

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

**South County Traffic Relief Effort
Draft Project Study Report-Project Development Support
(PSR-PDS)**

To

**Request Approval to Proceed to the Project Approval and
Environmental Document phase for a Locally Funded Project**

On Route	<u>State Route (SR) 241</u>
Between	<u>Center of Oso Parkway Bridge (12-Ora-241 – 14.4)</u>
And	<u>Interstate (I-) 5 / 0.7 mile south of La Novia Avenue (12-Ora-241 – 2.1)</u>

And

On Route	<u>SR 73</u>
Between	<u>0.1 mile south of Cabot Road Bridge (12-Ora-73 – 11.28)</u>
And	<u>0.1 mile south of SR 73/South I-5 Connector (11-SD-73 – 10.34)</u>

And

On Route	<u>I-5</u>
Between	<u>0.4 mile south of Bake Parkway (12-Ora-5 – 20.5)</u>
And	<u>0.1 mile south of Basilone Road (11-SD-5 – 71.3)</u>

APPROVAL RECOMMENDED:

Valarie McFall, *Chief Environmental Planning Officer*
Foothill/Eastern Transportation Corridor Agency (F/ETCA)
PROJECT SPONSOR, Accepts Risks Identified in this PSR-PDS and
Attached Risk Register

APPROVAL RECOMMENDED:

Farid Nowshiravan, *PROJECT MANAGER*
Caltrans District 12

APPROVED:

Adnan Maiah, *ACTING DIRECTOR*
Office of Program and Project Management

DATE

DRAFT

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Executive Summary
South County Traffic Relief Effort
DRAFT Project Study Report-Project Development Support (PSR-PDS) Document

This *Draft Project Study Report-Project Development Support (PSR-PDS)* document has been developed based upon coordination with Caltrans.

Purpose of this PSR-PDS:

Following Caltrans PSR-PDS guidance, the PSR-PDS is intended to provide sufficient detail to allow the project sponsor to program support costs for the next phase of the project - Project Approval & Environmental Document (PA/ED).

Location of Key Documents:

- Purpose and Need: Chapter 3
- Traffic Studies: Chapter 4 & Attachment J
- Project Alternatives: Chapter 7

Alternatives Evaluation:

The Draft PSR-PDS is a project initiation document and does not include specific recommendations regarding alternatives. The PSR-PDS does not preclude the study of any project alternatives, nor is it a substitute for the California Environmental Quality Act (CEQA)/ National Environmental Policy Act (NEPA) process. Alternatives scoping will occur at the beginning of the next phase of work (PA/ED) where the specific alternatives to be carried forward into the CEQA/NEPA environmental review process will be determined.

Project Development Team (PDT):

The PDT for the PSR-PDS phase is comprised of representatives from Caltrans, Transportation Corridor Agencies (TCA), nine cities within the Project Study Area, County of Orange, Orange County Transportation Authority (OCTA), San Diego Association of Governments (SANDAG), Marine Corps Base Camp Pendleton, and TCA's Consultant Team. Comments received from PDT members will be reviewed and addressed prior to submittal of a final PSR-PDS.

Tentative Project Schedule:

March 2017 – January 2018:	Alternatives development and traffic studies
February - July 2018:	PDT meetings & coordination
June 2018:	Draft PSR-PDS distributed for PDT 30-day review
July 2018:	Obtain PDT comments
August 2018:	Finalize the PSR-PDS

Public Involvement:

According to the Caltrans project development process and pursuant to the CEQA/NEPA process, the opportunity for public comment is during the Public Scoping Period after release of the Notice of Preparation/Notice of Intent (NOP/NOI) in PA/ED, which is anticipated to begin in the first quarter of 2019.

PLEASE NOTE: The public will be notified of specific dates for public participation. Solicitation of public input will begin in early 2019. Sign up for updates and submit comments at GetMovingOC.com.

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

Vicinity Map



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

This Project Study Report—Project Development Support (PSR-PDS) has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

David H. Speirs, P.E., REGISTERED CIVIL ENGINEER

DATE

*Corridor Management Group
On behalf of Transportation Corridor Agencies*



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1 INTRODUCTION

This Project Study Report—Project Development Support (PSR-PDS) identifies the project scope, schedule, and support costs necessary to complete needed studies and work during the subsequent Project Approval and Environmental Document (PA&ED) phase of the proposed South County Traffic Relief Effort. The Draft PSR-PDS has been distributed to the Project Development Team (PDT) for review. Upon completion of the 30-day review, PDT comments will be reviewed and a Final PSR-PDS will be prepared and submitted to Caltrans for approval.

The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with the California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility in South Orange County and accommodate regional demand.

