AM and PM peak hours (FOR Figures 35/36) to verify intersection volume balance.

2. **Volume Balancing**
The following intersections were identified as being more than 15%[1] imbalanced in the 2040 Build/No Build scenario. A focused evaluation of traffic volumes was conducted for the intersections, including a volume balance check for each intersection.

I. # 106. Milpas St/Quinientos St
II. # 47. Milpas St/US 101 NB Ramps
III. # 102. Garden St/Gutierrez St
IV. # 50. Garden St/US 101 NB Ramps
V. # 14. Casitas Pass Rd/Carpinteria Ave
VI. # 13. Casitas Pass Rd/US 101 SB Ramps

[1] Balancing turn movement checks/adjustments, 2009 Forecast Operation Report

VII. # 28. Ortega Hill Rd/NB Off Ramp

From the list of intersections above, only intersection #106 was identified for rebalancing in the 2020 Build and No Build scenario for the AM & PM.

3. **Analysis Using Balanced Volumes**
An analysis of each of the identified intersections was conducted using the same methodologies used in the FOR. The analysis was conducted using Synchro 7 software, HCM2000 methodology, which was the methodology used in the RDEIR.

Synchro 7 output reports are contained in **Attachment 1.**

4. **ICU Analysis**
Based on comments from the County of Santa Barbara, Intersection #86 (Patterson Ave/Calle Real) and Intersection #83 (Turnpike/Calle Real) were reanalyzed using the ICU methodology. The analysis was conducted using Traffix Software and the methodologies used by the County of Santa Barbara.

ICU output reports are contained in **Attachment 2.**

Analysis

1. **Comparison of Data.** Several public comments reported that data used in the Synchro analysis used different data from those presented in the figures of the FOR. An evaluation showed that the Synchro analysis and the LOS calculations were conducted by removing the Right Turns on Red (RTOR) traffic volumes reported in Figure 39 of the FOR and by prohibiting RTOR in the Synchro analysis. This is an acceptable methodology, and therefore, not discussed further in this analysis.

2. **2040 Traffic Volumes**
Several locations were identified where the information provided in the FOR did not match the data provided in the FOR Synchro Appendix C. Table A lists the locations where the volumes were different.

Table A - Volume Differences between Synchro Appendices and Figures (Year 2040)

#	Intersection Name	Comment
50	Garden St/US 101 NB Ramps	SBT under No Build AM is different
82	Turnpike Rd/US 101 SB Ramps	NBT, SBL, SBT, EBT, WBL, WBT under No Build AM are different
83	Turnpike Rd/Calle Real	NBL, NBT, SBT, WBL, WBT under No Build AM are different
84	Patterson Ave/US 101 NB Ramps	NBL, NBT, SBT, WBL, WBT under No Build AM are different
85	Patterson Ave/US 101 SB Ramps	NBT, SBL, SBT, EBL under No Build AM are different
86	Patterson Ave/Calle Real	NBL, NBT, SBT, EBL under No Build AM are different
87	Fairview Ave/US 101 NB Off-Ramp	SBT, EBL under No Build AM are different
88	Fairview Ave/Calle Real	NBL, NBT, SBL, SBT, EBL, EBT, WBL, WBT under No Build AM are different
89	Fairview Ave/US 101 SB Ramps	NBT, SBL, SBT, EBL under No Build AM are different

90	Los Carneros Rd/US 101 NB Ramps	NBL, SBL, SBT, EBL under No Build AM are different
91	US 101 NB Ramps/Calle Real	NBT, SBL, SBT, EBL under No Build AM are different
92	Los Carneros Rd/Calle Real	NBT, SBT, WBL under No Build AM are different
93	Glenn Annie Rd/US 101 NB Ramps	NBL, NBT, SBL, SBT, EBL, EBT, WBL, WBT under No Build AM are different
94	Glenn Annie Rd/Del Norte Dr	NBT, SBT under No Build AM are different
95	Glenn Annie Rd/US 101 SB Ramps	NBT, SBL, SBT, EBL under No Build AM are different
96	US 101 NB On-Ramp/Calle Real	EBT, WBL, WBT under No Build AM are different
97	Hollister Ave/US 101 SB Ramps	NBT, SBL, SBT, EBL, EBT under No Build AM are different
98	Winchester Canyon Rd/US 101 NB Off-Ramp	SBR, EBL, WBT under No Build AM are different
100	US 101 NB Ramps/Via Real	NBL, EBT, WBL, WBT under No Build AM are different
102	Garden St/Gutierrez St	NBL, NBT, SBT, WBL, WBT under No Build AM are different; NBL & NBT different under Build AM & PM
103	Castillo St/Montecito St	NBL, NBT, SBL, SBT, EBL, EBT, WBL, WBT under No Build AM are different
104	Carrillo St/San Andres Rd	NBL, NBT, SBL, SBT, EBL, EBT, WBL, WBT under No Build AM are different
105	Mission St/Modoc Rd	NBL, NBT, SBT, EBL under No Build AM are different
106	Milpas St/Quinientos St	NBL, NBT, SBL, SBT under No Build AM are different
792	San Marcos Pass/US 101 SB On-Ramp	NBL, SBL, SBT, EBL, EBT, WBL, WBT under No Build AM are different

* NB, SB, EB, WB are the directions (Northbound, Southbound, Eastbound, and Westbound); and L, T, R are the specific movement (Left, Through, and Right)

Source: SC101 HOV Traffic Study Forecast Operations Report (Figures 37/38); SC101 HOV Traffic Study Forecast Operations Report Technical Appendices

Based on further review, it was identified that incorrect files/printouts were included in the PDFs circulated in the RDEIR for the No Build AM Peak hour. There was one intersection, # 102 (Garden St/Gutierrez St), where volumes were also different for the Build AM and PM peak hours.

3. **Volume Balancing**

As stated in the methodology section, the following corridors were evaluated to identify volume imbalances:

- Evans Road - # 31 (Evans Ave/US 101 SB Off-Ramp), and # 29 (Evans Ave/Ortega Hill Rd)
- Casitas Pass Road - # 14 (Casitas Pass Rd/Carpinteria Ave), and # 13 (Casitas Pass Rd/US 101 SB Ramps)
- Milpas Street - # 106 (Milpas St/Quinientos St), and # 47 (Milpas St/US 101 NB Ramps)
- Garden Street - # 102 (Garden St/Gutierrez St), and # 50 (Garden St/US 101 NB Ramps)

The intersections on Casitas Pass Road and Ortega Hill Road were not rebalanced even though the 15% threshold was exceeded in these instances. These intersections are in the Downtown area where there are several commercial driveways between the analysis intersections which could account for the volume imbalance.

Volumes on Milpas Street and Garden Street were balanced to within 15%. On the Milpas Street corridor, volumes at # 106 (Milpas St/Quinientos St) were balanced with # 47 (Milpas St/US 101 NB Ramps). On the Garden Street corridor, volumes at # 102 (Garden St/Gutierrez St) were balanced with # 50 (Garden St/US 101 NB Ramps). The resulting traffic volumes show an imbalance of less than 15%.

4. **Revised Analysis Using Revised Volumes**
The Level of Service at intersections where volumes were revised were calculated using Synchro 7 software. Table B shows a comparison of LOS reported in the FOR and the resulting LOS using updated volumes for 2040 conditions. There was no imbalance at # 82 (Turnpike Rd/US 101 SB), but a very minor Synchro input error was discovered in the 2040 Build AM EB through movement during the volume imbalance checks. The error was corrected in the model and the intersection was re-analyzed.

Table B: 2040 LOS Comparison

		2040 No Build (From FOR[1])				2040 No Build Revised				2040 Build (From FOR[1])				2040 Build Revised			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
82 . Turnpike Rd/US 101 SB	Signal	-		-		-		-		25.2	C	20.6	C	25.3	C	20.6	C
102 . Garden St/Gutierrez St	Signal	-		-		-		-		20.8	C	64.2	E *	20.4	C	61.7	E *
106 . Milpas St/Quinientos St	Signal	-		-		-		-		9.6	A	21.8	C	10.2	B	27.0	C

Note:
[1] FOR - SC101HOV Traffic Study Forecast Operations Report, Oct 19, 2009 (Amended Dec 9, 2011)
* Exceeds LOS Threshold
LOS = Level of Service

There was no imbalance at # 64 (Mission St/US 101 SB), but a Synchro input error was discovered in the 2020 No-Build and Build PM NB through movement and SB Left during the volume imbalance checks. The error was corrected in the model and the intersection was re-analyzed. Table C shows a comparison of LOS reported in the FOR and the resulting LOS using updated volumes for 2020 conditions.

Table C: 2020 LOS Comparison

		2020 No Build (From FOR[1])				2020 No Build Revised				2020 Build (From FOR[1])				2020 Build Revised			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
64 . Mission St/US 101 SB	Signal	-		33.8	C	-		33.3	C	-		36.0	D	-		35.4	D
106 . Milpas St/Quinientos St	Signal	9.4	A	13.4	B	9.5	A	15.4	B	9.4	A	13.8	B	9.4	A	16.0	B

Note:
[1] FOR - SC101HOV Traffic Study Forecast Operations Report, Oct 19, 2009 (Amended Dec 9, 2011)
LOS = Level of Service

The results in Table B and C show a minimal change in LOS and Delay using the revised volumes.

5. **ICU Analysis**
An ICU analysis was conducted for Intersections # 83 (Turnpike/Calle Real) and # 86 (Patterson Ave/Calle Real) for the 2020 No Build conditions based on comments from the County of Santa Barbara. The resulting LOS were the same as those reported in the FOR.

6. **Intersection #48, 2020 & 2040 No-Build Conditions**
The No-Build condition LOS and Delay reported in the Draft Revised Environmental Impact Report (RDEIR, Nov. 2016) for this intersection was taken erroneously from the Tech Memo prepared by Kittelson/Dowling Associates in April 2012 for the Cabrillo Blvd I/C Alternative LOS Analysis at Milpas and US-101 SB Ramp Baseline condition. The No-build conditions performance should be reported. This correction affects Table 2.1, 2.2, 2.5, 2.6, 2.7, 2.8 and Appendix B: Corridor-wide LOS Figure B in the FREIR for this intersection.

Attachment(s)
(1) Synchro outputs superseding printouts in Forecast Operation Report Appendix C

(2) ICU outputs superseding printouts in Forecast Operation Report Appendix D
(3) Intersection #48 Synchro outputs superseding printouts in Forecast Operation Report Appendix C

c: Paul McClintic, P.E., T.E., Senior Transportation Engineer, Traffic Operations
Scott Eades, South Coast 101 Corridor Manager, Project Management

Attachment 1

2020 & 2040 Build/No Build

SYNCHRO-7 Output Reports

(These outputs supersedes those in the Forecast Operations Report Appendix C)

Table A Outputs

Lane Group	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	122	135	154	866	726	374
v/c Ratio	0.56	0.70	0.58	0.33	0.37	0.43
Control Delay	35.4	46.2	37.0	2.4	15.0	17.1
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	35.4	46.2	37.0	2.7	15.0	17.1
Queue Length 50th (ft)	42	47	63	51	124	123
Queue Length 95th (ft)	#91	#118	m87	m42	m175	m172
Internal Link Dist (ft)	173			177	463	
Turn Bay Length (ft)			200			200
Base Capacity (vph)	230	206	333	2609	1965	879
Starvation Cap Reductn	0	0	0	1065	0	0
Spillback Cap Reductn	0	0	0	0	65	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.66	0.46	0.56	0.38	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑	↱	↰	↑↑			↑↑	↱
Volume (vph)	0	0	0	112	0	124	142	797	0	0	668	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.2	4.2	3.7	4.2			4.2	4.2
Lane Util. Factor					1.00	1.00	1.00	0.95			0.95	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1770	1583	1770	3539			3539	1583
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1770	1583	1770	3539			3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	122	0	135	154	866	0	0	726	374
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	122	135	154	866	0	0	726	374
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type				Split		Perm	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					7.4	7.4	8.0	44.2			32.5	32.5
Effective Green, g (s)					7.4	7.4	8.0	44.2			32.5	32.5
Actuated g/C Ratio					0.12	0.12	0.13	0.74			0.54	0.54
Clearance Time (s)					4.2	4.2	3.7	4.2			4.2	4.2
Vehicle Extension (s)					2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)					218	195	236	2607			1917	857
v/s Ratio Prot					0.07		c0.09	0.24			0.21	
v/s Ratio Perm						c0.09						c0.24
v/c Ratio					0.56	0.69	0.65	0.33			0.38	0.44
Uniform Delay, d1					24.8	25.2	24.7	2.8			7.9	8.3
Progression Factor					1.00	1.00	1.31	0.74			1.65	1.64
Incremental Delay, d2					1.8	8.3	3.6	0.3			0.4	1.0
Delay (s)					26.5	33.5	35.9	2.3			13.5	14.5
Level of Service					C	C	D	A			B	B
Approach Delay (s)		0.0			30.2			7.4			13.8	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	→	↑	↘	↓
Lane Group	EBT	NBT	SBL	SBT
Lane Group Flow (vph)	453	1130	335	841
v/c Ratio	1.03dl	0.79	0.80	0.32
Control Delay	42.4	27.4	47.3	7.4
Queue Delay	0.2	0.2	16.0	0.8
Total Delay	42.6	27.6	63.3	8.1
Queue Length 50th (ft)	129	280	204	149
Queue Length 95th (ft)	171	#435	m#264	m164
Internal Link Dist (ft)	716	756		191
Turn Bay Length (ft)				
Base Capacity (vph)	766	1435	417	2598
Starvation Cap Reductn	0	0	73	1337
Spillback Cap Reductn	36	31	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.62	0.80	0.97	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱						↑↱		↰	↑↑	
Volume (vph)	310	0	107	0	0	0	0	601	439	308	774	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2						4.5		4.2	4.5	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.98		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.94		1.00	1.00	
Flt Protected		0.96						1.00		0.95	1.00	
Satd. Flow (prot)		3314						3246		1805	3610	
Flt Permitted		0.96						1.00		0.95	1.00	
Satd. Flow (perm)		3314						3246		1805	3610	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	0	116	0	0	0	0	653	477	335	841	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	453	0	0	0	0	0	1130	0	335	841	0
Confl. Peds. (#/hr)							13		17	17		13
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split									Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases												
Actuated Green, G (s)		16.5						39.8		20.8	64.8	
Effective Green, g (s)		16.5						39.8		20.8	64.8	
Actuated g/C Ratio		0.18						0.44		0.23	0.72	
Clearance Time (s)		4.2						4.5		4.2	4.5	
Vehicle Extension (s)		2.0						4.0		2.5	3.0	
Lane Grp Cap (vph)		608						1435		417	2599	
v/s Ratio Prot		c0.14						c0.35		c0.19	0.23	
v/s Ratio Perm												
v/c Ratio		1.03dl						0.79		0.80	0.32	
Uniform Delay, d1		34.8						21.5		32.7	4.6	
Progression Factor		1.00						1.00		1.07	1.42	
Incremental Delay, d2		4.3						4.4		7.5	0.2	
Delay (s)		39.1						25.9		42.5	6.8	
Level of Service		D						C		D	A	
Approach Delay (s)		39.1			0.0			25.9			17.0	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.9
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	70	130	207	67	163	641	61	517
v/c Ratio	0.36	0.29	0.63	0.77	0.09	0.46	0.42	0.46	0.36
Control Delay	49.4	36.8	49.8	55.2	24.2	30.0	9.4	50.0	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.8	0.0	206.2
Total Delay	49.4	36.8	49.8	55.2	24.2	30.4	10.2	50.0	227.7
Queue Length 50th (ft)	22	36	71	114	15	47	34	34	106
Queue Length 95th (ft)	54	71	122	178	28	72	200	71	177
Internal Link Dist (ft)		699			791		120		823
Turn Bay Length (ft)	150		150	150		170		100	
Base Capacity (vph)	126	455	387	364	1251	355	1518	158	1422
Starvation Cap Reductn	0	0	0	0	0	29	552	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	1065
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.15	0.34	0.57	0.05	0.50	0.66	0.39	1.45

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰↰	↑↱		↰	↑↱	
Volume (vph)	37	64	120	190	34	28	150	390	200	56	464	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		0.97	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3302		3433	3359		1770	3526	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3302		3433	3359		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	70	130	207	37	30	163	424	217	61	504	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	40	70	130	207	67	0	163	641	0	61	517	0
Turn Type	Prot		Prot	Prot			Prot			Prot		
Protected Phases	7	4	4	3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.7	11.8	11.8	13.6	21.7		10.2	39.8		5.8	35.4	
Effective Green, g (s)	3.7	11.8	11.8	13.6	21.7		10.2	39.8		5.8	35.4	
Actuated g/C Ratio	0.04	0.13	0.13	0.15	0.24		0.11	0.44		0.06	0.39	
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	1.0	2.0	2.0	1.0	2.0		1.0	3.0		1.0	3.0	
Lane Grp Cap (vph)	73	244	208	267	796		389	1485		114	1387	
v/s Ratio Prot	0.02	0.04	c0.08	c0.12	0.02		0.05	c0.19		c0.03	0.15	
v/s Ratio Perm												
v/c Ratio	0.55	0.29	0.62	0.78	0.08		0.42	0.43		0.54	0.37	
Uniform Delay, d1	42.3	35.3	37.0	36.7	26.5		37.1	17.3		40.8	19.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.67	0.43		1.00	1.00	
Incremental Delay, d2	4.4	0.2	4.2	12.1	0.0		0.3	0.9		2.4	0.8	
Delay (s)	46.8	35.5	41.2	48.8	26.5		25.3	8.3		43.2	20.2	
Level of Service	D	D	D	D	C		C	A		D	C	
Approach Delay (s)		40.5			43.3			11.7			22.6	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	281	275	119	343	474	1000	425
v/c Ratio	0.81	0.83	0.38	0.86	0.19	0.45	0.64
Control Delay	52.2	54.8	33.9	52.3	9.4	18.3	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	54.8	33.9	52.3	9.4	18.3	24.2
Queue Length 50th (ft)	155	160	60	193	88	112	133
Queue Length 95th (ft)	#266	#280	111	#318	123	177	239
Internal Link Dist (ft)		826			396	390	
Turn Bay Length (ft)	180		180				150
Base Capacity (vph)	396	379	355	443	2471	2215	667
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.73	0.34	0.77	0.19	0.45	0.64

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	✥	↱	↰	↑↑			↑↑↑	↱
Volume (vph)	0	0	0	497	3	121	316	436	0	0	920	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.2	4.2	4.2	3.7	5.3			5.3	5.3
Lane Util. Factor				0.95	0.91	0.95	1.00	0.95			0.91	1.00
Frpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	0.99	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1715	1640	1534	1787	3574			5187	1563
Flt Permitted				0.95	0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1715	1640	1534	1787	3574			5187	1563
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	540	3	132	343	474	0	0	1000	425
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	281	275	119	343	474	0	0	1000	425
Confl. Peds. (#/hr)									2	2		5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%
Turn Type				Split		Perm	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				18.3	18.3	18.3	20.1	62.2			38.4	38.4
Effective Green, g (s)				18.3	18.3	18.3	20.1	62.2			38.4	38.4
Actuated g/C Ratio				0.20	0.20	0.20	0.22	0.69			0.43	0.43
Clearance Time (s)				4.2	4.2	4.2	3.7	5.3			5.3	5.3
Vehicle Extension (s)				2.0	2.0	2.0	2.0	2.5			2.5	2.5
Lane Grp Cap (vph)				349	333	312	399	2470			2213	667
v/s Ratio Prot				0.16	c0.17		c0.19	0.13			0.19	
v/s Ratio Perm						0.08						c0.27
v/c Ratio				0.81	0.83	0.38	0.86	0.19			0.45	0.64
Uniform Delay, d1				34.2	34.3	31.0	33.6	5.0			18.3	20.3
Progression Factor				1.00	1.00	1.00	0.94	1.72			0.91	0.87
Incremental Delay, d2				12.0	14.6	0.3	15.5	0.2			0.6	4.4
Delay (s)				46.2	48.9	31.2	47.2	8.7			17.3	21.9
Level of Service				D	D	C	D	A			B	C
Approach Delay (s)		0.0			44.7			24.9			18.7	
Approach LOS		A			D			C			B	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	148	141	136	607	204	621	920
v/c Ratio	0.70	0.74	0.72	0.24	0.26	0.76	0.33
Control Delay	55.8	60.8	59.5	14.4	16.1	36.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	55.8	60.8	59.5	14.4	16.1	36.5	0.7
Queue Length 50th (ft)	84	84	77	71	67	112	0
Queue Length 95th (ft)	#162	#171	#155	109	130	141	0
Internal Link Dist (ft)		767		847			396
Turn Bay Length (ft)					230		
Base Capacity (vph)	239	217	214	2512	770	1607	2778
Starvation Cap Reductn	0	0	0	0	0	0	830
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.65	0.64	0.24	0.26	0.39	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	✥	↱					↑↑↑	↱	↰↰	↑↑	
Volume (vph)	194	2	195	0	0	0	0	558	188	571	846	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2	4.2					5.3	5.3	3.7	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1524	1504					5085	1558	3502	3610	
Flt Permitted	0.95	0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1524	1504					5085	1558	3502	3610	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	2	212	0	0	0	0	607	204	621	920	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	148	141	136	0	0	0	0	607	204	621	920	0
Confl. Peds. (#/hr)							5		2			5
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split		Perm						Perm	Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	11.3	11.3	11.3					44.4	44.4	21.1	69.2	
Effective Green, g (s)	11.3	11.3	11.3					44.4	44.4	21.1	69.2	
Actuated g/C Ratio	0.13	0.13	0.13					0.49	0.49	0.23	0.77	
Clearance Time (s)	4.2	4.2	4.2					5.3	5.3	3.7	5.3	
Vehicle Extension (s)	2.0	2.0	2.0					2.5	2.5	2.0	2.5	
Lane Grp Cap (vph)	211	191	189					2509	769	821	2776	
v/s Ratio Prot	0.09	c0.09						0.12		c0.18	c0.25	
v/s Ratio Perm			0.09						0.13			
v/c Ratio	0.70	0.74	0.72					0.24	0.27	0.76	0.33	
Uniform Delay, d1	37.7	37.9	37.8					13.1	13.3	32.1	3.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.98	0.09	
Incremental Delay, d2	8.3	12.1	10.4					0.2	0.8	3.0	0.3	
Delay (s)	46.0	50.0	48.2					13.3	14.1	34.5	0.6	
Level of Service	D	D	D					B	B	C	A	
Approach Delay (s)		48.0			0.0			13.5			14.2	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.9
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	73	221	372	435	1003
v/c Ratio	0.35	0.67	0.74	0.16	0.49
Control Delay	40.2	48.1	36.1	2.7	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.2	48.1	36.1	2.7	13.1
Queue Length 50th (ft)	39	69	69	18	162
Queue Length 95th (ft)	77	105	m124	34	262
Internal Link Dist (ft)	814			390	661
Turn Bay Length (ft)	300				
Base Capacity (vph)	433	681	624	2796	2042
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.32	0.60	0.16	0.49

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱↱	↰↰	↑↑	↑↱	
Volume (vph)	67	203	342	400	873	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.88	0.97	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	2787	3467	3574	3511	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	2787	3467	3574	3511	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	221	372	435	949	54
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	73	221	372	435	1003	0
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	10.6	10.6	13.0	70.4	52.4	
Effective Green, g (s)	10.6	10.6	13.0	70.4	52.4	
Actuated g/C Ratio	0.12	0.12	0.14	0.78	0.58	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)	208	328	501	2796	2044	
v/s Ratio Prot	0.04		c0.11	0.12	c0.29	
v/s Ratio Perm		c0.08				
v/c Ratio	0.35	0.67	0.74	0.16	0.49	
Uniform Delay, d1	36.5	38.0	36.9	2.4	11.0	
Progression Factor	1.00	1.00	0.73	0.95	1.00	
Incremental Delay, d2	0.4	4.3	5.1	0.1	0.8	
Delay (s)	36.9	42.3	32.1	2.4	11.8	
Level of Service	D	D	C	A	B	
Approach Delay (s)	41.0			16.1	11.8	
Approach LOS	D			B	B	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	WBT	WBR	SBT	SBR
Lane Group Flow (vph)	464	125	797	483	150	1064
v/c Ratio	0.52	0.08	0.78	0.70	0.73	0.38
Control Delay	25.9	0.1	45.1	32.7	59.9	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	0.1	45.1	32.7	59.9	0.7
Queue Length 50th (ft)	89	0	291	287	114	11
Queue Length 95th (ft)	136	0	361	378	m175	0
Internal Link Dist (ft)			759		290	
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	886	1583	1111	733	272	2787
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	10	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.08	0.72	0.66	0.55	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	427	0	115	0	733	444	0	0	0	0	138	979
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.0		5.7	5.7					4.5	4.0
Lane Util. Factor	0.94		1.00		0.95	1.00					1.00	0.88
Frt	1.00		0.85		1.00	0.85					1.00	0.85
Flt Protected	0.95		1.00		1.00	1.00					1.00	1.00
Satd. Flow (prot)	4990		1583		3574	1599					1863	2787
Flt Permitted	0.35		1.00		1.00	1.00					1.00	1.00
Satd. Flow (perm)	1841		1583		3574	1599					1863	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	464	0	125	0	797	483	0	0	0	0	150	1064
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	464	0	125	0	797	483	0	0	0	0	150	1064
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	2%	2%	2%
Turn Type	custom		Free			custom						Free
Protected Phases					2	2 3					3	
Permitted Phases	4		Free			2						Free
Actuated Green, G (s)	57.8		120.0		34.3	53.2					13.2	120.0
Effective Green, g (s)	57.8		120.0		34.3	53.2					13.2	120.0
Actuated g/C Ratio	0.48		1.00		0.29	0.44					0.11	1.00
Clearance Time (s)	4.5				5.7						4.5	
Vehicle Extension (s)	1.5				1.5						1.5	
Lane Grp Cap (vph)	887		1583		1022	709					205	2787
v/s Ratio Prot					c0.22	c0.30					0.08	
v/s Ratio Perm	c0.25		0.08									0.38
v/c Ratio	0.52		0.08		0.78	0.68					0.73	0.38
Uniform Delay, d1	21.6		0.0		39.4	26.6					51.7	0.0
Progression Factor	1.00		1.00		1.00	1.00					0.82	1.00
Incremental Delay, d2	2.2		0.1		3.5	2.2					9.6	0.3
Delay (s)	23.8		0.1		42.9	28.8					51.9	0.3
Level of Service	C		A		D	C					D	A
Approach Delay (s)		18.7			37.6			0.0			6.7	
Approach LOS		B			D			A			A	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.2
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	104	316	191	120	277	538	137	70	596
v/c Ratio	0.33	0.12	0.84	0.66	0.22	0.81	0.27	0.15	0.25	0.51
Control Delay	63.3	34.6	62.8	64.6	32.3	62.7	16.3	15.6	36.7	36.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.0	0.0	0.0
Total Delay	63.3	34.6	62.8	64.6	32.3	63.6	16.7	15.6	36.7	36.0
Queue Length 50th (ft)	26	33	233	74	73	196	117	55	40	198
Queue Length 95th (ft)	61	53	324	114	116	277	151	m87	91	286
Internal Link Dist (ft)		739			761		290			592
Turn Bay Length (ft)	130			200					180	
Base Capacity (vph)	103	1017	455	300	587	406	2001	895	283	1180
Starvation Cap Reductn	0	0	0	0	0	27	888	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.10	0.69	0.64	0.20	0.73	0.48	0.15	0.25	0.51

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰↰	↑↱		↰	↑↑	↱	↰	↑↑↱	
Volume (vph)	31	96	291	176	98	12	255	495	126	64	518	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	3433	1832		1770	3539	1583	1770	3510	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	1770	3539	1583	3433	1832		1770	3539	1583	841	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	104	316	191	107	13	277	538	137	70	563	33
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	34	104	316	191	120	0	277	538	137	70	596	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Perm		
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	4.2	30.3	30.3	10.1	36.2		23.0	66.1	66.1	38.6	38.6	
Effective Green, g (s)	4.2	30.3	30.3	10.1	36.2		23.0	66.1	66.1	38.6	38.6	
Actuated g/C Ratio	0.04	0.25	0.25	0.08	0.30		0.19	0.55	0.55	0.32	0.32	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	62	894	400	289	553		339	1949	872	271	1129	
v/s Ratio Prot	0.02	0.03		c0.06	0.07		c0.16	0.15			c0.17	
v/s Ratio Perm			c0.20						0.09	0.08		
v/c Ratio	0.55	0.12	0.79	0.66	0.22		0.82	0.28	0.16	0.26	0.53	
Uniform Delay, d1	57.0	34.5	41.9	53.3	31.3		46.5	14.3	13.3	30.1	33.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.02	1.12	1.10	1.00	1.00	
Incremental Delay, d2	9.6	0.1	10.2	5.6	0.2		11.7	0.3	0.3	2.3	1.8	
Delay (s)	66.5	34.6	52.1	58.9	31.5		59.0	16.3	14.9	32.4	35.0	
Level of Service	E	C	D	E	C		E	B	B	C	D	
Approach Delay (s)		49.1			48.3			28.5			34.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	183	326	413	76	638	1223
v/c Ratio	0.35	0.70	0.57	0.13	0.68	0.62
Control Delay	20.7	29.4	27.5	24.1	25.5	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	29.4	27.5	24.1	25.5	11.8
Queue Length 50th (ft)	52	104	71	13	105	141
Queue Length 95th (ft)	124	231	153	39	213	290
Internal Link Dist (ft)	720		855			529
Turn Bay Length (ft)		270		170	270	
Base Capacity (vph)	917	820	1815	1429	1761	3290
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.40	0.23	0.05	0.36	0.37

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱					↑↑	↱↱	↰↰	↑↑	
Volume (vph)	168	0	300	0	0	0	0	380	70	587	1125	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5					4.5	4.5	4.2	4.5	
Lane Util. Factor		1.00	1.00					0.95	0.88	0.97	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1787	1599					3539	2787	3433	3539	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1787	1599					3539	2787	3433	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	0	326	0	0	0	0	413	76	638	1223	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	183	326	0	0	0	0	413	76	638	1223	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Turn Type	Split		Prot						Perm	Prot		
Protected Phases	4	4	4					2		1	6	
Permitted Phases									2			
Actuated Green, G (s)		18.3	18.3					13.1	13.1	17.1	34.4	
Effective Green, g (s)		18.3	18.3					13.1	13.1	17.1	34.4	
Actuated g/C Ratio		0.30	0.30					0.21	0.21	0.28	0.56	
Clearance Time (s)		4.5	4.5					4.5	4.5	4.2	4.5	
Vehicle Extension (s)		2.0	2.0					2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)		530	474					751	592	951	1973	
v/s Ratio Prot		0.10	c0.20					0.12		0.19	c0.35	
v/s Ratio Perm									0.03			
v/c Ratio		0.35	0.69					0.55	0.13	0.67	0.62	
Uniform Delay, d1		17.0	19.2					21.7	19.7	19.8	9.2	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	3.3					0.4	0.0	1.5	0.4	
Delay (s)		17.1	22.5					22.1	19.7	21.3	9.6	
Level of Service		B	C					C	B	C	A	
Approach Delay (s)		20.6			0.0			21.7			13.6	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	468	468	152	352	591
v/c Ratio	0.93	0.94	0.66	0.17	0.40
Control Delay	57.4	59.6	50.1	7.9	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	59.6	50.1	7.9	11.5
Queue Length 50th (ft)	266	267	81	40	104
Queue Length 95th (ft)	#455	#458	#170	58	115
Internal Link Dist (ft)		788		371	474
Turn Bay Length (ft)	560		75		
Base Capacity (vph)	524	518	231	2111	1490
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.90	0.66	0.17	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	798	3	61	140	324	0	0	467	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5	4.5		3.5	5.3			5.3	
Lane Util. Factor				0.95	0.95		1.00	0.95			0.95	
Frt				1.00	0.98		1.00	1.00			0.98	
Flt Protected				0.95	0.96		0.95	1.00			1.00	
Satd. Flow (prot)				1715	1695		1805	3539			3465	
Flt Permitted				0.95	0.96		0.95	1.00			1.00	
Satd. Flow (perm)				1715	1695		1805	3539			3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	867	3	66	152	352	0	0	508	83
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	468	468	0	152	352	0	0	591	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%
Turn Type				Split			Prot					
Protected Phases				8	8		5	2			6	
Permitted Phases												
Actuated Green, G (s)				26.5	26.5		11.5	53.7			38.7	
Effective Green, g (s)				26.5	26.5		11.5	53.7			38.7	
Actuated g/C Ratio				0.29	0.29		0.13	0.60			0.43	
Clearance Time (s)				4.5	4.5		3.5	5.3			5.3	
Vehicle Extension (s)				2.0	2.0		2.0	2.5			2.5	
Lane Grp Cap (vph)				505	499		231	2112			1490	
v/s Ratio Prot				0.27	c0.28		c0.08	0.10			c0.17	
v/s Ratio Perm												
v/c Ratio				0.93	0.94		0.66	0.17			0.40	
Uniform Delay, d1				30.8	30.9		37.4	8.1			17.6	
Progression Factor				1.00	1.00		0.95	0.91			0.59	
Incremental Delay, d2				22.8	25.1		4.9	0.2			0.8	
Delay (s)				53.6	56.0		40.6	7.6			11.2	
Level of Service				D	E		D	A			B	
Approach Delay (s)		0.0			54.8			17.5			11.2	
Approach LOS		A			D			B			B	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

	→	↘	↑	↗	↘	↓
Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	293	243	211	303	109	1266
v/c Ratio	0.76	0.70	0.11	0.35	0.56	0.53
Control Delay	45.2	43.0	12.7	16.0	41.5	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3
Total Delay	45.2	43.0	12.7	16.0	41.5	10.5
Queue Length 50th (ft)	158	129	30	95	62	178
Queue Length 95th (ft)	220	187	63	202	m85	m240
Internal Link Dist (ft)	711		746			371
Turn Bay Length (ft)		130			180	
Base Capacity (vph)	632	565	1935	865	301	2395
Starvation Cap Reductn	0	0	0	0	0	511
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.43	0.11	0.35	0.36	0.67

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	0	224	0	0	0	0	194	279	100	1165	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5					5.3	5.3	3.7	5.3	
Lane Util. Factor		1.00	1.00					0.95	1.00	1.00	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805	1615					3539	1583	1770	3539	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1805	1615					3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	0	243	0	0	0	0	211	303	109	1266	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	293	243	0	0	0	0	211	303	109	1266	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Turn Type	Split		Perm						Perm	Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		19.3	19.3					48.5	48.5	8.7	60.9	
Effective Green, g (s)		19.3	19.3					48.5	48.5	8.7	60.9	
Actuated g/C Ratio		0.21	0.21					0.54	0.54	0.10	0.68	
Clearance Time (s)		4.5	4.5					5.3	5.3	3.7	5.3	
Vehicle Extension (s)		2.0	2.0					2.5	2.5	2.0	2.5	
Lane Grp Cap (vph)		387	346					1907	853	171	2395	
v/s Ratio Prot		c0.16						0.06		c0.06	c0.36	
v/s Ratio Perm			0.15						0.19			
v/c Ratio		0.76	0.70					0.11	0.36	0.64	0.53	
Uniform Delay, d1		33.2	32.7					10.2	11.8	39.1	7.3	
Progression Factor		1.00	1.00					1.00	1.00	0.90	1.15	
Incremental Delay, d2		7.3	5.2					0.1	1.2	3.9	0.6	
Delay (s)		40.5	37.9					10.3	13.0	39.2	9.0	
Level of Service		D	D					B	B	D	A	
Approach Delay (s)		39.3			0.0			11.9			11.4	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.2
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	305	10	170	284	23	333
v/c Ratio	0.73	0.03	0.15	0.26	0.16	0.26
Control Delay	41.9	12.2	3.5	0.8	40.4	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	12.2	3.5	0.8	40.4	7.3
Queue Length 50th (ft)	161	0	15	0	13	65
Queue Length 95th (ft)	225	11	m32	m0	36	134
Internal Link Dist (ft)	823		474			518
Turn Bay Length (ft)	130				85	
Base Capacity (vph)	728	657	1152	1088	177	1260
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.02	0.15	0.26	0.13	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱	↰	↑
Volume (vph)	281	9	156	261	21	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	305	10	170	284	23	333
RTOR Reduction (vph)	0	8	0	116	0	0
Lane Group Flow (vph)	305	2	170	168	23	333
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	21.1	21.1	53.3	53.3	3.6	60.9
Effective Green, g (s)	21.1	21.1	53.3	53.3	3.6	60.9
Actuated g/C Ratio	0.23	0.23	0.59	0.59	0.04	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	415	371	1103	937	71	1261
v/s Ratio Prot	c0.17		0.09		0.01	c0.18
v/s Ratio Perm		0.00		0.11		
v/c Ratio	0.73	0.01	0.15	0.18	0.32	0.26
Uniform Delay, d1	31.9	26.4	8.2	8.4	42.0	5.7
Progression Factor	1.00	1.00	0.32	0.12	1.00	1.00
Incremental Delay, d2	6.6	0.0	0.3	0.4	2.6	0.5
Delay (s)	38.5	26.4	2.9	1.4	44.7	6.2
Level of Service	D	C	A	A	D	A
Approach Delay (s)	38.1		2.0			8.7
Approach LOS	D		A			A

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	328	329	429	844	218	413	27	651
v/c Ratio	0.19	1.85	1.88	1.06	1.05	0.84	0.31	0.28	0.56
Control Delay	38.5	431.3	443.0	96.7	79.7	70.1	16.4	47.2	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	431.3	443.0	96.7	79.7	70.1	16.4	47.2	27.3
Queue Length 50th (ft)	21	~302	~303	~298	~290	70	70	15	159
Queue Length 95th (ft)	51	#472	#475	#496	#413	#131	96	41	214
Internal Link Dist (ft)		666			749		390		207
Turn Bay Length (ft)	200			200		100		150	
Base Capacity (vph)	207	177	175	404	804	259	1330	153	1154
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	1.85	1.88	1.06	1.05	0.84	0.31	0.18	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↰↑↱		↰↰	↑↱		↰	↑↱	
Volume (vph)	37	11	593	669	309	193	201	150	230	25	590	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.3	5.3		5.2	5.3		4.2	5.3	
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91		0.97	0.95		1.00	0.95	
Frt	1.00	0.86	0.85	1.00	0.96		1.00	0.91		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1514	1504	1579	3145		3433	3218		1770	3531	
Flt Permitted	0.95	1.00	1.00	0.95	0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1514	1504	1579	3145		3433	3218		1770	3531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	12	645	727	336	210	218	163	250	27	641	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	40	328	329	429	844	0	218	413	0	27	651	0
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	2%	2%	2%
Turn Type	Split		Perm	Split			Prot			Prot		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.5	10.5	10.5	23.0	23.0		6.8	34.7		2.5	29.4	
Effective Green, g (s)	10.5	10.5	10.5	23.0	23.0		6.8	34.7		2.5	29.4	
Actuated g/C Ratio	0.12	0.12	0.12	0.26	0.26		0.08	0.39		0.03	0.33	
Clearance Time (s)	4.5	4.5	4.5	5.3	5.3		5.2	5.3		4.2	5.3	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		1.0	2.0	
Lane Grp Cap (vph)	207	177	175	404	804		259	1241		49	1153	
v/s Ratio Prot	0.02	0.22		c0.27	0.27		c0.06	0.13		0.02	c0.18	
v/s Ratio Perm			c0.22									
v/c Ratio	0.19	1.85	1.88	1.06	1.05		0.84	0.33		0.55	0.56	
Uniform Delay, d1	35.9	39.8	39.8	33.5	33.5		41.1	19.5		43.2	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.05	0.83		1.00	1.00	
Incremental Delay, d2	0.2	404.8	416.9	62.1	45.6		19.6	0.7		7.4	2.0	
Delay (s)	36.1	444.6	456.6	95.6	79.1		62.6	16.8		50.6	27.0	
Level of Service	D	F	F	F	E		E	B		D	C	
Approach Delay (s)		426.8			84.7			32.6			28.0	
Approach LOS		F			F			C			C	

Intersection Summary			
HCM Average Control Delay	135.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.3
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↱	
Volume (veh/h)	0	137	0	467	487	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	149	0	508	529	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked						
vC, conflicting volume	799	281	562			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	799	281	562			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	79	100			
cM capacity (veh/h)	323	716	1005			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	149	254	254	353	209
Volume Left	0	0	0	0	0
Volume Right	149	0	0	0	33
cSH	716	1700	1700	1700	1700
Volume to Capacity	0.21	0.15	0.15	0.21	0.12
Queue Length 95th (ft)	19	0	0	0	0
Control Delay (s)	11.3	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.3	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	237	407	400	1026	1184	999
v/c Ratio	0.52	1.00	0.27	0.65	1.90	0.44
Control Delay	33.6	79.0	17.4	2.1	430.1	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3
Total Delay	33.6	79.0	17.4	2.1	430.1	9.7
Queue Length 50th (ft)	116	231	75	0	~560	175
Queue Length 95th (ft)	189	#419	108	0	m#491	m128
Internal Link Dist (ft)	624		748			390
Turn Bay Length (ft)		300		250	90	
Base Capacity (vph)	457	409	1502	1583	622	2289
Starvation Cap Reductn	0	0	0	0	0	582
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	1.00	0.27	0.65	1.90	0.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱					↑↑	↱	↰↰	↑↑	
Volume (vph)	218	0	374	0	0	0	0	368	944	1089	919	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.8	4.0	3.7	4.8	
Lane Util. Factor		1.00	1.00					0.95	1.00	0.97	0.95	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1787	1599					3539	1583	3433	3539	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1787	1599					3539	1583	3433	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	237	0	407	0	0	0	0	400	1026	1184	999	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	237	407	0	0	0	0	400	1026	1184	999	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Turn Type	Split		Perm						Free	Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4						Free			
Actuated Green, G (s)		23.0	23.0					38.2	90.0	16.3	58.2	
Effective Green, g (s)		23.0	23.0					38.2	90.0	16.3	58.2	
Actuated g/C Ratio		0.26	0.26					0.42	1.00	0.18	0.65	
Clearance Time (s)		4.0	4.0					4.8		3.7	4.8	
Vehicle Extension (s)		1.5	1.5					1.5		1.0	1.5	
Lane Grp Cap (vph)		457	409					1502	1583	622	2289	
v/s Ratio Prot		0.13						0.11		c0.34	0.28	
v/s Ratio Perm			c0.25						c0.65			
v/c Ratio		0.52	1.00					0.27	0.65	1.90	0.44	
Uniform Delay, d1		28.7	33.4					16.8	0.0	36.9	7.8	
Progression Factor		1.00	1.00					1.00	1.00	0.78	1.18	
Incremental Delay, d2		0.4	42.9					0.4	2.1	407.1	0.1	
Delay (s)		29.2	76.3					17.2	2.1	436.0	9.3	
Level of Service		C	E					B	A	F	A	
Approach Delay (s)		59.0			0.0			6.3			240.7	
Approach LOS		E			A			A			F	

Intersection Summary			
HCM Average Control Delay	134.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.7
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰		
Volume (veh/h)	131	79	134	76	0	0
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	142	86	146	83	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	157	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	157	0	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	84	92	78	91	100	
cM capacity (veh/h)	896	1085	654	896	1623	

Direction, Lane #	EB 1	WB 1
Volume Total	228	228
Volume Left	0	146
Volume Right	86	0
cSH	959	725
Volume to Capacity	0.24	0.31
Queue Length 95th (ft)	23	34
Control Delay (s)	9.9	12.2
Lane LOS	A	B
Approach Delay (s)	9.9	12.2
Approach LOS	A	B

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	62	4	99	0	0	0	0	132	139	254	234	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	4	108	0	0	0	0	143	151	276	254	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	950	950	254	952	950	143	254			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	950	950	254	952	950	143	254			143		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	98	86	100	100	100	100			81		
cM capacity (veh/h)	205	211	787	175	212	909	1311			1439		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	179	143	151	530
Volume Left	67	0	0	276
Volume Right	108	0	151	0
cSH	514	1700	1700	1439
Volume to Capacity	0.35	0.08	0.09	0.19
Queue Length 95th (ft)	39	0	0	18
Control Delay (s)	18.8	0.0	0.0	5.1
Lane LOS	C			A
Approach Delay (s)	18.8	0.0		5.1
Approach LOS	C			

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	59	0	122	101	0	157
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	0	133	110	0	171

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	64	242	171
Volume Left (vph)	64	0	0
Volume Right (vph)	0	110	171
Hadj (s)	0.23	-0.19	-0.57
Departure Headway (s)	4.8	4.2	4.0
Degree Utilization, x	0.08	0.28	0.19
Capacity (veh/h)	719	826	838
Control Delay (s)	8.2	8.8	8.0
Approach Delay (s)	8.2	8.8	8.0
Approach LOS	A	A	A

Intersection Summary			
Delay	8.4		
HCM Level of Service	A		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBT	EBR	WBT	NBL
Lane Group Flow (vph)	321	277	116	691
v/c Ratio	0.47	0.37	0.21	0.53
Control Delay	11.0	3.1	8.7	9.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.0	3.1	8.7	9.8
Queue Length 50th (ft)	38	0	12	41
Queue Length 95th (ft)	99	30	40	92
Internal Link Dist (ft)	165		649	69
Turn Bay Length (ft)		75		
Base Capacity (vph)	1023	994	1263	2717
Starvation Cap Reductn	60	30	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.33	0.29	0.09	0.25

Intersection Summary

	→	↘	↙	←	↖	↗			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	↑	↱		↰↑	↰↰↱				
Volume (vph)	295	255	42	64	591	45			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Total Lost time (s)	4.0	4.0		4.0	4.0				
Lane Util. Factor	1.00	1.00		1.00	0.97				
Frt	1.00	0.85		1.00	0.99				
Flt Protected	1.00	1.00		0.98	0.96				
Satd. Flow (prot)	1863	1583		1827	3417				
Flt Permitted	1.00	1.00		0.81	0.96				
Satd. Flow (perm)	1863	1583		1500	3417				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92			
Adj. Flow (vph)	321	277	46	70	642	49			
RTOR Reduction (vph)	0	175	0	0	10	0			
Lane Group Flow (vph)	321	102	0	116	681	0			
Turn Type		Perm	pm+pt						
Protected Phases	4		3	8	2				
Permitted Phases		4	8						
Actuated Green, G (s)	11.8	11.8		11.8	12.2				
Effective Green, g (s)	11.8	11.8		11.8	12.2				
Actuated g/C Ratio	0.37	0.37		0.37	0.38				
Clearance Time (s)	4.0	4.0		4.0	4.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	687	584		553	1303				
v/s Ratio Prot	c0.17				c0.20				
v/s Ratio Perm		0.06		0.08					
v/c Ratio	0.47	0.17		0.21	0.52				
Uniform Delay, d1	7.7	6.8		6.9	7.7				
Progression Factor	1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.5	0.1		0.2	0.4				
Delay (s)	8.2	7.0		7.1	8.0				
Level of Service	A	A		A	A				
Approach Delay (s)	7.6			7.1	8.0				
Approach LOS	A			A	A				
Intersection Summary									
HCM Average Control Delay			7.8		HCM Level of Service			A	
HCM Volume to Capacity ratio			0.50						
Actuated Cycle Length (s)			32.0		Sum of lost time (s)			8.0	
Intersection Capacity Utilization			49.5%		ICU Level of Service			A	
Analysis Period (min)			15						
c Critical Lane Group									

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	364	749	408	693	821
v/c Ratio	0.76	0.75	0.73	0.69	0.76
Control Delay	31.5	24.0	35.5	6.9	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	24.0	35.5	6.9	24.9
Queue Length 50th (ft)	128	129	65	47	140
Queue Length 95th (ft)	#261	190	109	63	#213
Internal Link Dist (ft)		450		463	298
Turn Bay Length (ft)	100		350		
Base Capacity (vph)	480	1001	601	1009	1076
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.76	0.75	0.68	0.69	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↱		↰↰	↑			↑↱	
Volume (vph)	0	0	0	435	539	50	375	638	0	0	698	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)				4.5	4.5		4.5	4.5			4.5	
Lane Util. Factor				0.91	0.91		0.97	1.00			0.95	
Frt				1.00	0.99		1.00	1.00			0.99	
Flt Protected				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (prot)				1557	3218		3433	1863			3499	
Flt Permitted				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (perm)				1557	3218		3433	1863			3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	473	586	54	408	693	0	0	759	62
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	364	740	0	408	693	0	0	811	0
Turn Type				Split			Prot					
Protected Phases				8	8		5	2			6	
Permitted Phases												
Actuated Green, G (s)				18.5	18.5		9.7	32.5			18.3	
Effective Green, g (s)				18.5	18.5		9.7	32.5			18.3	
Actuated g/C Ratio				0.31	0.31		0.16	0.54			0.31	
Clearance Time (s)				4.5	4.5		4.5	4.5			4.5	
Vehicle Extension (s)				5.0	5.0		1.5	5.0			5.0	
Lane Grp Cap (vph)				480	992		555	1009			1067	
v/s Ratio Prot				c0.23	0.23		0.12	c0.37			0.23	
v/s Ratio Perm												
v/c Ratio				0.76	0.75		0.74	0.69			0.76	
Uniform Delay, d1				18.7	18.6		23.9	10.0			18.9	
Progression Factor				1.00	1.00		1.14	0.31			1.00	
Incremental Delay, d2				8.0	3.7		4.2	3.6			5.1	
Delay (s)				26.7	22.4		31.5	6.7			24.0	
Level of Service				C	C		C	A			C	
Approach Delay (s)		0.0			23.8			15.9			24.0	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	702	247	12	180	199	57	363	65	390	710
v/c Ratio	1.17	0.44	0.13	0.79	0.54	0.53	0.21	0.59	0.43	0.64
Control Delay	135.3	32.9	53.4	72.0	12.0	69.7	17.5	67.0	20.4	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	135.3	32.9	53.4	72.0	12.0	69.7	17.5	67.0	20.4	10.2
Queue Length 50th (ft)	~319	128	9	129	0	41	82	48	194	143
Queue Length 95th (ft)	#438	241	28	#218	67	85	115	#93	293	266
Internal Link Dist (ft)		684		776			777		501	
Turn Bay Length (ft)	200		75			105		105		
Base Capacity (vph)	600	570	130	263	394	123	1709	124	904	1111
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	27
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.43	0.09	0.68	0.51	0.46	0.21	0.52	0.43	0.65

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	646	170	57	11	166	183	52	329	5	60	359	653
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.2	4.2		3.7	4.2	4.2	3.7	4.2		3.7	4.2	4.2
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3319	1733		1711	1801	1531	1711	3414		1711	1801	1531
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3319	1733		1711	1801	1531	1711	3414		1711	1801	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	702	185	62	12	180	199	57	358	5	65	390	710
RTOR Reduction (vph)	0	10	0	0	0	169	0	1	0	0	0	364
Lane Group Flow (vph)	702	237	0	12	180	30	57	362	0	65	390	346
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						6
Actuated Green, G (s)	20.8	36.7		2.1	17.5	17.5	6.3	53.9		6.5	54.1	54.1
Effective Green, g (s)	20.8	36.7		2.1	17.5	17.5	6.3	53.9		6.5	54.1	54.1
Actuated g/C Ratio	0.18	0.32		0.02	0.15	0.15	0.05	0.47		0.06	0.47	0.47
Clearance Time (s)	4.2	4.2		3.7	4.2	4.2	3.7	4.2		3.7	4.2	4.2
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	600	553		31	274	233	94	1600		97	847	720
v/s Ratio Prot	c0.21	0.14		0.01	c0.10		0.03	0.11		c0.04	0.22	
v/s Ratio Perm						0.02						c0.23
v/c Ratio	1.17	0.43		0.39	0.66	0.13	0.61	0.23		0.67	0.46	0.48
Uniform Delay, d1	47.1	30.9		55.8	45.9	42.2	53.1	18.2		53.2	20.6	20.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.90	0.95	3.74
Incremental Delay, d2	93.4	0.2		2.9	4.3	0.1	7.4	0.3		12.7	1.7	2.2
Delay (s)	140.5	31.1		58.7	50.2	42.3	60.5	18.5		60.8	21.2	80.1
Level of Service	F	C		E	D	D	E	B		E	C	F
Approach Delay (s)		112.0			46.4			24.2			59.3	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM Average Control Delay	69.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	257	259	220	146	18	943	64	659
v/c Ratio	0.78	0.76	0.72	0.40	0.06	0.63	0.38	0.44
Control Delay	52.8	49.6	51.7	11.5	21.7	25.6	36.0	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	49.6	51.7	11.5	21.7	25.6	36.0	25.0
Queue Length 50th (ft)	163	160	134	11	6	232	33	174
Queue Length 95th (ft)	237	233	196	59	26	#417	#96	269
Internal Link Dist (ft)		707	798			376		472
Turn Bay Length (ft)	100			100	75		75	
Base Capacity (vph)	435	449	462	491	277	1495	168	1481
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.58	0.48	0.30	0.06	0.63	0.38	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	✥			↰	↱	↰	↑↱		↰	↑↱	
Volume (vph)	295	154	26	60	143	134	17	807	61	59	502	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	10	10	10	10	10	10
Total Lost time (s)	4.5	4.5			4.0	4.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	0.95	0.95			1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1569	1605			1713	1478	1652	3269		1652	3218	
Flt Permitted	0.95	0.99			0.99	1.00	0.35	1.00		0.21	1.00	
Satd. Flow (perm)	1569	1605			1713	1478	606	3269		369	3218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	321	167	28	65	155	146	18	877	66	64	546	113
RTOR Reduction (vph)	0	5	0	0	0	104	0	4	0	0	14	0
Lane Group Flow (vph)	257	254	0	0	220	42	18	939	0	64	645	0
Turn Type	Split			Split		Perm	Perm			Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	21.1	21.1			17.8	17.8	45.6	45.6		45.6	45.6	
Effective Green, g (s)	21.1	21.1			17.8	17.8	45.6	45.6		45.6	45.6	
Actuated g/C Ratio	0.21	0.21			0.18	0.18	0.46	0.46		0.46	0.46	
Clearance Time (s)	4.5	4.5			4.0	4.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	2.5	2.5			2.5	2.5	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	331	339			305	263	276	1491		168	1467	
v/s Ratio Prot	c0.16	0.16			c0.13			c0.29			0.20	
v/s Ratio Perm						0.03	0.03			0.17		
v/c Ratio	0.78	0.75			0.72	0.16	0.07	0.63		0.38	0.44	
Uniform Delay, d1	37.2	37.0			38.8	34.8	15.3	20.8		17.9	18.5	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.15	1.19	
Incremental Delay, d2	10.5	8.6			7.7	0.2	0.5	2.0		6.3	0.9	
Delay (s)	47.7	45.6			46.4	35.0	15.7	22.8		26.9	23.0	
Level of Service	D	D			D	C	B	C		C	C	
Approach Delay (s)		46.6			41.9			22.6			23.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑	↑	↱
Sign Control	Stop			Stop	Stop	
Volume (vph)	256	120	143	531	334	148
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	278	130	155	577	363	161
Direction, Lane #	**EB 1**	**EB 2**	**NB 1**	**NB 2**	**SB 1**	**SB 2**
Volume Total (vph)	278	130	155	577	363	161
Volume Left (vph)	278	0	155	0	0	0
Volume Right (vph)	0	130	0	0	0	161
Hadj (s)	0.53	-0.67	0.53	0.03	0.03	-0.67
Departure Headway (s)	8.0	6.8	7.4	6.9	7.1	6.4
Degree Utilization, x	0.62	0.25	0.32	1.11	0.71	0.29
Capacity (veh/h)	431	513	472	527	497	550
Control Delay (s)	21.9	10.8	12.7	97.3	24.7	10.7
Approach Delay (s)	18.4		79.4		20.4	
Approach LOS	C		F		C	

Intersection Summary			
Delay	45.8		
HCM Level of Service	E		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	116	61	138	78	1109	111	1233
v/c Ratio	0.09	0.29	0.23	0.33	0.21	0.57	0.28	0.59
Control Delay	19.1	11.8	21.1	10.9	4.6	11.3	5.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	11.8	21.1	10.9	4.6	11.3	5.2	10.8
Queue Length 50th (ft)	6	13	17	12	6	129	9	151
Queue Length 95th (ft)	23	48	44	51	17	198	23	233
Internal Link Dist (ft)		542		390		472		186
Turn Bay Length (ft)	75		75		200		200	
Base Capacity (vph)	410	603	418	612	392	2017	408	2092
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.19	0.15	0.23	0.20	0.55	0.27	0.59

Intersection Summary

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	22	44	63	56	41	86	72	966	54	102	1077	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91		1.00	0.90		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1642		1711	1619		1711	3394		1711	3395	
Flt Permitted	0.67	1.00		0.68	1.00		0.17	1.00		0.18	1.00	
Satd. Flow (perm)	1204	1642		1229	1619		302	3394		326	3395	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	48	68	61	45	93	78	1050	59	111	1171	62
RTOR Reduction (vph)	0	58	0	0	79	0	0	6	0	0	5	0
Lane Group Flow (vph)	24	58	0	61	59	0	78	1103	0	111	1228	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.7	7.7		7.7	7.7		31.4	27.9		34.0	29.2	
Effective Green, g (s)	7.7	7.7		7.7	7.7		31.4	27.9		34.0	29.2	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.61	0.54		0.66	0.56	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179	245		183	241		279	1832		343	1917	
v/s Ratio Prot		0.04			0.04		0.02	0.33		c0.03	c0.36	
v/s Ratio Perm	0.02			c0.05			0.15			0.18		
v/c Ratio	0.13	0.24		0.33	0.24		0.28	0.60		0.32	0.64	
Uniform Delay, d1	19.1	19.4		19.7	19.4		4.8	8.1		4.2	7.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		1.1	0.5		0.5	0.6		0.6	0.7	
Delay (s)	19.4	19.9		20.8	20.0		5.4	8.7		4.7	8.4	
Level of Service	B	B		C	B		A	A		A	A	
Approach Delay (s)		19.8			20.2			8.5			8.1	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	51.7	Sum of lost time (s)	10.7
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	↗	→	←	↖	↑	↓	↙
Lane Group	EBL	EBT	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	941	329	450	46	5	233	120
v/c Ratio	0.74	0.15	0.60	0.14	0.05	0.62	0.37
Control Delay	27.1	6.7	35.0	32.4	47.4	39.4	34.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	6.7	35.0	32.4	47.4	39.4	34.5
Queue Length 50th (ft)	190	27	99	17	2	98	48
Queue Length 95th (ft)	399	75	226	64	18	249	137
Internal Link Dist (ft)		430	1525		152	52	
Turn Bay Length (ft)	200			100			
Base Capacity (vph)	2081	3238	1430	640	228	1073	923
Starvation Cap Reductn	58	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.10	0.31	0.07	0.02	0.22	0.13

Intersection Summary

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	866	300	3	0	414	42	1	0	4	214	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3		4.2			4.5	4.5
Lane Util. Factor	0.97	0.95			0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00		0.74			1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00			1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	3433	3532			3539	1583		1211			1770	1541
Flt Permitted	0.95	1.00			1.00	1.00		0.99			0.95	1.00
Satd. Flow (perm)	3433	3532			3539	1583		1211			1770	1541
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	941	326	3	0	450	46	1	0	4	233	0	120
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	941	329	0	0	450	46	0	5	0	0	233	120
Confl. Peds. (#/hr)			13	13					17			15
Turn Type	Prot			Perm		Perm	Split			Split		Perm
Protected Phases	3	8			4		1	1		2	2	
Permitted Phases				4		4						2
Actuated Green, G (s)	29.7	51.0			17.1	17.1		0.8			17.0	17.0
Effective Green, g (s)	29.7	51.0			17.1	17.1		0.8			17.0	17.0
Actuated g/C Ratio	0.36	0.62			0.21	0.21		0.01			0.21	0.21
Clearance Time (s)	4.2	5.3			5.3	5.3		4.2			4.5	4.5
Vehicle Extension (s)	2.0	2.0			2.0	2.0		2.0			1.5	1.5
Lane Grp Cap (vph)	1231	2176			731	327		12			363	316
v/s Ratio Prot	c0.27	0.09			c0.13			c0.00			c0.13	
v/s Ratio Perm						0.03						0.08
v/c Ratio	0.76	0.15			0.62	0.14		0.42			0.64	0.38
Uniform Delay, d1	23.5	6.7			29.9	26.8		40.8			30.1	28.4
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.6	0.0			1.1	0.1		8.3			2.9	0.3
Delay (s)	26.1	6.7			31.0	26.9		49.1			33.0	28.6
Level of Service	C	A			C	C		D			C	C
Approach Delay (s)		21.1			30.6			49.1			31.5	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	18.2
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Table B Outputs

Lane Group	EBT	NBT	SBL	SBT
Lane Group Flow (vph)	482	1146	353	876
v/c Ratio	1.06dl	0.81	0.85	0.34
Control Delay	42.9	28.7	49.6	7.5
Queue Delay	0.2	0.3	26.0	0.8
Total Delay	43.1	29.0	75.7	8.4
Queue Length 50th (ft)	137	291	216	152
Queue Length 95th (ft)	182	#445	m#279	m166
Internal Link Dist (ft)	716	756		191
Turn Bay Length (ft)				
Base Capacity (vph)	768	1414	417	2577
Starvation Cap Reductn	0	0	72	1310
Spillback Cap Reductn	35	35	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.66	0.83	1.02	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱						↑↑↱		↰	↑↑	
Volume (vph)	329	6	108	0	0	0	0	607	447	325	806	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2						4.5		4.2	4.5	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.98		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.94		1.00	1.00	
Flt Protected		0.96						1.00		0.95	1.00	
Satd. Flow (prot)		3321						3245		1805	3610	
Flt Permitted		0.96						1.00		0.95	1.00	
Satd. Flow (perm)		3321						3245		1805	3610	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	7	117	0	0	0	0	660	486	353	876	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	482	0	0	0	0	0	1146	0	353	876	0
Confl. Peds. (#/hr)							13		17	17		13
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split									Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases												
Actuated Green, G (s)		17.1						39.2		20.8	64.2	
Effective Green, g (s)		17.1						39.2		20.8	64.2	
Actuated g/C Ratio		0.19						0.44		0.23	0.71	
Clearance Time (s)		4.2						4.5		4.2	4.5	
Vehicle Extension (s)		2.0						4.0		2.5	3.0	
Lane Grp Cap (vph)		631						1413		417	2575	
v/s Ratio Prot		c0.15						c0.35		c0.20	0.24	
v/s Ratio Perm												
v/c Ratio		1.06dl						0.81		0.85	0.34	
Uniform Delay, d1		34.5						22.2		33.1	4.9	
Progression Factor		1.00						1.00		1.05	1.38	
Incremental Delay, d2		4.9						5.2		10.3	0.2	
Delay (s)		39.5						27.3		45.0	7.0	
Level of Service		D						C		D	A	
Approach Delay (s)		39.5			0.0			27.3			17.9	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.9
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBT	NBT	SBL	SBT
Lane Group Flow (vph)	637	964	320	905
v/c Ratio	0.99dl	0.86	0.84	0.41
Control Delay	27.7	32.2	37.8	5.0
Queue Delay	0.0	2.3	0.0	0.4
Total Delay	27.7	34.5	37.8	5.4
Queue Length 50th (ft)	120	187	131	38
Queue Length 95th (ft)	163	#326	m#234	45
Internal Link Dist (ft)	716	756		191
Turn Bay Length (ft)				
Base Capacity (vph)	1017	1121	383	2201
Starvation Cap Reductn	0	0	0	685
Spillback Cap Reductn	0	72	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.92	0.84	0.60

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱						↑↱		↰	↑↑	
Volume (vph)	423	0	163	0	0	0	0	657	230	294	833	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2						4.5		4.2	4.5	
Lane Util. Factor		0.95						0.95		1.00	0.95	
Frpb, ped/bikes		1.00						0.99		1.00	1.00	
Flpb, ped/bikes		1.00						1.00		1.00	1.00	
Frt		0.96						0.96		1.00	1.00	
Flt Protected		0.97						1.00		0.95	1.00	
Satd. Flow (prot)		3339						3367		1805	3610	
Flt Permitted		0.97						1.00		0.95	1.00	
Satd. Flow (perm)		3339						3367		1805	3610	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	460	0	177	0	0	0	0	714	250	320	905	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	637	0	0	0	0	0	964	0	320	905	0
Confl. Peds. (#/hr)							13		17	17		13
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split									Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases												
Actuated Green, G (s)		16.7						21.6		13.8	39.6	
Effective Green, g (s)		16.7						21.6		13.8	39.6	
Actuated g/C Ratio		0.26						0.33		0.21	0.61	
Clearance Time (s)		4.2						4.5		4.2	4.5	
Vehicle Extension (s)		2.0						4.0		2.5	3.0	
Lane Grp Cap (vph)		858						1119		383	2199	
v/s Ratio Prot		c0.19						c0.29		c0.18	0.25	
v/s Ratio Perm												
v/c Ratio		0.99dl						0.86		0.84	0.41	
Uniform Delay, d1		22.2						20.3		24.5	6.6	
Progression Factor		1.00						1.00		0.83	0.64	
Incremental Delay, d2		3.1						8.8		10.8	0.4	
Delay (s)		25.2						29.1		31.1	4.6	
Level of Service		C						C		C	A	
Approach Delay (s)		25.2			0.0			29.1			11.6	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.9
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Queues
102: Guteirrez St & Garden St

2040 Build w Ex Signal - AM Peak
07/13/2017

Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	346	711	399	684	840
v/c Ratio	0.73	0.72	0.72	0.67	0.77
Control Delay	29.7	23.0	34.5	6.5	25.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	23.0	34.5	6.5	25.1
Queue Length 50th (ft)	120	120	64	50	144
Queue Length 95th (ft)	#243	178	m103	m66	#233
Internal Link Dist (ft)		450		463	298
Turn Bay Length (ft)	100		350		
Base Capacity (vph)	480	1001	601	1015	1091
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.72	0.71	0.66	0.67	0.77

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↱		↰↰	↑			↑↱	
Volume (vph)	0	0	0	424	499	50	367	629	0	0	713	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)				4.5	4.5		4.5	4.5			4.5	
Lane Util. Factor				0.91	0.91		0.97	1.00			0.95	
Frt				1.00	0.99		1.00	1.00			0.99	
Flt Protected				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (prot)				1557	3214		3433	1863			3498	
Flt Permitted				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (perm)				1557	3214		3433	1863			3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	461	542	54	399	684	0	0	775	65
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	346	701	0	399	684	0	0	830	0
Turn Type				Split			Prot					
Protected Phases				8	8		5	2			6	
Permitted Phases												
Actuated Green, G (s)				18.3	18.3		9.7	32.7			18.5	
Effective Green, g (s)				18.3	18.3		9.7	32.7			18.5	
Actuated g/C Ratio				0.31	0.31		0.16	0.55			0.31	
Clearance Time (s)				4.5	4.5		4.5	4.5			4.5	
Vehicle Extension (s)				5.0	5.0		1.5	5.0			5.0	
Lane Grp Cap (vph)				475	980		555	1015			1079	
v/s Ratio Prot				c0.22	0.22		0.12	c0.37			c0.24	
v/s Ratio Perm												
v/c Ratio				0.73	0.72		0.72	0.67			0.77	
Uniform Delay, d1				18.6	18.5		23.9	9.8			18.8	
Progression Factor				1.00	1.00		1.13	0.30			1.00	
Incremental Delay, d2				6.7	3.1		3.5	3.3			5.3	
Delay (s)				25.4	21.6		30.4	6.3			24.1	
Level of Service				C	C		C	A			C	
Approach Delay (s)		0.0			22.9			15.2			24.1	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	433	879	355	633	1280
v/c Ratio	0.74	0.73	0.69	0.68	1.21
Control Delay	28.4	22.9	33.8	16.5	131.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	22.9	33.8	16.5	131.1
Queue Length 50th (ft)	175	174	71	204	~384
Queue Length 95th (ft)	#304	243	m103	m268	#525
Internal Link Dist (ft)		396		468	677
Turn Bay Length (ft)	100		350		
Base Capacity (vph)	595	1225	596	928	1055
Starvation Cap Reductn	0	0	0	6	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.72	0.60	0.69	1.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↱		↰↰	↑			↑↱	
Volume (vph)	0	0	0	642	481	84	327	582	0	0	1023	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)				4.5	4.5		3.5	4.5			4.5	
Lane Util. Factor				0.91	0.91		0.97	1.00			0.95	
Frt				1.00	0.98		1.00	1.00			0.98	
Flt Protected				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (prot)				1557	3178		3433	1863			3470	
Flt Permitted				0.95	0.99		0.95	1.00			1.00	
Satd. Flow (perm)				1557	3178		3433	1863			3470	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	698	523	91	355	633	0	0	1112	168
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	433	867	0	355	633	0	0	1264	0
Turn Type				Split			Prot					
Protected Phases				8	8		5	2			6	
Permitted Phases												
Actuated Green, G (s)				27.2	27.2		10.8	35.8			21.5	
Effective Green, g (s)				27.2	27.2		10.8	35.8			21.5	
Actuated g/C Ratio				0.38	0.38		0.15	0.50			0.30	
Clearance Time (s)				4.5	4.5		3.5	4.5			4.5	
Vehicle Extension (s)				5.0	5.0		1.5	5.0			5.0	
Lane Grp Cap (vph)				588	1201		515	926			1036	
v/s Ratio Prot				c0.28	0.27		0.10	c0.34			c0.36	
v/s Ratio Perm												
v/c Ratio				0.74	0.72		0.69	0.68			1.22	
Uniform Delay, d1				19.3	19.2		29.0	13.8			25.2	
Progression Factor				1.00	1.00		0.93	0.88			1.00	
Incremental Delay, d2				5.8	2.7		2.8	3.8			107.8	
Delay (s)				25.1	21.8		29.8	15.8			133.1	
Level of Service				C	C		C	B			F	
Approach Delay (s)		0.0			22.9			20.9			133.1	
Approach LOS		A			C			C			F	

Intersection Summary			
HCM Average Control Delay	61.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	114	62	135	102	1312	74	1282
v/c Ratio	0.09	0.28	0.24	0.33	0.29	0.62	0.21	0.65
Control Delay	19.1	9.5	21.4	10.7	5.7	11.7	4.7	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	9.5	21.4	10.7	5.7	11.7	4.7	12.8
Queue Length 50th (ft)	6	7	17	11	9	166	6	162
Queue Length 95th (ft)	22	41	45	49	21	#264	17	248
Internal Link Dist (ft)		542		390		472		186
Turn Bay Length (ft)	75		75		200		200	
Base Capacity (vph)	404	591	412	602	360	2115	369	1986
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.19	0.15	0.22	0.28	0.62	0.20	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	24	81	57	39	86	94	1145	62	68	1124	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88		1.00	0.90		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1592		1711	1615		1711	3395		1711	3397	
Flt Permitted	0.67	1.00		0.68	1.00		0.13	1.00		0.15	1.00	
Satd. Flow (perm)	1208	1592		1231	1615		242	3395		263	3397	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	26	88	62	42	93	102	1245	67	74	1222	60
RTOR Reduction (vph)	0	75	0	0	79	0	0	5	0	0	5	0
Lane Group Flow (vph)	24	39	0	62	56	0	102	1307	0	74	1277	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.7	7.7		7.7	7.7		34.9	30.1		32.5	28.9	
Effective Green, g (s)	7.7	7.7		7.7	7.7		34.9	30.1		32.5	28.9	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.66	0.57		0.62	0.55	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	177	233		180	236		294	1939		261	1863	
v/s Ratio Prot		0.02			0.03		c0.03	c0.39		0.02	0.38	
v/s Ratio Perm	0.02			c0.05			0.20			0.16		
v/c Ratio	0.14	0.17		0.34	0.24		0.35	0.67		0.28	0.69	
Uniform Delay, d1	19.6	19.7		20.2	19.9		4.9	7.9		5.0	8.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.3		1.2	0.5		0.7	0.9		0.6	1.1	
Delay (s)	20.0	20.0		21.4	20.4		5.6	8.8		5.6	9.7	
Level of Service	B	C		C	C		A	A		A	A	
Approach Delay (s)		20.0			20.7			8.6			9.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	52.7	Sum of lost time (s)	10.7
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	135	471	149	120	146	1262	199	1189
v/c Ratio	0.32	0.70	0.99	0.20	0.52	0.95	0.79	0.86
Control Delay	16.7	15.7	100.0	9.1	14.5	35.5	36.7	26.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	15.7	100.0	9.1	14.5	35.5	36.7	26.5
Queue Length 50th (ft)	34	74	51	15	25	225	35	210
Queue Length 95th (ft)	73	172	#154	46	50	#367	#127	#344
Internal Link Dist (ft)		808		508		474		435
Turn Bay Length (ft)	75		75		200			
Base Capacity (vph)	443	696	158	641	281	1326	251	1376
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.68	0.94	0.19	0.52	0.95	0.79	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	124	53	380	137	60	51	134	1093	68	183	959	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1564		1711	1677		1711	3391		1711	3358	
Flt Permitted	0.68	1.00		0.24	1.00		0.17	1.00		0.17	1.00	
Satd. Flow (perm)	1224	1564		435	1677		304	3391		301	3358	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	58	413	149	65	55	146	1188	74	199	1042	147
RTOR Reduction (vph)	0	136	0	0	36	0	0	7	0	0	17	0
Lane Group Flow (vph)	135	335	0	149	84	0	146	1255	0	199	1172	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.2	20.2		20.2	20.2		28.0	23.7		28.4	23.9	
Effective Green, g (s)	20.2	20.2		20.2	20.2		28.0	23.7		28.4	23.9	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.47	0.40		0.48	0.40	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	414	529		147	567		244	1346		249	1344	
v/s Ratio Prot		0.21			0.05		0.04	c0.37		c0.06	0.35	
v/s Ratio Perm	0.11			c0.34			0.24			0.32		
v/c Ratio	0.33	0.63		1.01	0.15		0.60	0.93		0.80	0.87	
Uniform Delay, d1	14.7	16.6		19.8	13.8		11.4	17.2		12.3	16.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.5		77.9	0.1		3.9	11.8		16.2	6.5	
Delay (s)	15.2	19.1		97.6	13.9		15.4	29.0		28.6	23.0	
Level of Service	B	B		F	B		B	C		C	C	
Approach Delay (s)		18.2			60.3			27.6			23.8	
Approach LOS		B			E			C			C	

Intersection Summary			
HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	11.3
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Table C Outputs

	↗	→	↑	↓
Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	557	521	611	1012
v/c Ratio	0.97	0.96	0.36	1.26
Control Delay	55.7	54.8	10.0	144.3
Queue Delay	101.5	97.7	0.0	73.9
Total Delay	157.2	152.5	10.0	218.2
Queue Length 50th (ft)	244	226	73	~290
Queue Length 95th (ft)	#447	#423	105	#409
Internal Link Dist (ft)		900	369	80
Turn Bay Length (ft)	300			
Base Capacity (vph)	577	545	1674	806
Starvation Cap Reductn	0	0	0	94
Spillback Cap Reductn	129	122	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.24	1.23	0.36	1.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	✣						↑↑↱			↰↑	
Volume (vph)	722	3	267	0	0	0	0	435	127	430	501	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	10
Total Lost time (s)	4.2	4.2						4.2			4.2	
Lane Util. Factor	0.95	0.95						0.95			0.95	
Frpb, ped/bikes	1.00	1.00						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.92						0.97			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1698	1603						3099			3293	
Flt Permitted	0.95	0.98						1.00			0.59	
Satd. Flow (perm)	1698	1603						3099			1991	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	785	3	290	0	0	0	0	473	138	467	545	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	557	521	0	0	0	0	0	611	0	0	1012	0
Confl. Peds. (#/hr)						1	12		47			12
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split									Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases												
Actuated Green, G (s)	23.8	23.8						37.8			37.8	
Effective Green, g (s)	23.8	23.8						37.8			37.8	
Actuated g/C Ratio	0.34	0.34						0.54			0.54	
Clearance Time (s)	4.2	4.2						4.2			4.2	
Vehicle Extension (s)	2.0	2.0						3.5			3.0	
Lane Grp Cap (vph)	577	545						1673			1075	
v/s Ratio Prot	c0.33	0.33						0.20				
v/s Ratio Perm											c0.51	
v/c Ratio	0.97	0.96						0.37			0.94	
Uniform Delay, d1	22.7	22.6						9.2			15.1	
Progression Factor	1.00	1.00						1.00			0.98	
Incremental Delay, d2	28.5	27.4						0.6			14.4	
Delay (s)	51.2	50.0						9.8			29.2	
Level of Service	D	D						A			C	
Approach Delay (s)		50.6			0.0			9.8			29.2	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.4
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	↗	→	↑	↓
Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	558	530	617	1030
v/c Ratio	0.97	0.97	0.37	1.28
Control Delay	55.9	58.3	10.0	154.0
Queue Delay	107.1	108.2	0.0	75.3
Total Delay	163.0	166.5	10.0	229.4
Queue Length 50th (ft)	244	232	73	~296
Queue Length 95th (ft)	#448	#433	106	#418
Internal Link Dist (ft)		900	369	80
Turn Bay Length (ft)	300			
Base Capacity (vph)	577	545	1676	806
Starvation Cap Reductn	0	0	0	94
Spillback Cap Reductn	133	125	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.26	1.26	0.37	1.45

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	✥						↑↱			↰↑	
Volume (vph)	733	3	265	0	0	0	0	442	126	438	510	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	10
Total Lost time (s)	4.2	4.2						4.2			4.2	
Lane Util. Factor	0.95	0.95						0.95			0.95	
Frpb, ped/bikes	1.00	1.00						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.92						0.97			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1698	1605						3103			3293	
Flt Permitted	0.95	0.98						1.00			0.59	
Satd. Flow (perm)	1698	1605						3103			1985	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	797	3	288	0	0	0	0	480	137	476	554	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	558	530	0	0	0	0	0	617	0	0	1030	0
Confl. Peds. (#/hr)						1	12		47			12
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	0%	0%	0%
Turn Type	Split									Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases												
Actuated Green, G (s)	23.8	23.8						37.8			37.8	
Effective Green, g (s)	23.8	23.8						37.8			37.8	
Actuated g/C Ratio	0.34	0.34						0.54			0.54	
Clearance Time (s)	4.2	4.2						4.2			4.2	
Vehicle Extension (s)	2.0	2.0						3.5			3.0	
Lane Grp Cap (vph)	577	546						1676			1072	
v/s Ratio Prot	0.33	c0.33						0.20				
v/s Ratio Perm											c0.52	
v/c Ratio	0.97	0.97						0.37			0.96	
Uniform Delay, d1	22.7	22.8						9.2			15.4	
Progression Factor	1.00	1.00						1.00			0.97	
Incremental Delay, d2	28.9	30.9						0.6			17.6	
Delay (s)	51.6	53.7						9.9			32.6	
Level of Service	D	D						A			C	
Approach Delay (s)		52.6			0.0			9.9			32.6	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.4
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	96	60	130	82	1197	88	1216
v/c Ratio	0.08	0.24	0.22	0.31	0.22	0.59	0.23	0.59
Control Delay	19.0	11.1	20.6	10.2	4.7	10.7	4.8	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	11.1	20.6	10.2	4.7	10.7	4.8	10.8
Queue Length 50th (ft)	6	9	16	10	7	144	7	148
Queue Length 95th (ft)	22	41	44	47	18	220	19	226
Internal Link Dist (ft)		542		390		472		186
Turn Bay Length (ft)	75		75		200		200	
Base Capacity (vph)	426	612	439	626	393	2071	399	2082
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.16	0.14	0.21	0.21	0.58	0.22	0.58

Intersection Summary

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	20	32	56	55	34	86	75	1016	86	81	1073	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1629		1711	1607		1711	3381		1711	3400	
Flt Permitted	0.67	1.00		0.69	1.00		0.16	1.00		0.17	1.00	
Satd. Flow (perm)	1213	1629		1251	1607		292	3381		302	3400	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	35	61	60	37	93	82	1104	93	88	1166	50
RTOR Reduction (vph)	0	52	0	0	79	0	0	8	0	0	4	0
Lane Group Flow (vph)	22	44	0	60	51	0	82	1189	0	88	1212	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.8	7.8		7.8	7.8		31.2	27.8		31.2	27.8	
Effective Green, g (s)	7.8	7.8		7.8	7.8		31.2	27.8		31.2	27.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.62	0.55		0.62	0.55	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	253		194	249		277	1869		283	1879	
v/s Ratio Prot		0.03			0.03		0.02	0.35		c0.02	c0.36	
v/s Ratio Perm	0.02			c0.05			0.16			0.17		
v/c Ratio	0.12	0.18		0.31	0.21		0.30	0.64		0.31	0.65	
Uniform Delay, d1	18.3	18.5		18.9	18.5		4.7	7.8		4.6	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3		0.9	0.4		0.6	0.7		0.6	0.8	
Delay (s)	18.6	18.8		19.8	19.0		5.3	8.5		5.3	8.6	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		18.7			19.2			8.3			8.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.3	Sum of lost time (s)	11.3
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	262	138	115	79	1302	188	1084
v/c Ratio	0.24	0.46	0.64	0.24	0.24	0.87	0.68	0.65
Control Delay	16.8	7.4	31.4	10.3	7.5	23.6	24.6	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	7.4	31.4	10.3	7.5	23.6	24.6	15.3
Queue Length 50th (ft)	19	14	38	15	8	171	20	134
Queue Length 95th (ft)	46	57	86	44	30	#385	#124	#299
Internal Link Dist (ft)		601		389		462		429
Turn Bay Length (ft)	75		75		200			
Base Capacity (vph)	501	768	337	714	327	1492	277	1675
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.34	0.41	0.16	0.24	0.87	0.68	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	72	53	188	127	58	48	73	1131	67	173	931	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1590		1711	1679		1711	3392		1711	3387	
Flt Permitted	0.68	1.00		0.46	1.00		0.18	1.00		0.15	1.00	
Satd. Flow (perm)	1230	1590		826	1679		326	3392		278	3387	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	58	204	138	63	52	79	1229	73	188	1012	72
RTOR Reduction (vph)	0	152	0	0	39	0	0	7	0	0	7	0
Lane Group Flow (vph)	78	110	0	138	76	0	79	1295	0	188	1077	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.7	13.7		13.7	13.7		27.8	24.6		30.4	25.9	
Effective Green, g (s)	13.7	13.7		13.7	13.7		27.8	24.6		30.4	25.9	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.51	0.45		0.56	0.48	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	311	403		209	425		249	1542		275	1622	
v/s Ratio Prot		0.07			0.05		0.02	c0.38		c0.06	0.32	
v/s Ratio Perm	0.06			c0.17			0.14			0.33		
v/c Ratio	0.25	0.27		0.66	0.18		0.32	0.84		0.68	0.66	
Uniform Delay, d1	16.1	16.2		18.1	15.8		7.4	13.0		8.8	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		7.6	0.2		0.7	4.3		6.9	1.0	
Delay (s)	16.5	16.6		25.7	16.0		8.1	17.3		15.7	11.8	
Level of Service	B	B		C	B		A	B		B	B	
Approach Delay (s)		16.6			21.3			16.8			12.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	14.8
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	93	60	129	87	1177	74	1235
v/c Ratio	0.08	0.23	0.22	0.31	0.23	0.57	0.19	0.60
Control Delay	19.0	10.1	20.6	10.2	4.8	10.5	4.4	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	10.1	20.6	10.2	4.8	10.5	4.4	10.9
Queue Length 50th (ft)	6	7	16	10	7	140	6	152
Queue Length 95th (ft)	22	38	44	46	18	215	16	232
Internal Link Dist (ft)		542		390		472		186
Turn Bay Length (ft)	75		75		200		200	
Base Capacity (vph)	423	603	437	620	388	2064	406	2065
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.15	0.14	0.21	0.22	0.57	0.18	0.60

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	20	24	62	55	33	86	80	1028	55	68	1091	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1606		1711	1606		1711	3395		1711	3401	
Flt Permitted	0.67	1.00		0.70	1.00		0.16	1.00		0.18	1.00	
Satd. Flow (perm)	1214	1606		1255	1606		282	3395		316	3401	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	26	67	60	36	93	87	1117	60	74	1186	49
RTOR Reduction (vph)	0	57	0	0	79	0	0	5	0	0	4	0
Lane Group Flow (vph)	22	36	0	60	50	0	87	1172	0	74	1231	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.7	7.7		7.7	7.7		31.7	28.2		31.5	28.1	
Effective Green, g (s)	7.7	7.7		7.7	7.7		31.7	28.2		31.5	28.1	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.63	0.56		0.62	0.56	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	244		191	244		276	1892		290	1889	
v/s Ratio Prot		0.02			0.03		c0.02	0.35		0.02	c0.36	
v/s Ratio Perm	0.02			c0.05			0.18			0.14		
v/c Ratio	0.12	0.15		0.31	0.21		0.32	0.62		0.26	0.65	
Uniform Delay, d1	18.5	18.6		19.1	18.8		4.7	7.6		4.4	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3		0.9	0.4		0.7	0.6		0.5	0.8	
Delay (s)	18.8	18.9		20.0	19.2		5.3	8.2		4.9	8.7	
Level of Service	B	B		C	B		A	A		A	A	
Approach Delay (s)		18.9			19.5			8.0			8.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	50.6	Sum of lost time (s)	11.3
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	62	277	140	100	96	1322	192	1084
v/c Ratio	0.19	0.49	0.67	0.21	0.30	0.89	0.70	0.65
Control Delay	15.8	7.9	34.1	9.1	8.2	25.4	26.1	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	7.9	34.1	9.1	8.2	25.4	26.1	15.5
Queue Length 50th (ft)	15	17	39	11	10	179	22	136
Queue Length 95th (ft)	38	62	89	38	35	#394	#128	#299
Internal Link Dist (ft)		808		508		474		435
Turn Bay Length (ft)	75		75		200			
Base Capacity (vph)	505	765	319	703	325	1483	275	1667
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.36	0.44	0.14	0.30	0.89	0.70	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Volume (vph)	57	51	204	129	43	49	88	1146	70	177	927	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88		1.00	0.92		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1584		1711	1658		1711	3392		1711	3385	
Flt Permitted	0.69	1.00		0.44	1.00		0.18	1.00		0.15	1.00	
Satd. Flow (perm)	1247	1584		786	1658		326	3392		278	3385	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	55	222	140	47	53	96	1246	76	192	1008	76
RTOR Reduction (vph)	0	154	0	0	39	0	0	7	0	0	8	0
Lane Group Flow (vph)	62	123	0	140	61	0	96	1315	0	192	1076	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.0	14.0		14.0	14.0		27.6	24.5		30.4	25.9	
Effective Green, g (s)	14.0	14.0		14.0	14.0		27.6	24.5		30.4	25.9	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.51	0.45		0.56	0.48	
Clearance Time (s)	3.7	3.7		3.7	3.7		3.5	4.1		3.5	4.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	322	408		203	427		245	1530		274	1615	
v/s Ratio Prot		0.08			0.04		0.02	c0.39		c0.06	0.32	
v/s Ratio Perm	0.05			c0.18			0.18			0.33		
v/c Ratio	0.19	0.30		0.69	0.14		0.39	0.86		0.70	0.67	
Uniform Delay, d1	15.7	16.2		18.2	15.5		7.6	13.4		9.1	10.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		9.4	0.2		1.0	5.1		7.8	1.1	
Delay (s)	16.0	16.6		27.6	15.7		8.7	18.4		17.0	11.9	
Level of Service	B	B		C	B		A	B		B	B	
Approach Delay (s)		16.5			22.6			17.8			12.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	54.3	Sum of lost time (s)	14.8
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Attachment 2

2020 No Build

ICU Output Reports

(These outputs supersedes those in the Forecast Operations Report Appendix D)

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------------------------------------------------------------------------------
                        US 101 Widening Project
                       2020 No Build Conditions
                             AM Peak Hour
------------------------------------------------------------------------------
                  Level Of Service Computation Report
     ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
******************************************************************************
Intersection #83 Turnpike Rd and Calle Real
******************************************************************************
Cycle (sec):        100              Critical Vol./Cap.(X):         0.500
Loss Time (sec):     10              Average Delay (sec/veh):       xxxxxx
Optimal Cycle:       33              Level Of Service:                   A
******************************************************************************
Street Name:              Turnpike                          Calle Real
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0     0    0     0     0    0     0     0    0     0
Y+R:         4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
Lanes:        2  0  1  1  0    1  0  1  1  0    1  0  1  0  1    1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    150  356   191    56  437    12    37   64   120   190   34    28
Growth Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse: 150  356   191    56  437    12    37   64   120   190   34    28
User Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:  150  356   191    56  437    12    37   64   120   190   34    28
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol: 150  356   191    56  437    12    37   64   120   190   34    28
PCE Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume: 150  356   191    56  437    12    37   64   120   190   34    28
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:      2.00 1.30  0.70  1.00 1.95  0.05  1.00 1.00  1.00  1.00 1.10  0.90
Final Sat.: 3200 2083  1117  1600 3114    86  1600 1600  1600  1600 1755  1445
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.05 0.17  0.17  0.04 0.14  0.14  0.02 0.04  0.08  0.12 0.02  0.02
Crit Moves:      ****        ****                          ****  ****
******************************************************************************
```

Traffix 8.0.0715 (c) 2008 Dowling Assoc.

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--------------------------------------------------------------------------------
                          US 101 Widening Project
                         2020 No Build Conditions
                               PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
        ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
********************************************************************************
Intersection #83 Turnpike Rd and Calle Real
********************************************************************************
Cycle (sec):          100                Critical Vol./Cap.(X):         0.593
Loss Time (sec):       10                Average Delay (sec/veh):      xxxxxx
Optimal Cycle:         39                Level Of Service:                  A
********************************************************************************
Street Name:                 Turnpike                         Calle Reak
Approach:        North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Protected        Protected        Protected        Protected
Rights:           Include          Include          Include          Include
Min. Green:     0     0     0    0     0     0    0     0     0    0     0     0
Y+R:          4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0
Lanes:         2  0  1  1  0   1  0  1  1  0   1  0  1  0  1   1  0  1  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     322   447   169   49   324    38   32    43    95  336    68    60
Growth Adj:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Initial Bse:  322   447   169   49   324    38   32    43    95  336    68    60
User Adj:    1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
PHF Volume:   322   447   169   49   324    38   32    43    95  336    68    60
Reduct Vol:     0     0     0    0     0     0    0     0     0    0     0     0
Reduced Vol:  322   447   169   49   324    38   32    43    95  336    68    60
PCE Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
FinalVolume:  322   447   169   49   324    38   32    43    95  336    68    60
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600  1600
Adjustment:  1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00
Lanes:       2.00  1.45  0.55 1.00  1.79  0.21 1.00  1.00  1.00 1.00  1.06  0.94
Final Sat.:  3200  2322   878 1600  2864   336 1600  1600  1600 1600  1700  1500
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10  0.19  0.19 0.03  0.11  0.11 0.02  0.03  0.06 0.21  0.04  0.04
Crit Moves:        ****       ****                              **** ****
********************************************************************************
```

Traffix 8.0.0715 (c) 2008 Dowling Assoc.

```
-------------------------------------------------------------------------------
                            US 101 Widening Project
                           2020 No Build Conditions
                                 AM Peak Hour
-------------------------------------------------------------------------------

                      Level Of Service Computation Report
      ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
*******************************************************************************
Intersection #86 Patterson Ave and Calle Real
*******************************************************************************
Cycle (sec):           100              Critical Vol./Cap.(X):         0.545
Loss Time (sec):        10              Average Delay (sec/veh):      xxxxxx
Optimal Cycle:          36              Level Of Service:                  A
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Protected        Protected        Protected        Protected
Rights:         Include          Include          Include          Include
Min. Green:    0     0     0     0     0     0     0     0     0     0     0     0
Y+R:          4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0   4.0
Lanes:        2  0  2  0  0   0  0  1  1  0    1  0  0  0  2   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     342   391     0     0   840    50    66     0   193     0     0     0
Growth Adj:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Initial Bse:  342   391     0     0   840    50    66     0   193     0     0     0
User Adj:    1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHF Volume:   342   391     0     0   840    50    66     0   193     0     0     0
Reduct Vol:     0     0     0     0     0     0     0     0     0     0     0     0
Reduced Vol:  342   391     0     0   840    50    66     0   193     0     0     0
PCE Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
MLF Adj:     1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
FinalVolume:  342   391     0     0   840    50    66     0   193     0     0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600  1600  1600  1600  1600  1600  1600  1600  1600  1600  1600  1600
Adjustment:  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
Lanes:       2.00  2.00  0.00  0.00  1.89  0.11  1.00  0.00  2.00  0.00  0.00  0.00
Final Sat.:  3200  3200     0     0  3020   180  1600     0  3200     0     0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.11  0.12  0.00  0.00  0.28  0.28  0.04  0.00  0.06  0.00  0.00  0.00
Crit Moves:  ****                    ****                    ****
*******************************************************************************
```

Traffix 8.0.0715 (c) 2008 Dowling Assoc.

```
--------------------------------------------------------------------------------
                            US 101 Widening Project
                           2020 No Build Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
      ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)
********************************************************************************
Intersection #86 Patterson Ave and Calle Real
********************************************************************************
Cycle (sec):          100               Critical Vol./Cap.(X):          0.648
Loss Time (sec):       10               Average Delay (sec/veh):       xxxxxx
Optimal Cycle:         44               Level Of Service:                   B
********************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected        Protected        Protected
Rights:          Include          Include          Include          Include
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
Lanes:       2  0  2  0  0   0  0  1  1  0   1  0  0  0  2   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     780  821     0    0  530    63  191    0   201    0    0     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  780  821     0    0  530    63  191    0   201    0    0     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   780  821     0    0  530    63  191    0   201    0    0     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  780  821     0    0  530    63  191    0   201    0    0     0
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  780  821     0    0  530    63  191    0   201    0    0     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       2.00 2.00  0.00 0.00 1.79  0.21 1.00 0.00  2.00 0.00 0.00  0.00
Final Sat.:  3200 3200     0    0 2860   340 1600    0  3200    0    0     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.24 0.26  0.00 0.00 0.19  0.19 0.12 0.00  0.06 0.00 0.00  0.00
Crit Moves:  ****                 ****       ****
********************************************************************************
```

Attachment 3

2020 & 2040 No Build

Synchro Output Reports for Intersection #48

(These outputs supersedes those in the Forecast Operations Report Appendix C)

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑	
Volume (veh/h)	0	341	0	1072	789	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	371	0	1165	858	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.99					
vC, conflicting volume	1460	457	878			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1440	457	878			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	32	100			
cM capacity (veh/h)	122	544	759			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	371	583	583	429	429
Volume Left	0	0	0	0	0
Volume Right	371	0	0	0	0
cSH	544	1700	1700	1700	1700
Volume to Capacity	0.68	0.34	0.34	0.25	0.25
Queue Length 95th (ft)	130	0	0	0	0
Control Delay (s)	24.6	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	24.6	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑	
Volume (veh/h)	0	531	0	1318	897	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	577	0	1433	975	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.85					
vC, conflicting volume	1711	516	995			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1484	516	995			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	98	498	692			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	577	716	716	488	488
Volume Left	0	0	0	0	0
Volume Right	577	0	0	0	0
cSH	498	1700	1700	1700	1700
Volume to Capacity	1.16	0.42	0.42	0.29	0.29
Queue Length 95th (ft)	512	0	0	0	0
Control Delay (s)	119.0	0.0	0.0	0.0	0.0
Lane LOS	F				
Approach Delay (s)	119.0	0.0		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	23.0		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑	
Volume (veh/h)	0	361	0	1099	824	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	392	0	1195	896	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.99					
vC, conflicting volume	1513	476	916			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1492	476	916			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	26	100			
cM capacity (veh/h)	113	528	734			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	392	597	597	448	448
Volume Left	0	0	0	0	0
Volume Right	392	0	0	0	0
cSH	528	1700	1700	1700	1700
Volume to Capacity	0.74	0.35	0.35	0.26	0.26
Queue Length 95th (ft)	158	0	0	0	0
Control Delay (s)	28.9	0.0	0.0	0.0	0.0
Lane LOS	D				
Approach Delay (s)	28.9	0.0		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑	
Volume (veh/h)	0	603	0	1328	897	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	655	0	1443	975	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.85					
vC, conflicting volume	1717	516	995			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1496	516	995			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	97	498	692			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	655	722	722	488	488
Volume Left	0	0	0	0	0
Volume Right	655	0	0	0	0
cSH	498	1700	1700	1700	1700
Volume to Capacity	1.32	0.42	0.42	0.29	0.29
Queue Length 95th (ft)	709	0	0	0	0
Control Delay (s)	179.9	0.0	0.0	0.0	0.0
Lane LOS	F				
Approach Delay (s)	179.9	0.0		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	38.4		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

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State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought. Help Save Water!

To: Jason Wilkinson
Senior Environmental Planner
Caltrans District 5

Date: August 11, 2017

File: **EA# 0N7000**
Proj# 0500000225

From: Sam Toh, P.E., T.E
Transportation Engineer
Traffic Operations

Subject: **Analysis of Pedestrian Volumes at Freeway Interchanges**

This memo was prepared to provide a response to the Transpogroup's comment #9. This comment questions to what extent pedestrian input was considered in the South Coast 101-HOV Lanes Forecast Operations Report Synchro 7 analyses.

Prior to the analyses the following was determined:

1. There were 51 intersection locations identified by the traffic committee for collecting pedestrian counts.
2. All locations to be analyzed as "pedestrian influenced intersections" for future conditions would use existing condition count data collected. The decision for this approach is documented in the SC101 HOV Traffic Study Methodology Report and the Forecast Operations Report (FOR).
3. For freeway ramp counts, it was determined that 7:30 to 8:30 AM and 4:30 to 5:30 PM would be designated as "system-wide" peak hours for all ramps. This decision is documented in the Existing Condition Operations Analysis.
4. It is not an industry standard to project pedestrian counts for future conditions. Therefore, the idea of increasing pedestrian counts for future analysis will not be discussed any further in this memo.

With these facts in mind, further investigation was performed to look into the intersections identified by the Transpogroup (#23, #29, #39-40, #47, #49, #55, #57, #86-89 and #93-95) as having no pedestrian counts. Of these, the signalized intersections are #49, #55, #57, #86-89, #93 and #95. Intersection #49 was the only intersection in the list identified by the traffic committee as a location to collect pedestrian counts. After a detailed look into the Synchro models, it was discovered that pedestrian counts were not entered into the model for this intersection. Therefore, the appropriate collected pedestrian counts were entered into the model and re-analyzed. The tables below show a comparison of LOS reported in the FOR and the Cabrillo/Hot Springs Tech Memo and the resulting LOS using pedestrian counts for 2020 and 2040 conditions.

Intersection #49 LOS Comparison with Pedestrian Count

		2020 No Build (From FOR[1])				2020 No Build Revised				2020 Build (From FOR[2])				2020 Build Revised			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO
49 . Milpas St/US 101 SB	Signal	29.8	C	56.8	E	29.8	C	60.0	E	35.8	D	50.1	D	35.8	D	50.6	D

		2040 No Build (From FOR[1])				2040 No Build Revised				2040 Build (From FOR[2])				2040 Build Revised			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Control	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO	Delay	LO
49 . Milpas St/US 101 SB	Signal	30.0	C	64.2	E	30.1	C	67.8	E	48.4	D	60.6	E	48.4	D	61.2	E

Note:
[1] FOR - SC101HOV Traffic Study Forecast Operations Report, Oct 19, 2009 (Amended Dec 9, 2011)
[2] Cabrillo/Hot Spring I/C Analysis Tech Memo, Mar 19, 2011 Alternative F.
LOS = Level of Service

The results in the tables show no change in LOS and minimal change in Delay using the entered pedestrian count.

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Pedestrian counts for Intersection # 49 are contained in Attachment 1 and Synchro 7 output reports are contained in Attachment 2 & 3.

Attachment(s)

(1) Pedestrian count, Int. #49, April, 2008
(2) Synchro outputs for No-Build condition superseding printouts in Forecast Operation Report Appendix C
(3) Synchro outputs for Build condition superseding printouts in SC101 HOV Traffic Study: Cabrillo/Hot Springs Interchange Configuration Analysis Attachment 4

c: Paul McClintic, P.E., T.E., Senior Transportation Engineer, Traffic Operations
Scott Eades, South Coast 101 Corridor Manager, Project Management

Attachment 1

Pedestrian Count for Intersection # 49

CLIENT:		DOWLING ASSOCIATES
PROJECT:		CALTRANS DISTRICT 5 - US-101 WIDENING ANALYSIS
INTERSECTION:	N/S	SB US-101 ON-RAMP
	E/W	MILPAS STREET
DATE:		THURSDAY APRIL 24, 2008
PERIODS:		7:00 AM - 9:00 AM AND 4:00 PM - 6:00 PM

AM COUNT RESULTS				
PERIOD	PEDESTRIANS			
15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
700-715	0	0	0	0
715-730	1	0	0	0
730-745	3	4	0	0
745-800	8	4	0	0
800-815	8	3	0	0
815-830	3	2	0	0
830-845	3	1	0	0
845-900	7	2	0	0
HOUR TOTALS				
700-800	12	8	0	0
715-815	20	11	0	0
730-830	22	13	0	0
745-845	22	10	0	0
800-900	21	8	0	0

PM COUNT RESULTS				
PERIOD	PEDESTRIANS			
15 MIN COUNTS	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG
400-415	15	1	0	0
415-430	7	6	0	0
430-445	11	10	0	0
445-500	4	3	0	0
500-515	8	5	0	0
515-530	1	1	0	0
530-545	15	6	0	0
545-600	4	5	0	0
HOUR TOTALS				
400-500	37	20	0	0
415-515	30	24	0	0
430-530	24	19	0	0
445-545	28	15	0	0
500-600	28	17	0	0

Based on freeway ramp counts alone, it was determined that 7:30 to 8:30 AM and 4:30 to 5:30 PM will be used as "system-wide" peak hours for all ramps.
Reference: SC101 HOV Traffic Study – Existing Conditions Operations Analysis

Attachment 2

2020 & 2040 No Build

SYNCHRO-7 Output Reports

(These outputs supersede those in the Forecast Operations Report Appendix C)

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	790	310	579	397	23
v/c Ratio	0.83	0.40	0.89	0.44	0.23
Control Delay	33.0	24.4	48.0	14.5	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	24.4	48.0	14.5	25.2
Queue Length 50th (ft)	157	59	133	108	3
Queue Length 95th (ft)	#325	94	#225	179	25
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	957	770	649	906	102
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.83	0.40	0.89	0.44	0.23

Intersection Summary

Description: SB On-Ramp & Milpas St

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL2	SWL	SWR
Lane Configurations									
Volume (vph)	0	727	212	74	533	365	1	6	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	12	12	12
Total Lost time (s)		4.0	4.5		4.5	4.5		4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00		1.00	
Frpb, ped/bikes		1.00	0.99		1.00	1.00		0.81	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	
Frt		0.85	0.96		1.00	1.00		0.91	
Flt Protected		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (prot)		2842	3248		3385	1837		1348	
Flt Permitted		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (perm)		2842	3248		3385	1837		1348	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	790	230	80	579	397	1	7	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	790	310	0	579	397	0	8	0
Confl. Peds. (#/hr)		22		13					22
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	2%
Turn Type		custom			Prot		Split		
Protected Phases		8	2		1	6	4	4	
Permitted Phases									
Actuated Green, G (s)		23.6	13.9		13.4	31.8		1.6	
Effective Green, g (s)		23.6	13.9		13.4	31.8		1.6	
Actuated g/C Ratio		0.34	0.20		0.19	0.45		0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		958	645		648	835		31	
v/s Ratio Prot		c0.28	0.10		c0.17	c0.22		c0.01	
v/s Ratio Perm									
v/c Ratio		0.82	0.48		0.89	0.48		0.27	
Uniform Delay, d1		21.3	24.9		27.6	13.3		33.6	
Progression Factor		1.00	1.00		1.08	1.08		1.00	
Incremental Delay, d2		5.9	2.6		13.9	1.8		4.6	
Delay (s)		27.2	27.4		43.7	16.2		38.3	
Level of Service		C	C		D	B		D	
Approach Delay (s)	27.2		27.4			32.5		38.3	
Approach LOS	C		C			C		D	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	702	772	964	386	25
v/c Ratio	0.85	0.98	0.96	0.36	0.33
Control Delay	46.1	66.8	56.7	14.4	35.1
Queue Delay	0.0	0.0	5.6	0.7	0.0
Total Delay	46.1	66.8	62.3	15.1	35.1
Queue Length 50th (ft)	226	258	270	148	3
Queue Length 95th (ft)	#399	#385	#439	235	30
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	827	785	999	1084	75
Starvation Cap Reductn	0	0	31	394	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.98	1.00	0.56	0.33

Intersection Summary

Description: SB On-Ramp & Milpas St

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

HCM Signalized Intersection Capacity Analysis
49: SB On-Ramp & Milpas St

2020 No Build w Existing Signal - PM Peak
8/11/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations								
Volume (vph)	0	646	445	265	887	355	5	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	12	12
Total Lost time (s)		4.0	4.5		4.5	4.5	4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00	1.00	
Frpb, ped/bikes		1.00	0.97		1.00	1.00	0.73	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	
Frt		0.85	0.94		1.00	1.00	0.89	
Flt Protected		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (prot)		2842	3136		3385	1837	1204	
Flt Permitted		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (perm)		2842	3136		3385	1837	1204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	702	484	288	964	386	5	20
RTOR Reduction (vph)	0	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	702	772	0	964	386	5	0
Confl. Peds. (#/hr)		24		19				24
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%
Turn Type		custom			Prot			
Protected Phases		8	2		1	6	4	
Permitted Phases								
Actuated Green, G (s)		29.1	22.3		29.5	56.3	1.6	
Effective Green, g (s)		29.1	22.3		29.5	56.3	1.6	
Actuated g/C Ratio		0.29	0.22		0.29	0.56	0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		827	699		999	1034	19	
v/s Ratio Prot		c0.25	c0.25		c0.28	0.21	c0.00	
v/s Ratio Perm								
v/c Ratio		0.85	1.10		0.96	0.37	0.28	
Uniform Delay, d1		33.4	38.9		34.7	12.1	48.6	
Progression Factor		1.00	1.00		1.05	1.25	1.00	
Incremental Delay, d2		8.1	66.3		18.6	0.9	7.9	
Delay (s)		41.5	105.1		55.1	16.0	56.5	
Level of Service		D	F		E	B	E	
Approach Delay (s)	41.5		105.1			43.9	56.5	
Approach LOS	D		F			D	E	

Intersection Summary			
HCM Average Control Delay	60.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

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"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	792	310	599	413	24
v/c Ratio	0.82	0.41	0.90	0.46	0.24
Control Delay	32.9	24.8	48.4	14.6	25.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	24.8	48.4	14.6	25.7
Queue Length 50th (ft)	158	60	138	113	4
Queue Length 95th (ft)	#326	95	#230	192	26
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	961	751	663	903	102
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	0.41	0.90	0.46	0.24

Intersection Summary

Description: SB On-Ramp & Milpas St

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL2	SWL	SWR
Lane Configurations									
Volume (vph)	0	729	212	74	551	380	1	7	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	12	12	12
Total Lost time (s)		4.0	4.5		4.5	4.5		4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00		1.00	
Frpb, ped/bikes		1.00	0.99		1.00	1.00		0.82	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	
Frt		0.85	0.96		1.00	1.00		0.92	
Flt Protected		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (prot)		2842	3248		3385	1837		1366	
Flt Permitted		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (perm)		2842	3248		3385	1837		1366	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	792	230	80	599	413	1	8	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	792	310	0	599	413	0	9	0
Confl. Peds. (#/hr)		22		13					22
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	2%
Turn Type		custom			Prot		Split		
Protected Phases		8	2		1	6	4	4	
Permitted Phases									
Actuated Green, G (s)		23.7	13.5		13.7	31.7		1.6	
Effective Green, g (s)		23.7	13.5		13.7	31.7		1.6	
Actuated g/C Ratio		0.34	0.19		0.20	0.45		0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		962	626		662	832		31	
v/s Ratio Prot		c0.28	0.10		c0.18	c0.22		c0.01	
v/s Ratio Perm									
v/c Ratio		0.82	0.50		0.90	0.50		0.30	
Uniform Delay, d1		21.2	25.2		27.5	13.5		33.7	
Progression Factor		1.00	1.00		1.07	1.07		1.00	
Incremental Delay, d2		5.8	2.8		14.9	2.0		5.4	
Delay (s)		27.0	28.0		44.3	16.4		39.1	
Level of Service		C	C		D	B		D	
Approach Delay (s)	27.0		28.0			32.9		39.1	
Approach LOS	C		C			C		D	

Intersection Summary			
HCM Average Control Delay	30.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	676	787	968	386	25
v/c Ratio	0.84	1.03	0.99	0.36	0.30
Control Delay	42.7	74.7	63.0	13.4	31.2
Queue Delay	0.0	0.0	0.0	0.7	0.0
Total Delay	42.7	74.7	63.0	14.1	31.2
Queue Length 50th (ft)	190	~254	~280	120	3
Queue Length 95th (ft)	#353	#370	#419	184	28
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	808	766	978	1071	82
Starvation Cap Reductn	0	0	0	369	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	1.03	0.99	0.55	0.30

Intersection Summary
Description: SB On-Ramp & Milpas St
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations								
Volume (vph)	0	622	445	279	891	355	5	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	12	12
Total Lost time (s)		4.0	4.5		4.5	4.5	4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00	1.00	
Frpb, ped/bikes		1.00	0.97		1.00	1.00	0.74	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	
Frt		0.85	0.94		1.00	1.00	0.89	
Flt Protected		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (prot)		2842	3134		3385	1837	1215	
Flt Permitted		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (perm)		2842	3134		3385	1837	1215	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	676	484	303	968	386	5	20
RTOR Reduction (vph)	0	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	676	787	0	968	386	5	0
Confl. Peds. (#/hr)		24		19				24
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%
Turn Type		custom			Prot			
Protected Phases		8	2		1	6	4	
Permitted Phases								
Actuated Green, G (s)		25.6	19.3		26.0	49.8	1.6	
Effective Green, g (s)		25.6	19.3		26.0	49.8	1.6	
Actuated g/C Ratio		0.28	0.21		0.29	0.55	0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		808	672		978	1016	22	
v/s Ratio Prot		c0.24	c0.25		c0.29	0.21	c0.00	
v/s Ratio Perm								
v/c Ratio		0.84	1.17		0.99	0.38	0.24	
Uniform Delay, d1		30.2	35.4		31.9	11.4	43.6	
Progression Factor		1.00	1.00		1.19	1.23	1.00	
Incremental Delay, d2		7.5	92.3		23.6	0.9	5.7	
Delay (s)		37.8	127.7		61.6	14.9	49.3	
Level of Service		D	F		E	B	D	
Approach Delay (s)	37.8		127.7			48.3	49.3	
Approach LOS	D		F			D	D	

Intersection Summary			
HCM Average Control Delay	67.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

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Attachment 3

2020 & 2040 Build

SYNCHRO-7 Output Reports

(These outputs supersede those in the Cabrillo/Hot Springs Tech Memo Attachment 4)

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	793	245	821	466	23
v/c Ratio	0.90	0.31	0.89	0.46	0.29
Control Delay	44.7	31.0	45.1	14.5	34.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	31.0	45.1	14.5	34.5
Queue Length 50th (ft)	227	61	230	148	4
Queue Length 95th (ft)	#373	101	#336	249	29
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	895	794	921	1024	79
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.31	0.89	0.46	0.29

Intersection Summary

Description: SB On-Ramp & Milpas St

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL2	SWL	SWR
Lane Configurations									
Volume (vph)	0	730	212	14	755	429	1	6	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11	11	11
Total Lost time (s)		4.0	4.5		4.5	4.5		4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00		1.00	
Frpb, ped/bikes		1.00	1.00		1.00	1.00		0.79	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	
Frt		0.85	0.99		1.00	1.00		0.91	
Flt Protected		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (prot)		2842	3378		3385	1837		1277	
Flt Permitted		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (perm)		2842	3378		3385	1837		1277	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	793	230	15	821	466	1	7	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	793	245	0	821	466	0	8	0
Confl. Peds. (#/hr)		22		13					22
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	2%
Turn Type		custom			Prot		Split		
Protected Phases		8	2		1	6	4	4	
Permitted Phases									
Actuated Green, G (s)		27.9	18.5		24.5	47.5		1.6	
Effective Green, g (s)		27.9	18.5		24.5	47.5		1.6	
Actuated g/C Ratio		0.31	0.21		0.27	0.53		0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		881	694		921	970		23	
v/s Ratio Prot		c0.28	0.07		c0.24	c0.25		c0.01	
v/s Ratio Perm									
v/c Ratio		0.90	0.35		0.89	0.48		0.36	
Uniform Delay, d1		29.7	30.6		31.5	13.4		43.7	
Progression Factor		1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		12.2	1.4		10.8	1.7		9.4	
Delay (s)		41.9	32.0		42.3	15.1		53.1	
Level of Service		D	C		D	B		D	
Approach Delay (s)	41.9		32.0			32.5		53.1	
Approach LOS	D		C			C		D	

Intersection Summary			
HCM Average Control Delay	35.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

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Queues
49: SB On-Ramp & Milpas St

2020 Cabrillo Alt.F - PM Peak
8/11/2017

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	745	546	1079	448	25
v/c Ratio	0.84	0.86	1.01	0.44	0.31
Control Delay	41.3	50.2	61.1	13.4	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	50.2	61.1	13.4	31.8
Queue Length 50th (ft)	209	160	~318	140	3
Queue Length 95th (ft)	#382	#248	#457	211	28
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	882	637	1072	1025	80
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.86	1.01	0.44	0.31

Intersection Summary

Description: SB On-Ramp & Milpas St

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations								
Volume (vph)	0	685	445	57	993	412	5	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11	11
Total Lost time (s)		4.0	4.5		4.5	4.5	4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00	1.00	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	0.74	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	
Frt		0.85	0.98		1.00	1.00	0.89	
Flt Protected		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (prot)		2842	3335		3385	1837	1175	
Flt Permitted		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (perm)		2842	3335		3385	1837	1175	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	745	484	62	1079	448	5	20
RTOR Reduction (vph)	0	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	745	546	0	1079	448	5	0
Confl. Peds. (#/hr)		24		19				24
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%
Turn Type		custom			Prot			
Protected Phases		8	2		1	6	4	
Permitted Phases								
Actuated Green, G (s)		27.9	14.5		28.5	47.5	1.6	
Effective Green, g (s)		27.9	14.5		28.5	47.5	1.6	
Actuated g/C Ratio		0.31	0.16		0.32	0.53	0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		881	537		1072	970	21	
v/s Ratio Prot		c0.26	c0.16		c0.32	0.24	c0.00	
v/s Ratio Perm								
v/c Ratio		0.85	1.02		1.01	0.46	0.26	
Uniform Delay, d1		29.0	37.8		30.8	13.3	43.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2		7.5	43.1		29.1	1.6	6.3	
Delay (s)		36.6	80.9		59.8	14.9	49.9	
Level of Service		D	F		E	B	D	
Approach Delay (s)	36.6		80.9			46.6	49.9	
Approach LOS	D		F			D	D	

Intersection Summary			
HCM Average Control Delay	50.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	803	245	1243	516	23
v/c Ratio	0.91	0.44	1.02	0.49	0.32
Control Delay	50.0	40.3	64.5	14.9	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	40.3	64.5	14.9	39.1
Queue Length 50th (ft)	263	74	~437	184	5
Queue Length 95th (ft)	#459	113	#567	269	31
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	884	561	1215	1047	72
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.91	0.44	1.02	0.49	0.32

Intersection Summary

Description: SB On-Ramp & Milpas St

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL2	SWL	SWR
Lane Configurations									
Volume (vph)	0	739	212	14	1144	475	1	6	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11	11	11
Total Lost time (s)		4.0	4.5		4.5	4.5		4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00		1.00	
Frpb, ped/bikes		1.00	1.00		1.00	1.00		0.79	
Flpb, ped/bikes		1.00	1.00		1.00	1.00		1.00	
Frt		0.85	0.99		1.00	1.00		0.91	
Flt Protected		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (prot)		2842	3377		3385	1837		1269	
Flt Permitted		1.00	1.00		0.95	1.00		0.98	
Satd. Flow (perm)		2842	3377		3385	1837		1269	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	803	230	15	1243	516	1	7	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	803	245	0	1243	516	0	8	0
Confl. Peds. (#/hr)		22		13					22
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	2%
Turn Type		custom			Prot		Split		
Protected Phases		8	2		1	6	4	4	
Permitted Phases									
Actuated Green, G (s)		31.1	13.9		35.9	54.3		1.6	
Effective Green, g (s)		31.1	13.9		35.9	54.3		1.6	
Actuated g/C Ratio		0.31	0.14		0.36	0.54		0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		884	469		1215	997		20	
v/s Ratio Prot		c0.28	0.07		c0.37	c0.28		c0.01	
v/s Ratio Perm									
v/c Ratio		0.91	0.52		1.02	0.52		0.41	
Uniform Delay, d1		33.1	40.0		32.0	14.5		48.7	
Progression Factor		1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		12.9	4.1		31.8	1.9		13.2	
Delay (s)		46.0	44.1		63.9	16.4		61.9	
Level of Service		D	D		E	B		E	
Approach Delay (s)	46.0		44.1			50.0		61.9	
Approach LOS	D		D			D		E	

Intersection Summary			
HCM Average Control Delay	48.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
Description: SB On-Ramp & Milpas St			
c Critical Lane Group			

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Lane Group	WBR	NBT	SBL	SBT	SWL
Lane Group Flow (vph)	790	556	1275	465	25
v/c Ratio	0.94	0.91	1.02	0.43	0.40
Control Delay	62.2	69.0	67.2	14.9	44.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	62.2	69.0	67.2	14.9	44.9
Queue Length 50th (ft)	~376	224	~522	186	4
Queue Length 95th (ft)	#513	#328	#672	262	#34
Internal Link Dist (ft)		512		343	478
Turn Bay Length (ft)			300		
Base Capacity (vph)	838	608	1255	1087	63
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.91	1.02	0.43	0.40

Intersection Summary

Description: SB On-Ramp & Milpas St

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	WBL	WBR	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations								
Volume (vph)	0	727	445	66	1173	428	5	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11	11	11
Total Lost time (s)		4.0	4.5		4.5	4.5	4.5	
Lane Util. Factor		0.88	0.95		0.97	1.00	1.00	
Frpb, ped/bikes		1.00	0.99		1.00	1.00	0.75	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	
Frt		0.85	0.98		1.00	1.00	0.89	
Flt Protected		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (prot)		2842	3316		3385	1837	1186	
Flt Permitted		1.00	1.00		0.95	1.00	0.99	
Satd. Flow (perm)		2842	3316		3385	1837	1186	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	790	484	72	1275	465	5	20
RTOR Reduction (vph)	0	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	790	556	0	1275	465	5	0
Confl. Peds. (#/hr)		24		19				24
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%
Turn Type		custom			Prot			
Protected Phases		8	2		1	6	4	
Permitted Phases								
Actuated Green, G (s)		35.4	20.2		44.5	69.2	2.4	
Effective Green, g (s)		35.4	20.2		44.5	69.2	2.4	
Actuated g/C Ratio		0.29	0.17		0.37	0.58	0.02	
Clearance Time (s)		4.0	4.5		4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		838	558		1255	1059	24	
v/s Ratio Prot		c0.28	c0.17		c0.38	0.25	c0.00	
v/s Ratio Perm								
v/c Ratio		0.94	1.00		1.02	0.44	0.22	
Uniform Delay, d1		41.3	49.9		37.8	14.4	57.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2		18.6	37.2		29.4	1.3	4.7	
Delay (s)		59.9	87.1		67.2	15.7	62.6	
Level of Service		E	F		E	B	E	
Approach Delay (s)	59.9		87.1			53.4	62.6	
Approach LOS	E		F			D	E	

Intersection Summary			
HCM Average Control Delay	61.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

Description: SB On-Ramp & Milpas St

c Critical Lane Group

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: Jason Wilkinson
Senior Environmental Planner
Caltrans District 5

Date: September 22, 2017

File: **EA# 0N7000**
Proj# 0500000225

From: Sam Toh, P.E., T.E
Transportation Engineer
Traffic Operations

Subject: Mitigation Technical Memo

This memo is to provide a summary of the possible mitigation option for the significantly impacted intersections identified using Approach 2 outlined in the FREIR. The intersections that were identified for the opening year (2020 or project completion) and design year (2040 or 20 years after project completion) and their performance measures were reported in the tables below:

Table 1: 2020 Intersections Impacts & Performance Measures

#	Intersection	Level of Service (LOS)				Delay (seconds)				Delay Change		Location
		No Build		Build		No Build		Build		Delta		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
8	SB On/Off & Bailard * ^	E	E	E	F	44.0	45.2	46.3	71.8	2.3	26.6	City of Carpinteria
19	SB On/Off & Carpinteria Ave * ^	C	F	C	F	22.7	59.2	22.5	90.3	-0.2	31.1	City of Carpinteria
21	NB On/Off & Via Real * ^	E	E	F	E	43.7	46.2	78.4	39.6	34.7	-6.6	City of Carpinteria
48	SB Off & Milpas St * ^ ~	C	F	D	F	24.6	119.0	31.7	159.4	7.1	40.4	City of Santa Barbara
107	Cabrillo Blvd/Los Patos *	C	D	C	F	17.5	27.4	19.5	56.9	2.0	29.5	City of Santa Barbara

Notes
* Unsignalized intersection
~ Congestion Management Plan (CMP) designated
^ State (Caltrans) controlled intersection
Analysis based on HCM methodology

Table 2: 2040 Intersections Impacts & Performance Measures

#	Intersection	Level of Service (LOS)				Delay (seconds)				Delay Change		Location
		No Build		Build		No Build		Build		Delta		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
8	SB On/Off & Bailard * ^	F	F	F	F	165.8	80.1	181.1	233.4	15.3	153.3	City of Carpinteria
19	SB On/Off & Carpinteria Ave * ^	D	F	D	F	28.1	537.1	27.4	999.0	-0.7	461.9	City of Carpinteria
21	NB On/Off & Via Real * ^	E	F	F	F	49.4	155.0	165.7	117.3	116.3	-37.7	City of Carpinteria
37	SB Off & San Ysidro Rd/Eucalyptus Ln *	D	F	E	E	30.4	585.3	38.7	37.9	8.3	-547.4	County of Santa Barbara
39	Olive Mill Rd I/C * ~	F	E	E	E	77.3	36.9	37.9	47.9	-39.4	11.0	City of Santa Barbara
48	SB Off & Milpas St * ^ ~	D	F	F	F	28.9	179.9	51.2	286.0	22.3	106.1	City of Santa Barbara
79	SB On & State St & SR 154 ^ ~	F	F	F	F	101.1	96.9	112.4	119.4	11.3	22.5	City of Santa Barbara
107	Cabrillo Blvd/Los Patos * ^	C	E	D	F	24.8	46.0	26.2	112.4	1.4	66.4	City of Santa Barbara

Notes
* Unsignalized intersection
~ Congestion Management Plan (CMP) designated
^ State (Caltrans) controlled intersection
Analysis based on HCM methodology

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Limitation of HCM 2000 Methodology

The HCM 2000 All Way Stop Control methodology had a limitation and is not capable of estimating 95%tile queue. Hence, HCM 2010 was employed to estimate the queue in this analysis. However, HCM 2000 LOS and Delay were reported to be consistent with the methodology used in the Forecast Operations Report for the environmental document.

The 95th-percentile queue is defined to be the queue length that has only a 5-percent probability of being exceeded during the analysis time period. It is a useful parameter for determining the maximum length of turn pockets, but it is not typical of what an average driver would experience. Driver experiences would be better characterized by the mean queue length or 50th-percentile queue. Hence, turn pocket designed to 50th-percentile queue length is typically sufficient. Furthermore, queue are dependent upon the capacity of the intersection and if the intersection is not near or at capacity, 50th-percentile queue represents the maximum queue a driver will typically experience.

Mitigation Options

The mitigation options for the intersection control types were assessed incrementally by starting at Two Way Stop Control (TWSC), All Way Stop Control (AWSC), and then Signal and/or Roundabout. At locations where basic control options (i.e. TWSC or AWSC) provided adequate performance for mitigation (up to the 2040 No Build condition or better), more intensive options were not assessed.

Five intersections #8, #19, #21, #48 & #107 were identified requiring mitigation by project completion. Three additional intersections #37, #39 & #79 would requires mitigation by design year. After identifying the significantly impacted intersections, mitigation options were analyzed using the design year traffic. The target performance is to bring the performance to the level of the design year No Build condition or better. Below are the possible mitigation options by location that were analyzed:

					2040 HCM Delay (seconds)				Delay Change before mitigation					2040 Build				Delay Change after mitigation from Build	
	2040 No Build		2040 Build		2040 No Build		2040 Build					No-Build Control	Mitigation Options	Mitigated LOS		Mitigated Delays			
Int. #	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Intersections	Type*	Control Type*	AM	PM	AM	PM	AM	PM
8	F	F	F	F	165.8	80.1	181.1	233.4	15.3	153.3	SB On / Off & Bailard	TWSC	AWSC	F	D	59.1	27.1	-122.0	-206.3
19	D	F	D	F	28.1	537.1	27.4	999.0	-0.7	461.9	SB On / Off & Capinteria Ave	TWSC	AWSC	B	D	10.4	29.4	-17.0	-969.6
21	E	F	F	F	49.4	155.0	165.7	117.3	116.3	-37.7	NB On / Off & Via Real	AWSC	Signal	D	E	42.1	71.9	-123.6	-45.4
													Roundabout	C	B	19.7	14.3	-146.0	-103.0
37	D	F	E	E	30.4	585.3	38.7	37.9	8.3	-547.4	SB Off & San Ysidro Rd / Eucalyptus Ln	TWSC	AWSC & RAB	B	B	14.8	11.1	-23.9	-26.8
39	F	E	E	E	77.3	36.9	37.9	47.9	-39.4	11.0	Olive Mill Rd NB Off-ramp	TWSC	Roundabout	B	B	10.9	14.2	-27.0	-33.7
107	C	E	D	F	24.8	46.0	26.2	112.4	1.4	66.4	Cabrillo Blvd / Los Patos	TWSC	Signal	B	B	11.8	14.6	-14.4	-97.8
													Roundabout	A	A	5.9	7.8	-20.3	-104.6
48	D	F	F	F	28.9	179.9	51.2	286.0	22.3	106.1	SB Off & Milpas St	OWSC	OWSC	C	E	20.0	40.7	-31.2	-245.3
79	F	F	F	F	101.1	96.9	112.4	119.4	11.3	22.5	SB On & State St & SR 154	TWSC	Signal	C	C	26.5	20.3	-85.9	-99.1

* OWSC: One Way Stop Control, TWSC: Two Way Stop Control, AWSC: All Way Stop Control, RAB: Roundabout

Location	Mitigation Options$_1$	2040 Delay change without mitigation (seconds)$_2$		2040 Delay change with mitigation from Build (seconds)$_3$	
		AM	PM	AM	PM
#8 SB On/Off ramp & Bailard	Convert from 2-way to 4-way stop control. Needs to occur by project completion (2020).	15.3	153.3	-122.0	-206.3
#19 SB On/Off ramps & Carpinteria Ave.	Convert from 2-way to 4-way stop control. Needs to occur by project completion (2020).	-0.7	461.9	-17.0	-969.6

#21 NB On/Off & Via Real/Santa Monica	Option 1 - Install signal with dual left turn lanes for westbound traffic. Needs to occur by project completion (2020).	116.3	-37.7	-123.6	-45.4
	Option 2 - Install single lane roundabout. Needs to occur by project completion (2020).			-146.0	-103.0
#37 SB Off & San Ysidro/Eucalyptus Ln.	Option 1 – Install 4-way stop control at intersection #37. Delay reduction may not be adequate, however, without additional improvements at the NB ramp / N. Jameson / San Ysidro intersection. Needs to occur by design year (2040).	8.3	-547.4	-23.9	-26.8
	Option 2 – Install 4-way stop control at SB Off & San Ysidro/Eucalyptus Ln intersection with single lane roundabout at the NB ramp / N. Jameson / San Ysidro intersection. Needs to occur by design year (2040).			-23.9	-26.8
#39 Olive Mill Road NB Off-ramp	Construct one-lane roundabout. Needs to occur by design year (2040).	-39.4	11.0	-27.0	-33.7
#48 SB Off-ramp & Milpas	Add second right turn lane to SB off-ramp. Retain existing stop control at intersection. Needs to occur by project completion (2020).	22.3	106.1	-31.2	-245.3
#79 SB On-ramp & State St. & SR 154	Adjust signal phasing, coordinate signal actuation and delay optimization (in coordination with intersection #792 - San Marcos and SB on-ramp node). Needs to occur by design year (2040).	11.3	22.5	-85.9	-99.1
#107 Cabrillo Blvd/Los Patos	Option 1 – Install signal. Needs to occur by project completion (2020).	1.4	66.4	-14.4	-97.8
	Option 2 - Install single lane roundabout. Needs to occur by project completion (2020).			-20.3	-104.6

1 The type of improvements needed to bring the traffic levels to no-build conditions, or better, in 2040.
2 Indicates the changes in delay associated with building the project.
3 Indicates the amount of delay reduction associated with building the project and incorporating the respective mitigation option.

Intersection #8 - SB On/Off ramp & Bailard
This 2040 Build intersection control type, prior to mitigation, is TWSC. When AWSC was tested, it was able to bring the performance of the intersection up to and better than the No Build condition.

Intersection #19 - SB On/Off ramps & Carpinteria Ave.
This 2040 Build intersection control type, prior to mitigation, is TWSC. When AWSC was tested, it was able to bring the performance of the intersection up to and better than the No Build condition.

Intersection #21 - Northbound On-/Off-ramps and Via Real/Santa Monica
This 2040 Build intersection control type, prior to mitigation, is AWSC. When Signal was tested, it was able to bring the performance of the intersection up to and better than the No Build condition. However, the City of Carpinteria had expressed their preference of a roundabout solution. The analysis shows that a roundabout is also a viable control type for this intersection operationally.

Intersection #37 - Southbound Off-ramp and San Ysidro/Eucalyptus Lane
This 2040 Build intersection control type, prior to mitigation, is TWSC. When AWSC was tested, it was able to bring the performance of the intersection up to and better than the No Build condition. An ICE step 1 study was also performed by the county and has shown that if this AWSC was coupled with a roundabout at the N. Jameson Lane/NB Off-ramp intersections, it will make the entire interchange function very well in the 2040 Build condition.

Intersection #39 - Olive Mill Road/Coast Village Road
This 2040 Build intersection control type, prior to mitigation, is AWSC. An ICE step 1 study performed by the city has shown that a roundabout would bring the performance of the intersection up to and better than the No Build condition.

Intersection #48 - Southbound Off-ramp and Milpas
This 2040 Build intersection control type, prior to mitigation, is TWSC. Four different intersection control types were explored and the performance are reported in the table below.

						2040 HCM Delay (seconds)								2040 Build				Mitigated Delays Change		
		2040 No Build		2040 Build		2040 No Build		2040 Build		Delays Change		No-Build	Mitigation Options	Mitigated LOS		Mitigated Delays				
Int. #	Intersections	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Control Type	Control Type	AM	PM	AM	PM	AM	PM	Critical 95th %tile queue oberseved
48	SB Off & Milpas St	D	F	F	F	28.9	179.9	51.2	286.0	22.3	106.1	OWSC	Add 2nd RT lane	C	E	20.0	40.7	-8.9	-139.2	Before mitigation PM SB Off-ramp Queue = 813' After mitigation PM SB Off-ramp Queue = 160' (Ramp storage 1000')
													AWSC	C	C	15.5	20.6	-13.4	-159.3	370' (PM Milpas SB), Queue into roundabout 233' (PM SB Off-ramp Queue)
													Signal	B	C	11.5	20.7	-17.4	-159.2	#348' (PM Milpas SB), Queue into roundabout #353' (PM SB Off-ramp Queue)
													Half RAB	B	F	11.5	57.4	-17.4	-122.5	1244' (SIDRA HCM 6) (PM SB Off), exceed ramp storage 1000'

95th %tile vol. exceeds capacity, queue may be longer

All four options explored were able to bring the performance of the intersection up to and better than the No Build condition. However due to the close proximity of the Milpas roundabout to this intersection, queue analysis was also assessed. The AWSC and signal options shows that there is a 5% percent chance the queue may queue back into the roundabout. The half roundabout option, however, showed that the queue at the SB Off-ramp could exceed the ramp storage. Hence, balancing intersection performance and queue, adding the 2^{nd} right turn lane at the SB off-ramp would be the best mitigation option.

Intersection #79 - SB On-ramp & State St. & SR 154
This 2040 Build intersection control type, prior to mitigation, is a Signal. By optimizing the signal phasing and coordinating the signal actuation with intersection #792 (San Marcos and Southbound on-ramp node) it was shown that this strategy was able to bring the performance of the intersection up to and better than the No Build condition.

Intersection #107 - Cabrillo Boulevard/Los Patos
This 2040 Build intersection control type, prior to mitigation, is TWSC. A signal control option is able to bring the performance of the intersection up to and better than the No Build condition. However, the City of Santa Barbara had expressed a preference for a roundabout solution at this location. A Draft Cabrillo corridor study was performed by Fehr & Peers, under contract with SBCAG. This analysis clarifies that both a signal and the roundabout option function very well in the 2040 Build condition.

All proposed mitigation Synchro and SIDRA outputs reports by intersections numbering are presented in **Attachment 1.**

c: Paul McClintic, P.E., T.E., Senior Transportation Engineer, Traffic Operations
Scott Eades, South Coast 101 Corridor Manager, Project Management

Attachment 1

SYNCHRO & SIDRA Output Reports

(For proposed mitigation options by intersections numbering)

Intersection #8

SB On/Off ramp & Bailard

HCM Unsignalized Intersection Capacity Analysis — 2020 Build w Existing Signal - AM Peak
8: Bailard Ave & SB On/Off Ramps — 2/15/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	329	0	162	0	0	0	0	126	28	29	218	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	358	0	176	0	0	0	0	137	30	32	237	0
Direction, Lane #	**EB 1**	**NB 1**	**SB 1**									
Volume Total (vph)	534	167	268									
Volume Left (vph)	358	0	32									
Volume Right (vph)	176	30	0									
Hadj (s)	-0.06	-0.08	0.04									
Departure Headway (s)	5.1	5.8	5.7									
Degree Utilization, x	0.75	0.27	0.43									
Capacity (veh/h)	689	559	586									
Control Delay (s)	22.0	10.9	12.9									
Approach Delay (s)	22.0	10.9	12.9									
Approach LOS	C	B	B									
Intersection Summary												
Delay			17.6									
Level of Service			C									
Intersection Capacity Utilization			61.1%		ICU Level of Service				B			
Analysis Period (min)			15									

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"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	289	3	39	0	0	0	0	276	101	48	212	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	314	3	42	0	0	0	0	300	110	52	230	0

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	360	410	283
Volume Left (vph)	314	0	52
Volume Right (vph)	42	110	0
Hadj (s)	0.12	-0.13	0.07
Departure Headway (s)	5.9	5.4	5.8
Degree Utilization, x	0.59	0.62	0.45
Capacity (veh/h)	579	637	587
Control Delay (s)	16.9	16.7	13.5
Approach Delay (s)	16.9	16.7	13.5
Approach LOS	C	C	B

Intersection Summary			
Delay	15.9		
Level of Service	C		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

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HCM Unsignalized Intersection Capacity Analysis 2040 Build w Ex Signal - AM Peak
8: Bailard Ave & SB On/Off Ramps 2/18/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	439	0	259	0	0	0	0	126	30	38	224	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	477	0	282	0	0	0	0	137	33	41	243	0

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	759	170	285
Volume Left (vph)	477	0	41
Volume Right (vph)	282	33	0
Hadj (s)	-0.10	-0.08	0.05
Departure Headway (s)	5.2	6.3	6.2
Degree Utilization, x	1.0	0.30	0.49
Capacity (veh/h)	679	560	572
Control Delay (s)	86.3	11.9	14.9
Approach Delay (s)	86.3	11.9	14.9
Approach LOS	F	B	B

Intersection Summary			
Delay	59.1		
Level of Service	F		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	40.6
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	439	0	259	0	0	0	0	0	0	126	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0	2	0	0	0	2	2	2	2
Mvmt Flow	0	477	0	282	0	0	0	0	0	0	137	33
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0

Approach	EB	NB
Opposing Approach		SB
Opposing Lanes	0	1
Conflicting Approach Left	SB	EB
Conflicting Lanes Left	1	1
Conflicting Approach Right	NB	
Conflicting Lanes Right	1	0
HCM Control Delay	56.7	11.9
HCM LOS	F	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	63%	15%
Vol Thru, %	81%	0%	85%
Vol Right, %	19%	37%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	156	698	262
LT Vol	0	439	38
Through Vol	126	0	224
RT Vol	30	259	0
Lane Flow Rate	170	759	285
Geometry Grp	1	1	1
Degree of Util (X)	0.294	1	0.488
Departure Headway (Hd)	6.25	5.231	6.163
Convergence, Y/N	Yes	Yes	Yes
Cap	575	698	587
Service Time	4.299	3.231	4.19
HCM Lane V/C Ratio	0.296	1.087	0.486
HCM Control Delay	11.9	56.7	14.9
HCM Lane LOS	B	F	B
HCM 95th-tile Q	1.2	16.1	2.7

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	38	224	0
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	41	243	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	
Conflicting Lanes Left	0
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	14.9
HCM LOS	B

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	411	3	55	0	0	0	0	276	105	57	212	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	447	3	60	0	0	0	0	300	114	62	230	0

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	510	414	292
Volume Left (vph)	447	0	62
Volume Right (vph)	60	114	0
Hadj (s)	0.12	-0.13	0.08
Departure Headway (s)	6.1	6.1	6.5
Degree Utilization, x	0.87	0.70	0.53
Capacity (veh/h)	510	566	512
Control Delay (s)	37.1	22.2	16.7
Approach Delay (s)	37.1	22.2	16.7
Approach LOS	E	C	C

Intersection Summary			
Delay	27.1		
Level of Service	D		
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	26.3
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	411	3	55	0	0	0	0	0	0	276	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1	2	0	0	0	2	2	2	2
Mvmt Flow	0	447	3	60	0	0	0	0	0	0	300	114
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0

Approach	EB	NB
Opposing Approach		SB
Opposing Lanes	0	1
Conflicting Approach Left	SB	EB
Conflicting Lanes Left	1	1
Conflicting Approach Right	NB	
Conflicting Lanes Right	1	0
HCM Control Delay	35.3	22
HCM LOS	E	C

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	88%	21%
Vol Thru, %	72%	1%	79%
Vol Right, %	28%	12%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	381	469	269
LT Vol	0	411	57
Through Vol	276	3	212
RT Vol	105	55	0
Lane Flow Rate	414	510	292
Geometry Grp	1	1	1
Degree of Util (X)	0.699	0.856	0.527
Departure Headway (Hd)	6.074	6.167	6.49
Convergence, Y/N	Yes	Yes	Yes
Cap	596	591	558
Service Time	4.085	4.167	4.504
HCM Lane V/C Ratio	0.695	0.863	0.523
HCM Control Delay	22	35.3	16.5
HCM Lane LOS	C	E	C
HCM 95th-tile Q	5.6	9.4	3.1

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Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	57	212	0
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	62	230	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	
Conflicting Lanes Left	0
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	16.5
HCM LOS	C

Lane

Intersection #19

SB On/Off ramps & Carpinteria Ave.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	133	193	1	66	268	11	3	17	48	15	5	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	145	210	1	72	291	12	3	18	52	16	5	14
Direction, Lane #	**EB 1**	**EB 2**	**WB 1**	**WB 2**	**NB 1**	**SB 1**						
Volume Total (vph)	145	211	72	303	74	36						
Volume Left (vph)	145	0	72	0	3	16						
Volume Right (vph)	0	1	0	12	52	14						
Hadj (s)	0.52	0.01	0.52	-0.01	-0.41	-0.15						
Departure Headway (s)	5.7	5.2	5.7	5.2	5.2	5.5						
Degree Utilization, x	0.23	0.30	0.11	0.43	0.11	0.05						
Capacity (veh/h)	617	674	611	681	625	577						
Control Delay (s)	9.2	9.2	8.2	10.8	8.8	8.8						
Approach Delay (s)	9.2		10.3		8.8	8.8						
Approach LOS	A		B		A	A						
Intersection Summary												
Delay			9.7									
Level of Service			A									
Intersection Capacity Utilization			42.2%	ICU Level of Service					A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	286	347	3	20	315	40	2	16	34	31	17	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	311	377	3	22	342	43	2	17	37	34	18	120

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	311	380	22	386	57	172
Volume Left (vph)	311	0	22	0	2	34
Volume Right (vph)	0	3	0	43	37	120
Hadj (s)	0.52	0.01	0.52	-0.06	-0.38	-0.38
Departure Headway (s)	6.3	5.8	6.7	6.1	6.5	6.1
Degree Utilization, x	0.55	0.61	0.04	0.66	0.10	0.29
Capacity (veh/h)	553	598	513	564	473	534
Control Delay (s)	15.5	16.4	8.8	18.8	10.2	11.6
Approach Delay (s)	16.0		18.3		10.2	11.6
Approach LOS	C		C		B	B

Intersection Summary			
Delay	15.9		
Level of Service	C		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	166	212	1	66	303	12	4	17	48	15	5	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	180	230	1	72	329	13	4	18	52	16	5	15

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	180	232	72	342	75	37
Volume Left (vph)	180	0	72	0	4	16
Volume Right (vph)	0	1	0	13	52	15
Hadj (s)	0.52	0.01	0.52	-0.01	-0.41	-0.16
Departure Headway (s)	5.7	5.2	5.8	5.2	5.4	5.7
Degree Utilization, x	0.29	0.34	0.12	0.50	0.11	0.06
Capacity (veh/h)	601	666	601	670	599	553
Control Delay (s)	9.9	9.7	8.3	12.1	9.1	9.1
Approach Delay (s)	9.8		11.5		9.1	9.1
Approach LOS	A		B		A	A

Intersection Summary			
Delay	10.4		
Level of Service	B		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	166	212	1	0	66	303	12	0	4	17	48
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1	2	1	1	1	2	0	0	0
Mvmt Flow	0	180	230	1	0	72	329	13	0	4	18	52
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	10.7	12.3	9.2
HCM LOS	B	B	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	6%	100%	0%	100%	0%	44%
Vol Thru, %	25%	0%	100%	0%	96%	15%
Vol Right, %	70%	0%	0%	0%	4%	41%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	69	166	213	66	315	34
LT Vol	4	166	0	66	0	15
Through Vol	17	0	212	0	303	5
RT Vol	48	0	1	0	12	14
Lane Flow Rate	75	180	232	72	342	37
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.112	0.286	0.334	0.114	0.494	0.059
Departure Headway (Hd)	5.376	5.706	5.199	5.73	5.199	5.7
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	660	626	688	622	688	622
Service Time	3.463	3.474	2.967	3.497	2.966	3.798
HCM Lane V/C Ratio	0.114	0.288	0.337	0.116	0.497	0.059
HCM Control Delay	9.2	10.8	10.6	9.2	13	9.2
HCM Lane LOS	A	B	B	A	B	A
HCM 95th-tile Q	0.4	1.2	1.5	0.4	2.8	0.2

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	15	5	14
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	16	5	15
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	9.2
HCM LOS	A

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	429	347	3	20	342	59	2	23	34	50	27	144
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	466	377	3	22	372	64	2	25	37	54	29	157
Direction, Lane #	**EB 1**	**EB 2**	**WB 1**	**WB 2**	**NB 1**	**SB 1**						
Volume Total (vph)	466	380	22	436	64	240						
Volume Left (vph)	466	0	22	0	2	54						
Volume Right (vph)	0	3	0	64	37	157						
Hadj (s)	0.52	0.01	0.52	-0.09	-0.34	-0.35						
Departure Headway (s)	6.9	6.4	7.4	6.8	7.4	6.7						
Degree Utilization, x	0.90	0.68	0.04	0.83	0.13	0.45						
Capacity (veh/h)	513	546	465	515	440	513						
Control Delay (s)	43.5	20.7	9.6	33.4	11.6	14.9						
Approach Delay (s)	33.3		32.3		11.6	14.9						
Approach LOS	D		D		B	B						
Intersection Summary												
Delay			29.4									
Level of Service			D									
Intersection Capacity Utilization			75.8%	ICU Level of Service					D			
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	30.6
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	429	347	3	0	20	342	59	0	2	23	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1	2	1	1	1	2	0	0	0
Mvmt Flow	0	466	377	3	0	22	372	64	0	2	25	37
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	34.7	33.7	11.8
HCM LOS	D	D	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	3%	100%	0%	100%	0%	23%
Vol Thru, %	39%	0%	99%	0%	85%	12%
Vol Right, %	58%	0%	1%	0%	15%	65%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	59	429	350	20	401	221
LT Vol	2	429	0	20	0	50
Through Vol	23	0	347	0	342	27
RT Vol	34	0	3	0	59	144
Lane Flow Rate	64	466	380	22	436	240
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.135	0.901	0.681	0.045	0.829	0.453
Departure Headway (Hd)	7.553	6.958	6.441	7.468	6.851	6.793
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	475	522	563	480	527	531
Service Time	5.604	4.696	4.179	5.207	4.59	4.827
HCM Lane V/C Ratio	0.135	0.893	0.675	0.046	0.827	0.452
HCM Control Delay	11.8	45.2	21.9	10.6	34.8	15.4
HCM Lane LOS	B	E	C	B	D	C
HCM 95th-tile Q	0.5	10.4	5.2	0.1	8.3	2.3

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	50	27	144
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	54	29	157
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	15.4
HCM LOS	C

Lane

Intersection #21

NB On/Off & Via Real/Santa Monica

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	119	44	336	237	43	143	82	44	82	140	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			1.00			1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.98			0.98			0.97	
Flt Protected		0.99	1.00	0.95	1.00			0.97			0.99	
Satd. Flow (prot)		1851	1583	3433	1813			1765			1768	
Flt Permitted		0.99	1.00	0.95	1.00			0.97			0.99	
Satd. Flow (perm)		1851	1583	3433	1813			1765			1768	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	129	48	365	258	47	155	89	48	89	152	66
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	147	48	365	305	0	0	292	0	0	307	0
Confl. Peds. (#/hr)	1					1	8		5	5		8
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)		11.1	26.2	15.2	15.2			15.1			15.3	
Effective Green, g (s)		11.1	26.2	15.2	15.2			15.1			15.3	
Actuated g/C Ratio		0.15	0.36	0.21	0.21			0.21			0.21	
Clearance Time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		282	570	717	379			366			372	
v/s Ratio Prot		c0.08	0.02	0.11	c0.17			c0.17			c0.17	
v/s Ratio Perm			0.01									
v/c Ratio		0.52	0.08	0.51	0.80			0.80			0.83	
Uniform Delay, d1		28.4	15.3	25.4	27.3			27.4			27.4	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.7	0.1	0.6	11.7			11.5			13.8	
Delay (s)		30.1	15.4	26.0	39.1			38.8			41.3	
Level of Service		C	B	C	D			D			D	
Approach Delay (s)		26.5			32.0			38.8			41.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	72.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	363	18	210	145	52	115	68	103	120	71	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			1.00			1.00	
Frpb, ped/bikes		1.00	1.00	1.00	0.99			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.96			0.95			0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98			0.97	
Satd. Flow (prot)		1855	1583	3433	1778			1734			1786	
Flt Permitted		1.00	1.00	0.95	1.00			0.98			0.97	
Satd. Flow (perm)		1855	1583	3433	1778			1734			1786	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	395	20	228	158	57	125	74	112	130	77	17
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	431	20	228	215	0	0	311	0	0	224	0
Confl. Peds. (#/hr)	1					1	8		5	5		8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)		21.9	39.8	14.0	14.0			17.9			14.2	
Effective Green, g (s)		21.9	39.8	14.0	14.0			17.9			14.2	
Actuated g/C Ratio		0.26	0.47	0.17	0.17			0.21			0.17	
Clearance Time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		483	750	572	296			369			301	
v/s Ratio Prot		c0.23	0.01	0.07	c0.12			c0.18			c0.13	
v/s Ratio Perm			0.01									
v/c Ratio		0.89	0.03	0.40	0.73			0.84			0.74	
Uniform Delay, d1		29.9	11.8	31.2	33.2			31.7			33.2	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		18.4	0.0	0.5	8.6			15.9			9.6	
Delay (s)		48.4	11.8	31.7	41.8			47.6			42.7	
Level of Service		D	B	C	D			D			D	
Approach Delay (s)		46.7			36.6			47.6			42.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	125	61	471	237	49	142	87	44	118	196	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			1.00			1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.97			0.98			0.98	
Flt Protected		0.99	1.00	0.95	1.00			0.97			0.98	
Satd. Flow (prot)		1850	1583	3433	1808			1767			1782	
Flt Permitted		0.99	1.00	0.95	1.00			0.97			0.98	
Satd. Flow (perm)		1850	1583	3433	1808			1767			1782	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	136	66	512	258	53	154	95	48	128	213	66
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	157	66	512	311	0	0	297	0	0	407	0
Confl. Peds. (#/hr)	1					1	8		5	5		8
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)		12.1	29.1	16.8	16.8			17.0			21.8	
Effective Green, g (s)		12.1	29.1	16.8	16.8			17.0			21.8	
Actuated g/C Ratio		0.14	0.35	0.20	0.20			0.20			0.26	
Clearance Time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		267	550	689	362			358			464	
v/s Ratio Prot		c0.08	0.02	0.15	c0.17			c0.17			c0.23	
v/s Ratio Perm			0.02									
v/c Ratio		0.59	0.12	0.74	0.86			0.83			0.88	
Uniform Delay, d1		33.5	18.6	31.4	32.3			32.0			29.7	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		3.3	0.1	4.3	18.0			14.6			16.8	
Delay (s)		36.8	18.7	35.8	50.3			46.6			46.5	
Level of Service		D	B	D	D			D			D	
Approach Delay (s)		31.4			41.2			46.6			46.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	42.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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	→	↘	↙	←	↑	↓
Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	157	66	512	311	297	407
v/c Ratio	0.59	0.12	0.74	0.86	0.83	0.88
Control Delay	43.7	10.0	40.4	58.1	54.2	52.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	10.0	40.4	58.1	54.2	52.6
Queue Length 50th (ft)	81	12	136	166	155	210
Queue Length 95th (ft)	141	26	#214	#328	#300	#391
Internal Link Dist (ft)	604			480	212	391
Turn Bay Length (ft)		50	230			
Base Capacity (vph)	356	571	702	369	382	493
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.12	0.73	0.84	0.78	0.83

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	363	26	307	145	63	172	117	141	141	117	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			1.00			1.00	
Frpb, ped/bikes		1.00	1.00	1.00	0.99			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.95			0.96			0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.98			0.98	
Satd. Flow (prot)		1855	1583	3433	1767			1743			1793	
Flt Permitted		1.00	1.00	0.95	1.00			0.98			0.98	
Satd. Flow (perm)		1855	1583	3433	1767			1743			1793	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	395	28	334	158	68	187	127	153	153	127	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	431	28	334	226	0	0	467	0	0	303	0
Confl. Peds. (#/hr)	1					1	8		5	5		8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)		19.0	42.0	14.6	14.6			23.0			16.0	
Effective Green, g (s)		19.0	42.0	14.6	14.6			23.0			16.0	
Actuated g/C Ratio		0.21	0.47	0.16	0.16			0.26			0.18	
Clearance Time (s)		4.0	4.0	4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		397	750	565	291			452			323	
v/s Ratio Prot		c0.23	0.01	0.10	c0.13			c0.27			c0.17	
v/s Ratio Perm			0.01									
v/c Ratio		1.09	0.04	0.59	0.78			1.03			0.94	
Uniform Delay, d1		34.8	12.5	34.2	35.4			32.8			35.8	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		70.1	0.0	1.7	12.2			51.1			33.8	
Delay (s)		104.9	12.5	35.9	47.7			83.9			69.7	
Level of Service		F	B	D	D			F			E	
Approach Delay (s)		99.3			40.7			83.9			69.7	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	71.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

	→	↘	↙	←	↑	↓
Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	431	28	334	226	467	303
v/c Ratio	1.09	0.04	0.59	0.78	1.03	0.94
Control Delay	105.3	6.7	38.9	54.7	85.7	74.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.3	6.7	38.9	54.7	85.7	74.8
Queue Length 50th (ft)	~281	4	90	122	~292	172
Queue Length 95th (ft)	#462	10	132	#223	#478	#331
Internal Link Dist (ft)	604			480	212	391
Turn Bay Length (ft)		50	230			
Base Capacity (vph)	397	750	620	319	452	323
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.04	0.54	0.71	1.03	0.94

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

MOVEMENT SUMMARY

Site: Santa Monica Rd-Via Real (Int# 21) - AM 2040 Build - HCM

Santa Monica Rd-Via Real (Int# 21) Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Off Ramp											
3b	L3	1	2.0	0.296	6.6	LOS A	1.5	37.8	0.50	0.78	32.0
3	L2	154	2.0	0.296	6.6	LOS A	1.5	37.8	0.50	0.78	32.0
8	T1	95	2.0	0.296	6.6	LOS A	1.5	37.8	0.50	0.78	32.0
18	R2	48	2.0	0.296	6.6	LOS A	1.5	37.8	0.50	0.78	32.0
Approach		298	2.0	0.296	6.6	LOS A	1.5	37.8	0.50	0.39	32.0
East: Via Real WB											
1a	L1	512	2.0	0.807	20.4	LOS C	11.6	293.9	0.94	1.81	22.0
6	T1	258	2.0	0.807	20.4	LOS C	11.6	293.9	0.94	1.81	22.0
16	R2	53	2.0	0.807	20.4	LOS C	11.6	293.9	0.94	1.81	22.0
Approach		823	2.0	0.807	20.4	LOS C	11.6	293.9	0.94	0.90	22.0
North: Santa Monica Rd											
7	L2	128	2.0	0.789	32.2	LOS D	6.4	161.4	0.90	2.21	19.0
14a	R1	213	2.0	0.789	32.2	LOS D	6.4	161.4	0.90	2.21	19.0
14	R2	66	2.0	0.789	32.2	LOS D	6.4	161.4	0.90	2.21	19.0
Approach		408	2.0	0.789	32.2	LOS D	6.4	161.4	0.90	1.10	19.0
West: Via Real EB											
5	L2	21	2.0	0.386	12.0	LOS B	1.8	45.8	0.72	1.51	26.0
2	T1	136	2.0	0.386	12.0	LOS B	1.8	45.8	0.72	1.51	26.0
12b	R3	66	2.0	0.386	12.0	LOS B	1.8	45.8	0.72	1.51	26.0
Approach		223	2.0	0.386	12.0	LOS B	1.8	45.8	0.72	0.75	26.0
All Vehicles		1751	2.0	0.807	19.7	LOS C	11.6	293.9	0.83	0.84	23.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Thursday, June 29, 2017 11:18:39 AM
SIDRA INTERSECTION 6.0.11.3995

Project: D:\001 Work Drive\0_Current_Projects\SB\0N7000 SC101 HOV\ED\Legal\Court Ruling\Establish Level of Significance\EIR Compensatory Mitigation\Int #21\Santa Monica - Via Real Int# 21.sip6
8001297, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), NETWORK / Enterprise

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Santa Monica Rd-Via Real (Int# 21) - PM 2040 Build - HCM

Santa Monica Rd-Via Real (Int# 21) Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Off Ramp											
3b	L3	1	1.0	0.629	15.8	LOS C	4.7	118.7	0.81	1.77	28.2
3	L2	187	1.0	0.629	15.8	LOS C	4.7	118.7	0.81	1.77	28.2
8	T1	127	1.0	0.629	15.8	LOS C	4.7	118.7	0.81	1.77	28.2
18	R2	153	1.0	0.629	15.8	LOS C	4.7	118.7	0.81	1.77	28.2
Approach		468	1.0	0.629	15.8	LOS C	4.7	118.7	0.81	0.88	28.2
East: Via Real WB											
1a	L1	334	2.0	0.595	12.2	LOS B	4.6	117.6	0.72	1.38	25.0
6	T1	158	2.0	0.595	12.2	LOS B	4.6	117.6	0.72	1.38	25.0
16	R2	68	2.0	0.595	12.2	LOS B	4.6	117.6	0.72	1.38	25.0
Approach		560	2.0	0.595	12.2	LOS B	4.6	117.6	0.72	0.69	25.0
North: Santa Monica Rd											
7	L2	153	2.0	0.454	12.1	LOS B	2.4	61.7	0.73	1.54	25.1
14a	R1	127	2.0	0.454	12.1	LOS B	2.4	61.7	0.73	1.54	25.1
14	R2	23	2.0	0.454	12.1	LOS B	2.4	61.7	0.73	1.54	25.1
Approach		303	2.0	0.454	12.1	LOS B	2.4	61.7	0.73	0.77	25.1
West: Via Real EB											
5	L2	36	2.0	0.637	16.5	LOS C	4.7	119.4	0.82	1.81	24.3
2	T1	395	2.0	0.637	16.5	LOS C	4.7	119.4	0.82	1.81	24.3
12b	R3	28	2.0	0.637	16.5	LOS C	4.7	119.4	0.82	1.81	24.3
Approach		459	2.0	0.637	16.5	LOS C	4.7	119.4	0.82	0.91	24.3
All Vehicles		1790	1.7	0.637	14.3	LOS B	4.7	119.4	0.77	0.81	25.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA INTERSECTION 6.0.11.3995

Project: D:\001 Work Drive\0_Current_Projects\SB\0N7000 SC101 HOV\ED\Legal\Court Ruling\Establish Level of Significance\EIR Compensatory Mitigation\Int #21\Santa Monica - Via Real Int# 21.sip6
8001297, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), NETWORK / Enterprise

SIDRA INTERSECTION 6

Internal Memo to Corridor Manager
For

Intersection #19
SB On/Off ramps & Carpinteria Ave.

&

Intersection #21
NB On/Off & Via Real/Santa Monica

Toh, Sam S@DOT

From:	Toh, Sam S@DOT
Sent:	Tuesday, October 11, 2016 9:26 AM
To:	Eades, Scott@DOT; Mcclintic, Paul@DOT
Subject:	City of Carpinteria Mitigation
Attachments:	City of Carpinteria.pdf; 2040 No Build Lane Configurations.pdf; 2040 Build Mitigated Lane Configurations.pdf

Scott,

Here's a comparison table between 2040 No Build condition to our proposed 2040 Build Mitigation per your request. Please keep in mind, CEQA only requires mitigation to bring the performance of an intersection to the No Build condition or better. Please take a look at it and see what you want to do this information.

For Intersection #19 - Converting TWSC to AWSC:

AM Peak: The mitigation would provide a tremendous operational benefits in terms of control delay, especially SB Off-ramp delay. From 95%tile queue perspective, the AWSC would increase no more than 1-3 cars on the approaches.

PM Peak: Before mitigation, our SB Off-ramp queue has a potential to queue up to 490 ft. (20 cars). For AWSC, SB off-ramp 95%tile queue will be reduced to 58 feet (2 cars) but the EB queue on Carpinteria Ave. would grow to 260 ft.(10-11 cars, 230 ft. storage) from 49 ft.(2 cars). We are able to bring the Delay/LOS from 537.1 sec./F down to 29.4 sec./D, a 2 LOS grade improvement for the intersection, EB Carpinteria Ave. would increase from LOS B to D, take in mind, Carpinteria Ave is free flow move with TWSC.

For intersection #21 – Converting AWSC to Signal:

AM Peak: The mitigation would provide an improved operational benefits slightly in terms of control delay. We are able to bring the Delay/LOS from 49.4 sec./E down to 42.1 sec./D, a one(1) LOS grade improvement for the intersection. However, queue for signal would increase no more than 4-12 cars on the approaches compare to AWSC, nevertheless there is adequate NB-Off ramp storage to handle the queue increase from 100 ft. to 300 ft. (available NB Off-ramp storage is 700 ft.)

PM Peak: The mitigation would provide an improved operational benefits in terms of control delay, cutting the control delay by more than half. We are able to bring the Delay/LOS from 155 sec./F down to 71.9 sec./E, a one(1) LOS grade improvement for the intersection. Queue for signal would increase no more than 1-10 cars on the approaches compare to AWSC. Via Real EB and Santa Monica SB will see the most increase in queue. The NB-Off ramp queue increase by about 1 car but there is ample storage to handle the queue expected.

Tein-Su Samuel Toh, PE, TE

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Traffic Operations - District 5
50 Higuera Street, San Luis Obispo, CA 93405
(805) 542-4709

Int#	Condition	Peak	Overall HCM	Carpinteria EB	Carpinteria WB	Reynolds Ave NB	Southbound Off-ramp	HCM Methodology
19	2040 No Build/TWSC	AM	28.1/D	8.5/A	8.0/A	17.9/C	28.1/D	HCM2000
	Mitigated/AWSC		10.4/A	9.8/A	11.5/B	9.1/A	9.1/A	HCM2000
	No-Build TWSC 95% Q (ft.)		--	13	4	20	17	HCM2000
	AWSC 95% Q (ft.)		--	38	70	10	5	HCM2010
	2040 No Build/TWSC	PM	537.1/F	10.5/B	8.2/A	51.6/F	537.1/F	HCM2000
	Mitigated/AWSC		29.4/D	33.3/D	32.3/D	11.6/B	14.9/B	HCM2000
	TWSC 95% Q (ft.)		--	49	1	43	490	HCM2000
	AWSC 95% Q (ft.)		--	260	208	13	58	HCM2010

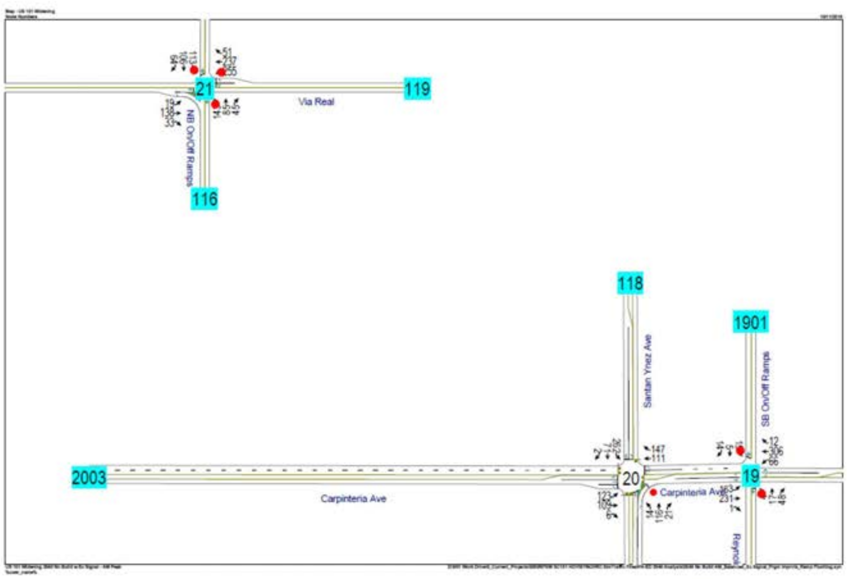
Int#	Condition	Peak	Overall HCM	Via Real EB	Via Real WB	Santa Monica SB	Northbound Off-ramp	HCM Methodology
21	2040 No Build/AWSC	AM	49.4/E	13.7/B	91.1/F	20.6/C	21.0/C	HCM2000
	Mitigated/Signal		42.1/D	31.4/D	41.2/D	46.6/D	46.5/D	HCM2000
	AWSC 95% Q (ft.)		--	45	#333	108	100	HCM2010
	Signal 95% Q (ft.)		--	141	#328	#391	#300	HCM2000
	2040 No Build/AWSC	PM	155.0/F	277.0/F	84.7/F	139.0/F	58.8/F	HCM2000
	Mitigated/Signal		71.9/E	99.3/F	40.7/D	83.9/F	69.7/E	HCM2000
	AWSC 95% Q (ft.)		--	#298	#295	#240	#303	HCM2010
	Signal 95% Q (ft.)		--	#462	#223	#478	#331	HCM2000

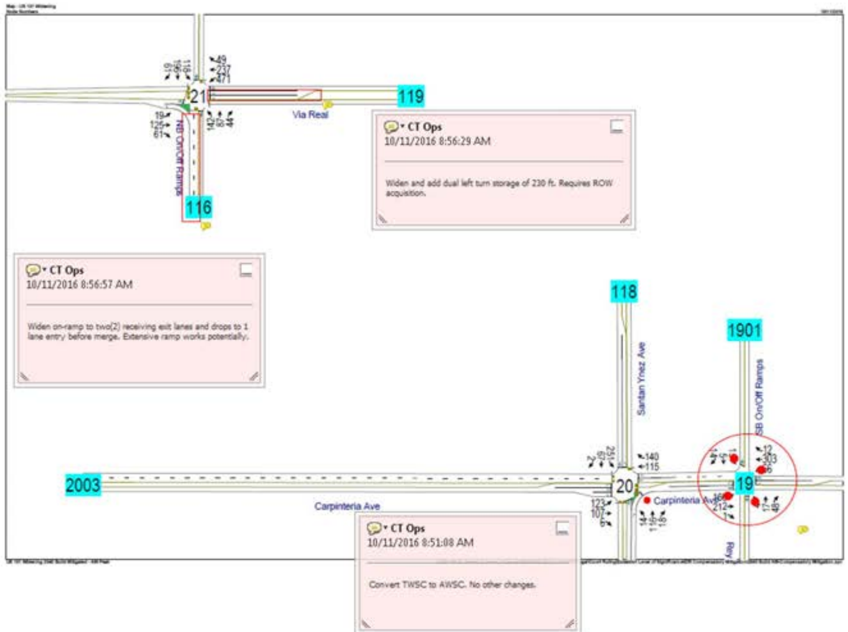
Note:

#: 95%tile volume exceeds capacity, queue could be longer.

HCM Methodology: HCM2000 do not have a queue prediction model for AWSC, therefore HCM2010 is used to predict the queue.

Both NB and SB Off-ramp storage is 700 ft.





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Intersection #37

SB Off & San Ysidro/Eucalyptus Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	380	34	40	8	0	27	0	97	43	88	72	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	413	37	43	9	0	29	0	105	47	96	78	0
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total (vph)	413	80	38	152	174							
Volume Left (vph)	413	0	9	0	96							
Volume Right (vph)	0	43	29	47	0							
Hadj (s)	0.50	-0.38	-0.38	-0.15	0.11							
Departure Headway (s)	6.0	5.1	5.4	5.5	5.7							
Degree Utilization, x	0.69	0.11	0.06	0.23	0.28							
Capacity (veh/h)	585	682	603	602	582							
Control Delay (s)	20.0	7.6	8.7	10.2	10.9							
Approach Delay (s)	18.0		8.7	10.2	10.9							
Approach LOS	C		A	B	B							
Intersection Summary												
Delay			14.8									
Level of Service			B									
Intersection Capacity Utilization			54.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	380	34	40	0	8	0	27	0	0	97	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0	2	2	2	2	2	2	2	2
Mvmt Flow	0	413	37	43	0	9	0	29	0	0	105	47
Number of Lanes	0	1	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	18.9	8.7	10.3
HCM LOS	C	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	23%	55%
Vol Thru, %	69%	0%	46%	0%	45%
Vol Right, %	31%	0%	54%	77%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	380	74	35	160
LT Vol	0	380	0	8	88
Through Vol	97	0	34	0	72
RT Vol	43	0	40	27	0
Lane Flow Rate	152	413	80	38	174
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.234	0.688	0.114	0.056	0.278
Departure Headway (Hd)	5.537	5.999	5.113	5.343	5.749
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	648	603	702	670	626
Service Time	3.571	3.72	2.834	3.382	3.781
HCM Lane V/C Ratio	0.235	0.685	0.114	0.057	0.278
HCM Control Delay	10.3	20.9	8.5	8.7	11
HCM Lane LOS	B	C	A	A	B
HCM 95th-tile Q	0.9	5.4	0.4	0.2	1.1

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	88	72	0
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	96	78	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	11
HCM LOS	B

Lane

HCM Unsignalized Intersection Capacity Analysis — 2040 Build w Ex Signal - PM Peak
37: San Ysidro Rd & SB Off Ramp — 2/18/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	234	20	139	6	0	27	0	80	31	186	73	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	254	22	151	7	0	29	0	87	34	202	79	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	254	173	36	121	282
Volume Left (vph)	254	0	7	0	202
Volume Right (vph)	0	151	29	34	0
Hadj (s)	0.50	-0.61	-0.42	-0.13	0.14
Departure Headway (s)	6.2	5.1	5.4	5.4	5.4
Degree Utilization, x	0.44	0.24	0.05	0.18	0.42
Capacity (veh/h)	560	681	595	617	632
Control Delay (s)	12.7	8.5	8.7	9.6	12.3
Approach Delay (s)	11.0		8.7	9.6	12.3
Approach LOS	B		A	A	B

Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

US 101 Widening — Synchro 7 - Report
Dowling Associates, Inc. — Page 1

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Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	234	20	139	0	6	0	27	0	0	80	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0	2	2	2	2	2	2	2	2
Mvmt Flow	0	254	22	151	0	7	0	29	0	0	87	34
Number of Lanes	0	1	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	11.9	8.7	9.6
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	18%	72%
Vol Thru, %	72%	0%	13%	0%	28%
Vol Right, %	28%	0%	87%	82%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	234	159	33	259
LT Vol	0	234	0	6	186
Through Vol	80	0	20	0	73
RT Vol	31	0	139	27	0
Lane Flow Rate	121	254	173	36	282
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.181	0.436	0.243	0.053	0.417
Departure Headway (Hd)	5.415	6.178	5.054	5.35	5.445
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	664	585	714	671	664
Service Time	3.435	3.884	2.76	3.367	3.445
HCM Lane V/C Ratio	0.182	0.434	0.242	0.054	0.425
HCM Control Delay	9.6	13.6	9.4	8.7	12.3
HCM Lane LOS	A	B	A	A	B
HCM 95th-tile Q	0.7	2.2	0.9	0.2	2.1

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	186	73	0
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	202	79	0
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.3
HCM LOS	B

Lane

Intersection #39

Olive Mill Road NB Off-ramp

Table 6. Year 2040 Operations Analysis Results Comparison

Time Period	Existing All Way Stop Control [1,2]			Signal Control [2]			Roundabout Control [2]		
	Volume to Capacity Ratio [3]	Delay (seconds/ vehicle)	Queue Length (feet) [3]	Volume to Capacity Ratio	Delay (seconds/ vehicle)	Queue Length (feet)	Volume to Capacity Ratio	Delay (seconds/ vehicle)	Queue Length (feet)
AM	NA	**37.9 (E)*** 20.1 (C)** 15.1 (C)***	NA	> 1.00	**124.4 (F)**	700 (S)	0.58	10.9 (B)	100 (E)
PM	NA	**47.9 (E)*** 16.7 (C)** **38.1 (E)*****	NA	> 1.00	**209.4 (F)**	775 (S)	0.77	14.2 (B)	250 (W)

1 Results for all way stop control extracted from SC101 HOV EIR Traffic Study, Cabrillo Hot Springs Interchange Configuration Anaysis Technical Memorandums. The EIR analyzed the intersection as three distinct intersections. These three results are shown above.
2 Overall intersection operations shown for all-way stop control, signal and roundabout alternatives.
3 Volume to capacity ratios and queue lengths are not reported by the HCM all-way control method. Further analysis needed to quantify future queue lengths under all-way stop control.
Modified F configuration at the Cabrillo Boulevard interchange was assumed.
* NB off ramp/Olive Mill Road intesecection
** N. Jameson Ln/Olive Mill Road intersection
*** SB on ramp/Olive Mill Road intersection
NA = Not Available
Bold indicates unacceptable operations

ATTACHMENT 3: SIDRA REPORTS

LANE SUMMARY

Site: 2040mF AM Alt 0.1

US 101 at Olive Mill Road
Santa Barbara, CA
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Olive Mill Rd													
Lane 1[d]	377	5.7	757	0.498	100	11.9	LOS B	2.9	75.5	Full	1600	0.0	0.0
Lane 2	54	0.0	800	0.068	100	5.2	LOS A	0.3	6.9	Short	50	0.0	0.0
Approach	432	5.0		0.498		11.0	LOS B	2.9	75.5				
East: 101 NB Off-Ramp													
Lane 1[d]	428	3.6	739	0.579	100	14.3	LOS B	3.9	99.3	Full	1600	0.0	0.0
Approach	428	3.6		0.579		14.3	LOS B	3.9	99.3				
NorthEast: N Jameson Lane													
Lane 1[d]	226	1.4	597	0.379	100	11.5	LOS B	1.8	45.2	Full	1600	0.0	0.0
Approach	226	1.4		0.379		11.5	LOS B	1.8	45.2				
North: Olive Mill Rd													
Lane 1[d]	250	3.3	769	0.325	100	8.5	LOS A	1.5	38.1	Full	1600	0.0	0.0
Approach	250	3.3		0.325		8.5	LOS A	1.5	38.1				
West: Coast Village Road													
Lane 1[d]	433	7.3	1007	0.430	100	8.4	LOS A	2.3	62.2	Full	1600	0.0	0.0
Approach	433	7.3		0.430		8.4	LOS A	2.3	62.2				
Intersection	1768	4.5		0.579		10.9	LOS B	3.9	99.3				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Processed: Thursday, May 28, 2015 2:56:09 PM
SIDRA INTERSECTION 6.0.18.4502
Project: H:\profile\17493 - US 101 at Olive Mill ICE\Sidra\17493 Olive Mill ICE_modF.sip6
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SIDRA INTERSECTION 6

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LANE SUMMARY

Site: 2040mF PM Alt 0.1

US 101 at Olive Mill Road
Santa Barbara, CA
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Olive Mill Rd													
Lane 1[d]	313	3.0	562	0.567	100	16.9	LOS C	3.2	81.1	Full	1600	0.0	0.0
Lane 2	150	2.0	567	0.264	100	9.9	LOS A	1.1	27.3	Short	50	0.0	0.0
Approach	463	2.7		0.567		14.7	LOS B	3.2	81.1				
East: 101 NB Off-Ramp													
Lane 1[d]	340	1.1	800	0.425	100	9.9	LOS A	2.3	58.8	Full	1600	0.0	0.0
Approach	340	1.1		0.425		9.9	LOS A	2.3	58.8				
NorthEast: N Jameson Lane													
Lane 1[d]	245	0.0	776	0.315	100	8.3	LOS A	1.5	36.9	Full	1600	0.0	0.0
Approach	245	0.0		0.315		8.3	LOS A	1.5	36.9				
North: Olive Mill Rd													
Lane 1[d]	363	5.0	731	0.497	100	12.2	LOS B	2.9	74.2	Full	1600	0.0	0.0
Approach	363	5.0		0.497		12.2	LOS B	2.9	74.2				
West: Coast Village Road													
Lane 1[d]	749	2.7	970	0.772	100	18.9	LOS C	9.4	239.1	Full	1600	0.0	0.0
Approach	749	2.7		0.772		18.9	LOS C	9.4	239.1				
Intersection	2160	2.5		0.772		14.2	LOS B	9.4	239.1				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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SIDRA INTERSECTION 6.0.18.4502
Project: H:\profile\17493 - US 101 at Olive Mill ICE\Sidra\17493 Olive Mill ICE_modF.sip6
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SIDRA INTERSECTION 6

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Intersection #48

SB Off-ramp & Milpas

						2040 HCM Delay (seconds)								2040 Build						
		2040 No Build		2040 Build		2040 No Build		2040 Build		Delays Change		No-Build	Mitigation Options	Mitigated LOS		Mitigated Delays		Mitigated Delays Change		
Int. #	Intersections	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	Control Type	Control Type	AM	PM	AM	PM	AM	PM	Critical 95th %tile queue oberseved
48	SB Off & Milpas St	D	F	F	F	28.9	179.9	51.2	286.0	22.3	106.1	OWSC	Add 2nd RT lane	C	E	20.0	40.7	-8.9	-139.2	Before mitigation PM SB Off-ramp Queue = 813' After mitigation PM SB Off-ramp Queue = 160' (Ramp storage 1000')
													AWSC	C	C	15.5	20.6	-13.4	-159.3	370' (PM Milpas SB), Queue into roundabout 233' (PM SB Off-ramp Queue)
													Signal	B	C	11.5	20.7	-17.4	-159.2	#348' (PM Milpas SB), Queue into roundabout #353' (PM SB Off-ramp Queue)
													Half RAB	B	F	11.5	57.4	-17.4	-122.5	1244' [SIDRA HCM 6] (PM SB Off), exceed ramp storage 1000'

95th %tile vol. exceeds capacity, queue may be longer

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	341	0	1059	917	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	371	0	1151	997	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.96					
vC, conflicting volume	1592	526	1017			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1533	526	1017			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	24	100			
cM capacity (veh/h)	103	490	673			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	185	185	576	576	498	498
Volume Left	0	0	0	0	0	0
Volume Right	185	185	0	0	0	0
cSH	490	490	1700	1700	1700	1700
Volume to Capacity	0.38	0.38	0.34	0.34	0.29	0.29
Queue Length 95th (ft)	44	44	0	0	0	0
Control Delay (s)	16.7	16.7	0.0	0.0	0.0	0.0
Lane LOS	C	C				
Approach Delay (s)	16.7		0.0		0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	505	0	1312	1056	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	549	0	1426	1148	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.86					
vC, conflicting volume	1881	602	1168			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1701	602	1168			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	72	438	590			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	274	274	713	713	574	574
Volume Left	0	0	0	0	0	0
Volume Right	274	274	0	0	0	0
cSH	438	438	1700	1700	1700	1700
Volume to Capacity	0.63	0.63	0.42	0.42	0.34	0.34
Queue Length 95th (ft)	105	105	0	0	0	0
Control Delay (s)	26.1	26.1	0.0	0.0	0.0	0.0
Lane LOS	D	D				
Approach Delay (s)	26.1		0.0		0.0	
Approach LOS	D					

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗↗		↑↑	↑↑	
Volume (veh/h)	0	347	0	1064	1089	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	377	0	1157	1184	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.95					
vC, conflicting volume	1782	620	1204			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1719	620	1204			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	11	100			
cM capacity (veh/h)	77	426	571			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	189	189	578	578	592	592
Volume Left	0	0	0	0	0	0
Volume Right	189	189	0	0	0	0
cSH	426	426	1700	1700	1700	1700
Volume to Capacity	0.44	0.44	0.34	0.34	0.35	0.35
Queue Length 95th (ft)	55	55	0	0	0	0
Control Delay (s)	20.0	20.0	0.0	0.0	0.0	0.0
Lane LOS	C	C				
Approach Delay (s)	20.0		0.0		0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	536	0	1312	1241	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	583	0	1426	1349	0
Pedestrians	20			8		
Lane Width (ft)	12.0			11.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				423		
pX, platoon unblocked	0.85					
vC, conflicting volume	2082	702	1369			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1924	702	1369			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	50	376	494			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	291	291	713	713	674	674
Volume Left	0	0	0	0	0	0
Volume Right	291	291	0	0	0	0
cSH	376	376	1700	1700	1700	1700
Volume to Capacity	0.77	0.77	0.42	0.42	0.40	0.40
Queue Length 95th (ft)	160	160	0	0	0	0
Control Delay (s)	40.7	40.7	0.0	0.0	0.0	0.0
Lane LOS	E	E				
Approach Delay (s)	40.7		0.0		0.0	
Approach LOS	E					

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

HCM Unsignalized Intersection Capacity Analysis
48: Milpas St & SB Off-Ramp

6/5/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	347	0	0	1089	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	377	0	0	1184	0

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total (vph)	377	592	592
Volume Left (vph)	0	0	0
Volume Right (vph)	377	0	0
Hadj (s)	-0.60	0.00	0.00
Departure Headway (s)	3.2	4.5	4.5
Degree Utilization, x	0.34	0.74	0.74
Capacity (veh/h)	1113	787	787
Control Delay (s)	7.8	17.9	17.9
Approach Delay (s)	7.8	17.9	
Approach LOS	A	C	

Intersection Summary			
Delay	15.5		
Level of Service	C		
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Intersection	
Intersection Delay, s/veh	22.8
Intersection LOS	C

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Vol, veh/h	0	0	347	0	0	0	0	1089	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	2	1	1	2	0	0
Mvmt Flow	0	0	377	0	0	0	0	1184	0
Number of Lanes	0	0	1	0	0	0	0	2	0

Approach	EB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left	SB	
Conflicting Lanes Left	2	0
Conflicting Approach Right		EB
Conflicting Lanes Right	0	1
HCM Control Delay	13.9	25.7
HCM LOS	B	D

Lane	EBLn1	SBLn1	SBLn2
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	347	545	545
LT Vol	0	0	0
Through Vol	0	545	545
RT Vol	347	0	0
Lane Flow Rate	377	592	592
Geometry Grp	2	7	7
Degree of Util (X)	0.535	0.903	0.621
Departure Headway (Hd)	5.107	5.494	3.779
Convergence, Y/N	Yes	Yes	Yes
Cap	702	657	947
Service Time	3.162	3.257	1.541
HCM Lane V/C Ratio	0.537	0.901	0.625
HCM Control Delay	13.9	38.7	12.6
HCM Lane LOS	B	E	B
HCM 95th-tile Q	3.2	11.4	4.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	536	0	0	1241	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	583	0	0	1349	0

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total (vph)	583	674	674
Volume Left (vph)	0	0	0
Volume Right (vph)	583	0	0
Hadj (s)	-0.60	0.00	0.00
Departure Headway (s)	3.2	4.5	4.5
Degree Utilization, x	0.52	0.84	0.84
Capacity (veh/h)	1117	792	792
Control Delay (s)	9.6	25.3	25.3
Approach Delay (s)	9.6	25.3	
Approach LOS	A	D	

Intersection Summary			
Delay	20.6		
Level of Service	C		
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	38.4
Intersection LOS	E

Movement	EBU	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Vol, veh/h	0	0	536	0	0	0	0	1241	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	2	1	1	2	0	0
Mvmt Flow	0	0	583	0	0	0	0	1349	0
Number of Lanes	0	0	1	0	0	0	0	2	0

Approach	EB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left	SB	
Conflicting Lanes Left	2	0
Conflicting Approach Right		EB
Conflicting Lanes Right	0	1
HCM Control Delay	29	42.5
HCM LOS	D	E

Lane	EBLn1	SBLn1	SBLn2
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	536	621	621
LT Vol	0	0	0
Through Vol	0	621	621
RT Vol	536	0	0
Lane Flow Rate	583	674	674
Geometry Grp	2	7	7
Degree of Util (X)	0.838	1	0.815
Departure Headway (Hd)	5.178	6.075	4.351
Convergence, Y/N	Yes	Yes	Yes
Cap	705	594	823
Service Time	3.178	3.856	2.131
HCM Lane V/C Ratio	0.827	1.135	0.819
HCM Control Delay	29	61.5	23.5
HCM Lane LOS	D	F	C
HCM 95th-tile Q	9.3	14.8	9

Lane Group	EBR	SBT
Lane Group Flow (vph)	377	1184
v/c Ratio	0.70	0.66
Control Delay	21.4	11.5
Queue Delay	0.0	0.0
Total Delay	21.4	11.5
Queue Length 50th (ft)	83	118
Queue Length 95th (ft)	174	220
Internal Link Dist (ft)		270
Turn Bay Length (ft)		
Base Capacity (vph)	771	2211
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.49	0.54

Intersection Summary

HCM Signalized Intersection Capacity Analysis
48: Milpas St & SB Off-Ramp

6/5/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱			↑↑	
Volume (vph)	0	347	0	0	1089	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		1.00			0.95	
Frpb, ped/bikes		0.98			1.00	
Flpb, ped/bikes		1.00			1.00	
Frt		0.86			1.00	
Flt Protected		1.00			1.00	
Satd. Flow (prot)		1612			3490	
Flt Permitted		1.00			1.00	
Satd. Flow (perm)		1612			3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	377	0	0	1184	0
RTOR Reduction (vph)	0	31	0	0	0	0
Lane Group Flow (vph)	0	346	0	0	1184	0
Confl. Peds. (#/hr)		8	20			
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%
Turn Type		Perm			NA	
Protected Phases					6	
Permitted Phases		4				
Actuated Green, G (s)		15.4			25.4	
Effective Green, g (s)		15.4			25.4	
Actuated g/C Ratio		0.32			0.52	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		508			1816	
v/s Ratio Prot					c0.34	
v/s Ratio Perm		c0.21				
v/c Ratio		0.68			0.65	
Uniform Delay, d1		14.6			8.5	
Progression Factor		1.00			1.00	
Incremental Delay, d2		3.8			0.8	
Delay (s)		18.3			9.3	
Level of Service		B			A	
Approach Delay (s)	18.3			0.0	9.3	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	48.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	SBT
Lane Group Flow (vph)	583	1349
v/c Ratio	0.88	0.85
Control Delay	32.3	20.8
Queue Delay	0.0	0.0
Total Delay	32.3	20.8
Queue Length 50th (ft)	175	217
Queue Length 95th (ft)	#352	#348
Internal Link Dist (ft)		316
Turn Bay Length (ft)	230	
Base Capacity (vph)	746	1689
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.78	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
48: Milpas St & SB Off-Ramp

6/5/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	536	0	0	1241	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	11	11	11
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		1.00			0.95	
Frpb, ped/bikes		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	
Frt		0.86			1.00	
Flt Protected		1.00			1.00	
Satd. Flow (prot)		1644			3490	
Flt Permitted		1.00			1.00	
Satd. Flow (perm)		1644			3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	583	0	0	1349	0
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	0	572	0	0	1349	0
Confl. Peds. (#/hr)		8	20			
Heavy Vehicles (%)	0%	0%	1%	1%	0%	0%
Turn Type		Prot			NA	
Protected Phases		7			6	
Permitted Phases						
Actuated Green, G (s)		22.5			25.8	
Effective Green, g (s)		22.5			25.8	
Actuated g/C Ratio		0.40			0.46	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		657			1599	
v/s Ratio Prot		c0.35			c0.39	
v/s Ratio Perm						
v/c Ratio		0.87			0.84	
Uniform Delay, d1		15.6			13.5	
Progression Factor		1.00			1.00	
Incremental Delay, d2		12.1			4.3	
Delay (s)		27.7			17.7	
Level of Service		C			B	
Approach Delay (s)	27.7			0.0	17.7	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

LANE SUMMARY

Site: Milpas & SB Off-ramp AM - HCM

Milpas & SB Off-ramp (Int# 48) Half-Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
North: Milpas Street													
Lane 1	577	0.0	1350	0.427	100	6.8	LOS A	0.0	0.0	Full	1600	0.0	0.0
Lane 2[d]	607	0.0	1420	0.427	100	6.5	LOS A	0.0	0.0	Full	1600	0.0	0.0
Approach	1184	0.0		0.427		6.7	LOS A	0.0	0.0				
West: SB Off-ramp													
Lane 1[d]	377	0.0	519	0.726	100	26.8	LOS D	4.5	112.8	Full	1600	0.0	0.0
Approach	377	0.0		0.726		26.8	LOS D	4.5	112.8				
Intersection	1561	0.0		0.726		11.5	LOS B	4.5	112.8				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Processed: Wednesday, June 07, 2017 5:40:40 PM
SIDRA INTERSECTION 6.0.11.3995
Project: D:\001 Work Drive\0_Current_Projects\SB\0N7000 SC101 HOV\ED\Legal\Court Ruling\Establish Level of Significance\EIR Compensatory Mitigation\Int #48\Half Roundabout\Milpas & SB Off-ramp - Int# 48.sip6
8001297, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), NETWORK / Enterprise

SIDRA INTERSECTION 6

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

LANE SUMMARY

Site: Milpas & SB Off-ramp PM - HCM

Milpas & SB Off-ramp (Int# 48) Half-Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
North: Milpas Street													
Lane 1	657	0.0	1350	0.487	100	7.6	LOS A	0.0	0.0	Full	1600	0.0	0.0
Lane 2[d]	692	0.0	1420	0.487	100	7.4	LOS A	0.0	0.0	Full	1600	0.0	0.0
Approach	1349	0.0		0.487		7.5	LOS A	0.0	0.0				
West: SB Off-ramp													
Lane 1[d]	583	0.0	451	1.291	100	173.0	LOS F	49.8	1244.1	Full	1600	0.0	0.0
Approach	583	0.0		1.291		173.0	LOS F	49.8	1244.1				
Intersection	1932	0.0		1.291		57.4	LOS F	49.8	1244.1				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Processed: Wednesday, June 07, 2017 5:42:19 PM
SIDRA INTERSECTION 6.0.11.3995

Project: D:\001 Work Drive\0_Current_Projects\SB\0N7000 SC101 HOV\ED\Legal\Court Ruling\Establish Level of Significance\EIR Compensatory Mitigation\Int #48\Half Roundabout\Milpas & SB Off-ramp - Int# 48.sip6
8001297, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), NETWORK / Enterprise

SIDRA INTERSECTION 6

Intersection #79

SB On-ramp & State St. & SR 154

	↑	↗	↘	↓
Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	728	268	805	460
v/c Ratio	0.32	0.27	0.89	0.94
Control Delay	0.2	0.3	42.7	59.5
Queue Delay	1.6	2.8	0.0	10.4
Total Delay	1.8	3.0	42.7	69.9
Queue Length 50th (ft)	0	0	199	225
Queue Length 95th (ft)	m0	m0	#302	#404
Internal Link Dist (ft)	52			270
Turn Bay Length (ft)				
Base Capacity (vph)	2256	1009	901	489
Starvation Cap Reductn	1292	618	0	28
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.76	0.69	0.89	1.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	0	670	247	741	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	0.97	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	3433	1863
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	3433	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	728	268	805	460
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	728	268	805	460
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Turn Type			NA	Perm	Split	NA
Protected Phases			3 1 4		2	2
Permitted Phases				3 1 4		
Actuated Green, G (s)			51.0	51.0	21.0	21.0
Effective Green, g (s)			51.0	51.0	21.0	21.0
Actuated g/C Ratio			0.64	0.64	0.26	0.26
Clearance Time (s)					4.0	4.0
Vehicle Extension (s)					3.0	3.0
Lane Grp Cap (vph)			2256	1009	901	489
v/s Ratio Prot			c0.21		0.23	c0.25
v/s Ratio Perm				0.17		
v/c Ratio			0.32	0.27	0.89	0.94
Uniform Delay, d1			6.6	6.3	28.4	28.9
Progression Factor			0.00	0.00	1.00	1.00
Incremental Delay, d2			0.0	0.1	13.1	28.3
Delay (s)			0.1	0.1	41.6	57.2
Level of Service			A	A	D	E
Approach Delay (s)	0.0		0.1			47.3
Approach LOS	A		A			D

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

	↑	↗	↘	↓
Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	737	252	824	216
v/c Ratio	0.33	0.25	0.93	0.45
Control Delay	0.2	0.3	45.3	25.5
Queue Delay	1.2	2.1	0.0	0.0
Total Delay	1.4	2.4	45.3	25.5
Queue Length 50th (ft)	0	0	178	78
Queue Length 95th (ft)	m0	m0	#286	138
Internal Link Dist (ft)	52			270
Turn Bay Length (ft)				
Base Capacity (vph)	2224	995	882	479
Starvation Cap Reductn	1192	597	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.63	0.93	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑	↱	↰↰	↑
Volume (vph)	0	0	678	232	758	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	0.97	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	3433	1863
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	3433	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	737	252	824	216
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	737	252	824	216
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Turn Type			NA	Perm	Split	NA
Protected Phases			3 1 4		2	2
Permitted Phases				3 1 4		
Actuated Green, G (s)			44.0	44.0	18.0	18.0
Effective Green, g (s)			44.0	44.0	18.0	18.0
Actuated g/C Ratio			0.63	0.63	0.26	0.26
Clearance Time (s)					4.0	4.0
Vehicle Extension (s)					3.0	3.0
Lane Grp Cap (vph)			2224	995	882	479
v/s Ratio Prot			c0.21		c0.24	0.12
v/s Ratio Perm				0.16		
v/c Ratio			0.33	0.25	0.93	0.45
Uniform Delay, d1			6.1	5.7	25.4	21.8
Progression Factor			0.00	0.01	1.00	1.00
Incremental Delay, d2			0.0	0.1	18.0	3.0
Delay (s)			0.1	0.1	43.4	24.9
Level of Service			A	A	D	C
Approach Delay (s)	0.0		0.1			39.6
Approach LOS	A		A			D

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

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Intersection #107

Cabrillo Boulevard/Los Patos

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	0	10	21	0	72	26	256	86	17	292	189
Future Volume (vph)	64	0	10	21	0	72	26	256	86	17	292	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.95		1.00	0.95		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.85		1.00	0.96		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1702	1487		1697	1487		1752	1757		1752	1704	
Flt Permitted	0.71	1.00		0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1265	1487		1340	1487		1752	1757		1752	1704	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	0	11	23	0	78	28	278	93	18	317	205
RTOR Reduction (vph)	0	10	0	0	68	0	0	13	0	0	24	0
Lane Group Flow (vph)	70	1	0	23	10	0	28	358	0	18	498	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	8.7	8.7		8.7	8.7		2.8	45.4		2.9	45.5	
Effective Green, g (s)	8.7	8.7		8.7	8.7		2.8	45.4		2.9	45.5	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.04	0.66		0.04	0.66	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	187		168	187		71	1156		73	1123	
v/s Ratio Prot		0.00			0.01		0.02	c0.20		0.01	c0.29	
v/s Ratio Perm	c0.06			0.02								
v/c Ratio	0.44	0.01		0.14	0.05		0.39	0.31		0.25	0.44	
Uniform Delay, d1	27.9	26.4		26.8	26.5		32.3	5.1		32.0	5.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.14	1.26	
Incremental Delay, d2	1.9	0.0		0.4	0.1		3.6	0.7		1.7	1.2	
Delay (s)	29.8	26.4		27.2	26.6		35.9	5.8		38.1	8.3	
Level of Service	C	C		C	C		D	A		D	A	
Approach Delay (s)		29.4			26.8			7.9			9.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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system to enhance California's economy and livability"

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	68	0	10	93	2	92	25	514	10	69	356	87
Future Volume (vph)	68	0	10	93	2	92	25	514	10	69	356	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.95		1.00	0.95		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.85		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1700	1484		1693	1491		1752	1838		1752	1773	
Flt Permitted	0.69	1.00		0.75	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1237	1484		1338	1491		1752	1838		1752	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	0	11	101	2	100	27	559	11	75	387	95
RTOR Reduction (vph)	0	10	0	0	87	0	0	1	0	0	8	0
Lane Group Flow (vph)	74	1	0	101	15	0	27	569	0	75	474	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	9.7	9.7		9.7	9.7		3.1	42.9		8.4	48.2	
Effective Green, g (s)	9.7	9.7		9.7	9.7		3.1	42.9		8.4	48.2	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.04	0.59		0.12	0.66	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	197		177	198		74	1080		201	1170	
v/s Ratio Prot		0.00			0.01		0.02	c0.31		0.04	c0.27	
v/s Ratio Perm	0.06			c0.08								
v/c Ratio	0.45	0.01		0.57	0.08		0.36	0.53		0.37	0.40	
Uniform Delay, d1	29.2	27.5		29.7	27.7		34.0	9.0		29.9	5.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.93	0.84	
Incremental Delay, d2	2.0	0.0		4.4	0.2		3.0	1.8		1.1	1.0	
Delay (s)	31.2	27.5		34.1	27.9		37.0	10.8		28.8	5.8	
Level of Service	C	C		C	C		D	B		C	A	
Approach Delay (s)		30.7			31.0			12.0			8.9	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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MOVEMENT SUMMARY

Site: 1 [107 Cabrillo and Los Patos - 2040 AM - HCM]

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Cabrillo Bl											
3	L2	28	2.0	0.310	5.6	LOS A	1.8	45.3	0.29	0.14	34.4
8	T1	278	2.0	0.310	5.6	LOS A	1.8	45.3	0.29	0.14	34.4
18	R2	93	2.0	0.310	5.6	LOS A	1.8	45.3	0.29	0.14	33.5
Approach		400	2.0	0.310	5.6	LOS A	1.8	45.3	0.29	0.14	34.2
East: Channel Dr											
1	L2	23	2.0	0.106	4.7	LOS A	0.5	11.5	0.48	0.37	34.4
6	T1	1	2.0	0.106	4.7	LOS A	0.5	11.5	0.48	0.37	34.4
16	R2	78	2.0	0.106	4.7	LOS A	0.5	11.5	0.48	0.37	33.5
Approach		102	2.0	0.106	4.7	LOS A	0.5	11.5	0.48	0.37	33.7
North: Cabrillo Bl											
7	L2	18	2.0	0.404	6.5	LOS A	2.7	68.7	0.24	0.10	34.1
4	T1	317	2.0	0.404	6.5	LOS A	2.7	68.7	0.24	0.10	34.0
14	R2	205	2.0	0.404	6.5	LOS A	2.7	68.7	0.24	0.10	33.1
Approach		541	2.0	0.404	6.5	LOS A	2.7	68.7	0.24	0.10	33.7
West: Los Patos Way											
5	L2	70	2.0	0.083	4.4	LOS A	0.4	8.9	0.46	0.34	32.9
2	T1	1	2.0	0.083	4.4	LOS A	0.4	8.9	0.46	0.34	32.9
12	R2	11	2.0	0.083	4.4	LOS A	0.4	8.9	0.46	0.34	32.1
Approach		82	2.0	0.083	4.4	LOS A	0.4	8.9	0.46	0.34	32.8
All Vehicles		1125	2.0	0.404	5.9	LOS A	2.7	68.7	0.30	0.16	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [107 Cabrillo and Los Patos - 2040 PM - HCM]

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Cabrillo Bl											
3	L2	27	2.0	0.493	8.3	LOS A	3.5	87.8	0.47	0.30	33.2
8	T1	559	2.0	0.493	8.3	LOS A	3.5	87.8	0.47	0.30	33.2
18	R2	11	2.0	0.493	8.3	LOS A	3.5	87.8	0.47	0.30	32.3
Approach		597	2.0	0.493	8.3	LOS A	3.5	87.8	0.47	0.30	33.2
East: Channel Dr											
1	L2	101	2.0	0.282	8.4	LOS A	1.2	31.6	0.66	0.66	32.0
6	T1	2	2.0	0.282	8.4	LOS A	1.2	31.6	0.66	0.66	32.0
16	R2	100	2.0	0.282	8.4	LOS A	1.2	31.6	0.66	0.66	31.2
Approach		203	2.0	0.282	8.4	LOS A	1.2	31.6	0.66	0.66	31.6
North: Cabrillo Bl											
7	L2	75	2.0	0.450	7.5	LOS A	3.0	76.9	0.42	0.25	33.3
4	T1	387	2.0	0.450	7.5	LOS A	3.0	76.9	0.42	0.25	33.3
14	R2	95	2.0	0.450	7.5	LOS A	3.0	76.9	0.42	0.25	32.4
Approach		557	2.0	0.450	7.5	LOS A	3.0	76.9	0.42	0.25	33.1
West: Los Patos Way											
5	L2	74	2.0	0.108	5.6	LOS A	0.4	11.2	0.56	0.50	32.4
2	T1	1	2.0	0.108	5.6	LOS A	0.4	11.2	0.56	0.50	32.4
12	R2	11	2.0	0.108	5.6	LOS A	0.4	11.2	0.56	0.50	31.6
Approach		86	2.0	0.108	5.6	LOS A	0.4	11.2	0.56	0.50	32.3
All Vehicles		1442	2.0	0.493	7.8	LOS A	3.5	87.8	0.48	0.34	32.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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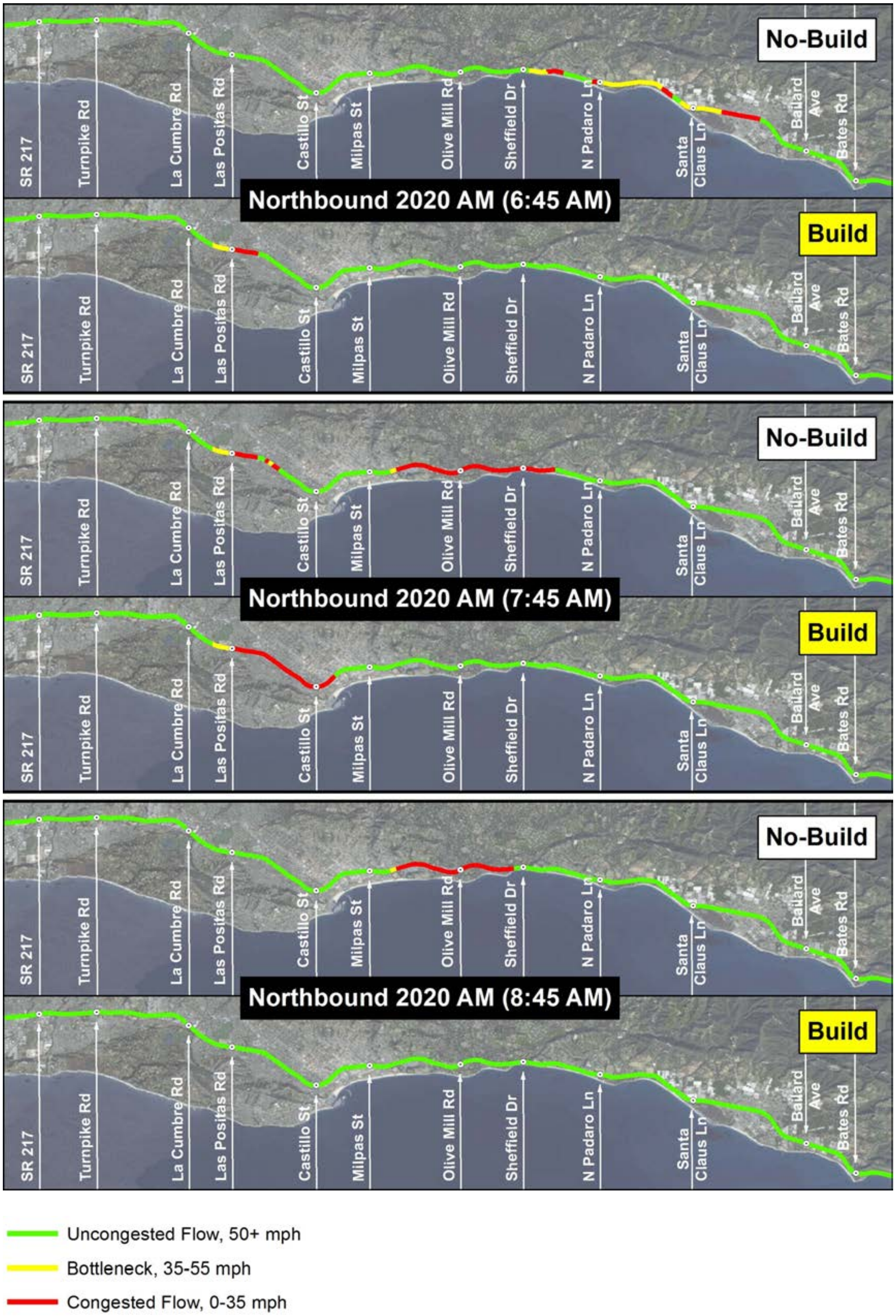
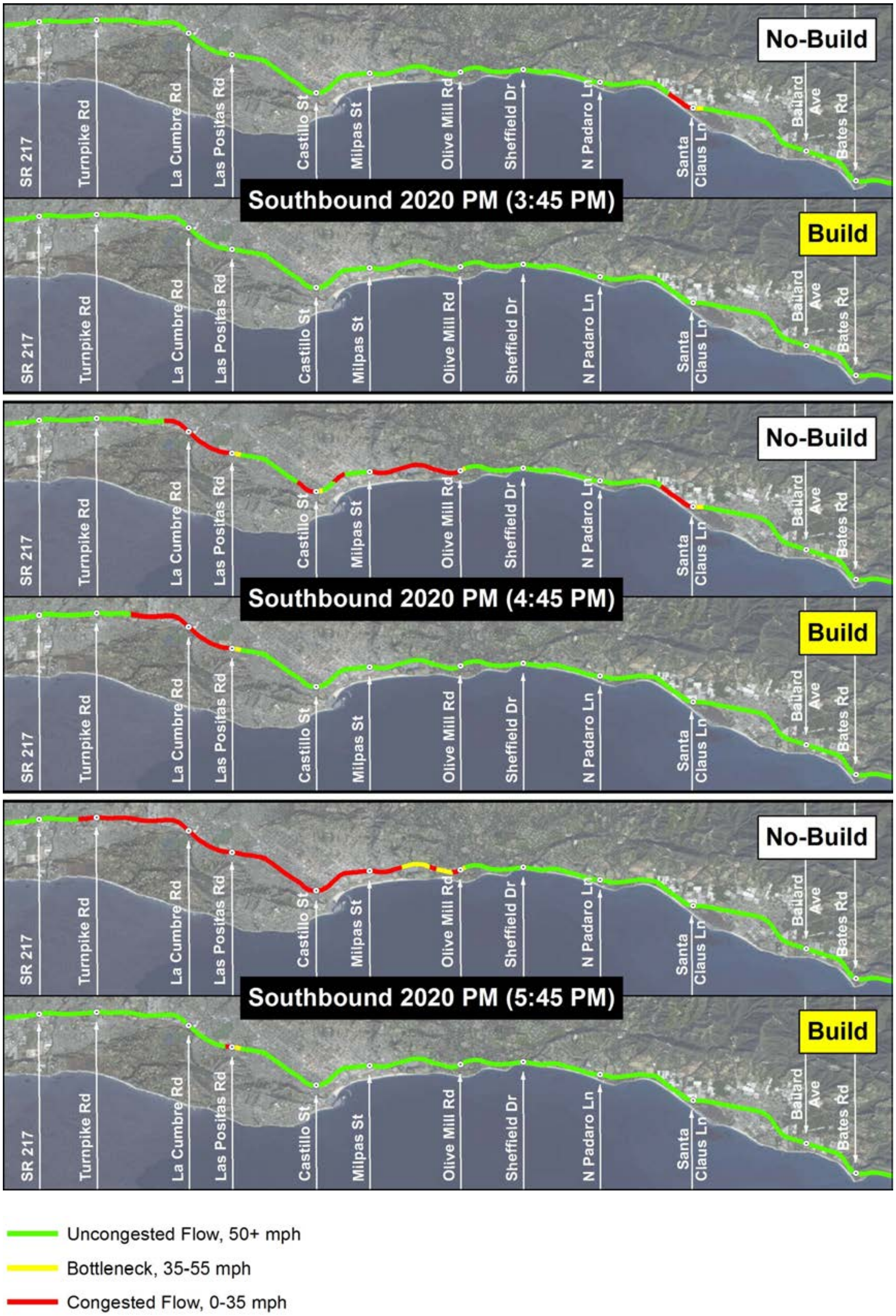
Appendix I Peak Hour Congestion Maps

The following maps have been added to provide a visual representation of proposed delay reduction throughout the corridor. The No-Build congested conditions for the 2040 Northbound AM Peak Hour extend into multiple time periods; therefore, six time periods for this scenario are represented on two maps.

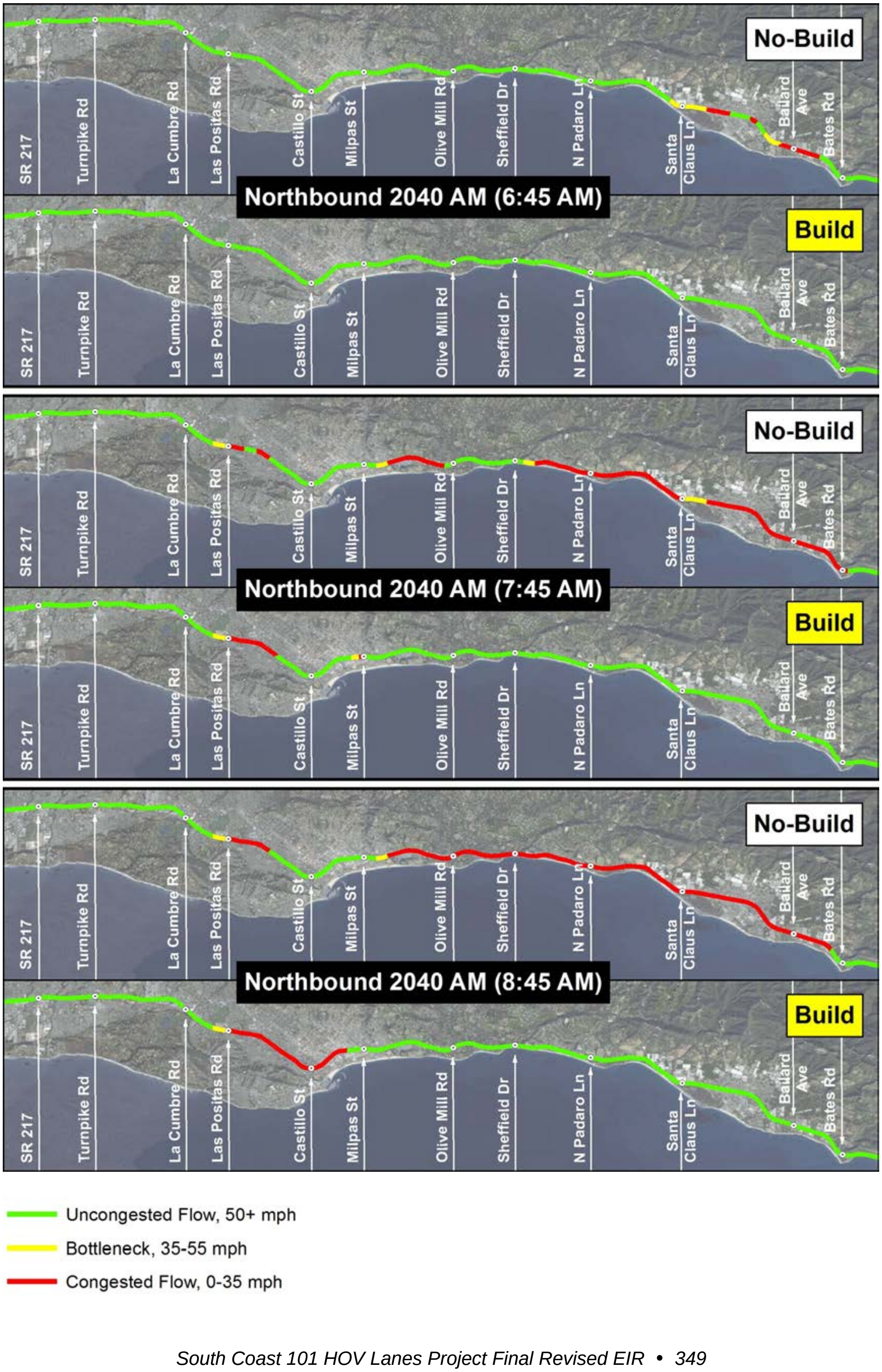
2020 Northbound AM Peak Hour Congestion Map



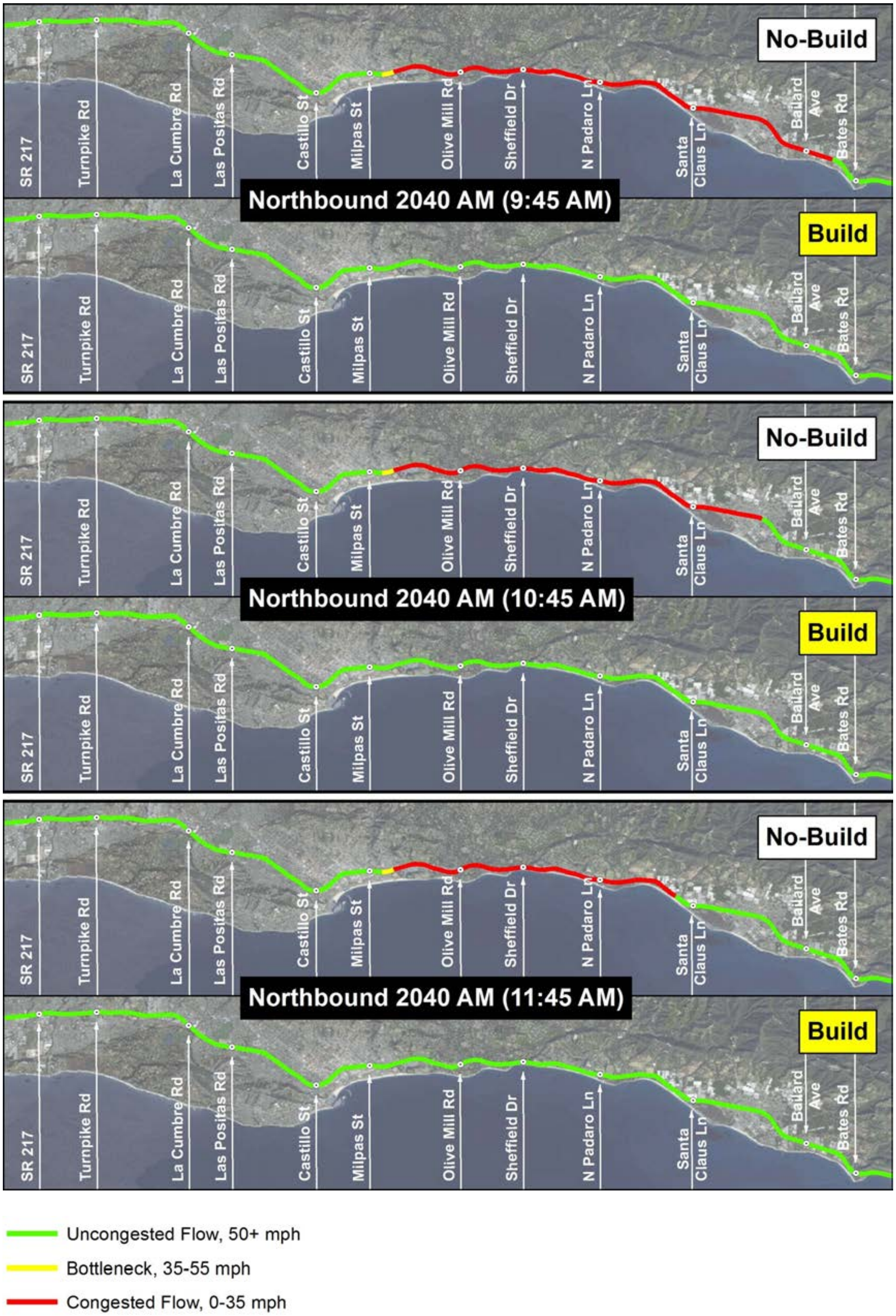
2020 Southbound PM Peak Hour Congestion Map



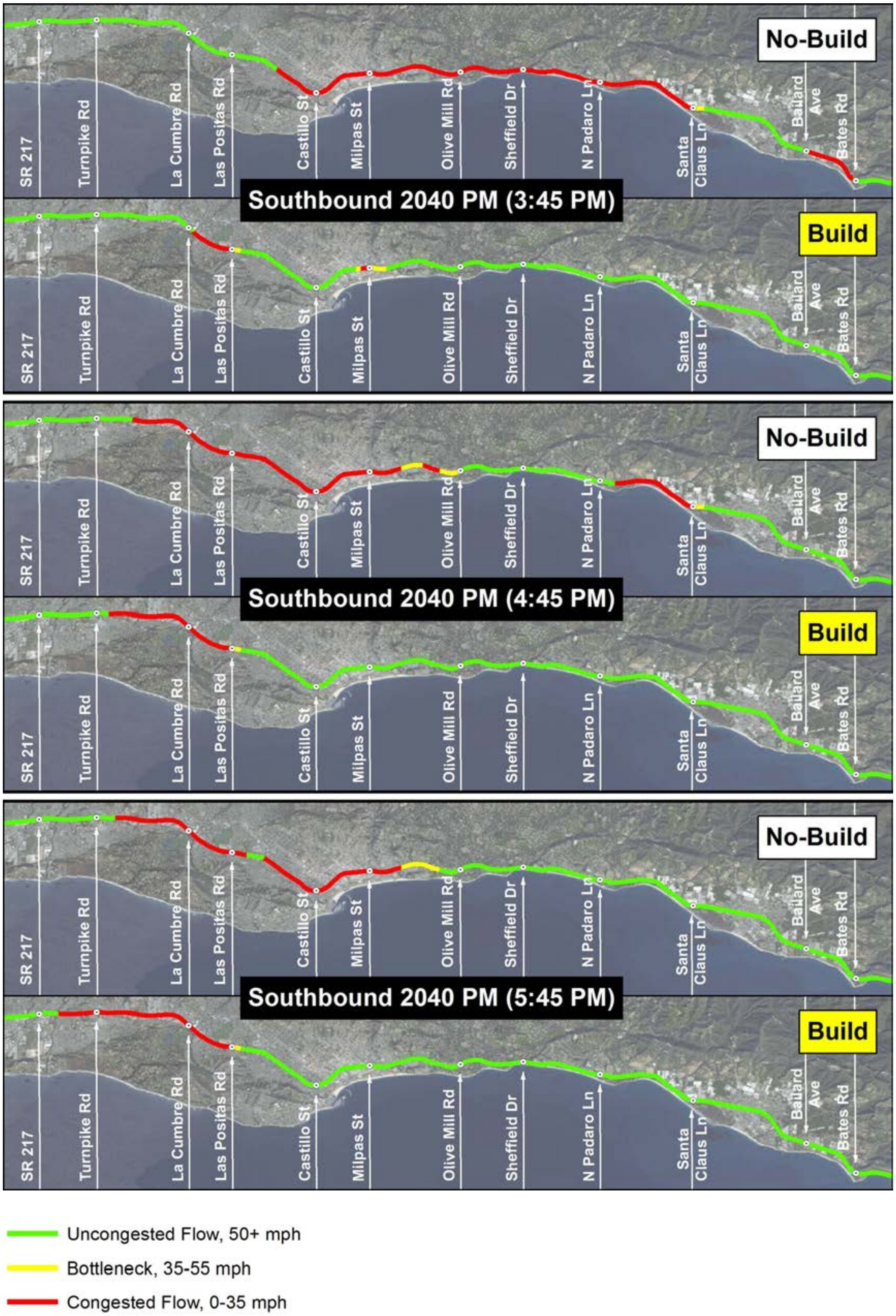
2040 Northbound AM Peak Hour Congestion Map 1



2040 Northbound AM Peak Hour Congestion Map 2



2040 Southbound PM Peak Hour Congestion Map



Appendix J Response to Comments

Caltrans received comments from state agencies, local agencies, public interest groups, and other individuals. Written comments were submitted in the form of comment cards, emails and letters. In addition, a court reporter recorded two verbal comments during the public hearing held for the project at the Chase Palm Park Center on December 15, 2016. The comment period began December 1, 2016 and ended January 31, 2017. Refer to Chapter 4 for additional details on the public hearing.

As the CEQA lead agency, Caltrans was directed by the Writ of Mandate issued January 26, 2016 to prepare and circulate a legally adequate Revised Environmental Impact Report with respect to the impact to intersections and cumulative traffic impacts. The Court found no fault with either the analysis or conclusion of any other portions of the 2014 Final EIR.

Many of the comments received during public review of the Draft Revised EIR fell outside the scope of the Revised EIR.

Comments outside the scope of the Revised EIR include the following categories:

- Induced Travel and Senate Bill (SB) 743
- Local Coastal Program Consistency
- Bicycles and Pedestrians
- Air Quality/Noise
- Funding

The comments determined to be outside the scope of the Revised EIR are duly noted and identified as such in the responses. Any responses to comments determined to be outside the scope of the Revised EIR are made solely for informational purposes and do not contain new information or analysis added to the Final Revised EIR. Other topics in the comment letters that were considered outside the scope of the Revised EIR will not contain responses, but may include a reference for where information can be found in the 2014 Final EIR.

This appendix is bound in Volume II under separate cover.