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

- *Alternative 1 – No-Build Alternative*
- *Alternative 13 – Build Idea 13 (ID 13): Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)*
- *Alternative 17 – Build Idea 17 (ID 17): Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)*
- *Alternative 14 – Build Idea 14 (ID 14): Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)*
- *Alternative 11 – Build Idea 11 (ID 11): Add I-5 General Purpose Lanes from I-405 to San Diego County*
- *Alternative 12 – Build Idea 12 (ID 12): Add I-5 High-Occupancy/Toll (HOT) Lane from I-405 to San Diego County*
- *Alternative 9 – Build Idea 9 (ID 9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73*
- *Alternative 18 – Build Idea 18 (ID 18): Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241*
- *Alternative 21 – Build Idea 21 (ID 21): Los Patrones Parkway Extension and I-5 HOT Lanes*

The Build Alternatives and Idea Numbers correspond to the ideas studied in the *South County Traffic Relief Effort Initial Screening* (Attachment I) and Idea 21 as identified in Section 9 of this PSR-PDS. For the purpose of this report, the Alternatives will be referred to using the Alternative Number only.

If a Build Alternative is selected, after Project completion, and once the build facilities are adopted into the State Highway System, Caltrans will be responsible for maintenance of facilities within existing and newly dedicated State right-of-way limits.

Table 1-1 is a summary of the Project information. The support, right-of-way, and construction components of the Build Alternatives shown in Table 1-1 are preliminary estimates and are not suitable for programming purposes. The Project Report (PR) will serve as the programming document for the remaining support and capital components of the Build Alternatives. For the cost estimate summary, see Attachment D.

Caltrans will provide oversight and Independent Quality Assurance for the Project. It is anticipated that Caltrans would be the lead agency for required National Environmental Policy Act (NEPA) approval, as delegated by the Federal Highway Administration (FHWA), and may be the lead agency for required California Environmental Quality Act (CEQA) approval. Project environmental studies are anticipated to begin in January 2019 with the PA&ED phase to be completed by January 2022. Construction could begin in July 2024 with a duration dependent on Project phasing and funding. Funding is expected to be provided through a combination of funds, not yet secured, but will likely include Development Impact Fees, Toll Revenue Bond funds in addition to potential federal, state, and local funding sources. The Build Alternatives have an initial Project Development Category 1 because they will require access control, new right-of-way, and adoption of the route location by the California Transportation Commission (CTC) and State Highway Agreements.

This PSR-PDS is not a substitute for the formal environmental analysis which would be conducted in the next phase of project development. Preliminary traffic data, for the purpose of comparing the project alternatives, is included; however, the PSR-PDS would not foreclose the study of any alternatives. The PR will serve as the approval mechanism for the “preferred” alternative.

For jointly completing the PA&ED efforts, F/ETCA intends to enter into a cooperative agreement (co-op) with Caltrans. A draft co-op that outlines Project roles and responsibilities is in development.

Other approvals required are:

- SR 241 and SR 73 are part of the California Freeway and Expressway System therefore the FHWA and the CTC must be consulted and will have approval authority over critical design elements.

Anticipated permits and agency-specific coordination to be required by the Project are detailed in Sections 7 and 14, respectively.

See Attachment A for the Project location map.

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

See Attachment C for conceptual plans, cross sections, and lane diagrams.

See Attachments D and G for the cost estimate for specific work items included for each alternative.

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
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Table 1-1: Project Information

Project Limits	12 - Ora - 241 – 2.1/14.4 12 - Ora - 73 – 10.34/11.28 12 - Ora - 5 – 0.0/20.5 11 - SD - 5 – 71.3/72.4								
Number of Alternatives	9 (1 No-Build Alternative & 8 Build Alternatives)								
Alternatives	Alt. 1 – No Build	Alt. 13 – Build	Alt. 17 – Build	Alt. 14 – Build	Alt. 11 – Build	Alt. 12 – Build	Alt. 9 – Build	Alt. 18 – Build	Alt. 21 – Build
Current Capital Outlay Support Estimate for PA&ED	\$0	\$100-\$110M	\$90-\$100M	\$90-\$100M	\$100-\$110M	\$100-\$110M	\$50-\$60M	\$50-\$60M	\$80-\$90M
Current Capital Outlay Construction Cost Range	\$0	\$1.8-\$2.3B	\$1.1-\$1.5B	\$1.0-\$1.4B	\$1.3-\$1.6B	\$1.2-\$1.6B	\$0.6-\$0.8B	\$0.6-\$0.8B	\$1.0-\$1.3B
Current Capital Outlay Right-of-Way Cost Range	\$0	\$220-\$280M	\$220-\$280M	\$100-\$130M	\$570-\$710M	\$250-\$320M	\$250-\$320M	\$240-\$300M	\$70-\$90M
Funding Sources	N/A	Development Impact Fees, Toll Revenue Bonds	Development Impact Fees, Toll Revenue Bonds	Development Impact Fees, Toll Revenue Bonds	Not Identified	Development Impact Fees, Toll Revenue Bonds	Not Identified	Not Identified	Development Impact Fees, Toll Revenue Bonds
Number of Structures (Bridges)	N/A	27	23	22	38	34	2	3	32

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

Table 1-1: Project Information (cont.)

Alternatives	Alt. 1 – No Build	Alt. 13 – Build	Alt. 17 – Build	Alt. 14 – Build	Alt. 11 – Build	Alt. 12 – Build	Alt. 9 – Build	Alt. 18 – Build	Alt. 21 – Build
Type of Facility	Freeway, Expressway	Expressway, Expressway Connector							
Anticipated Environmental Determination or Document	N/A	A PEAR was prepared and included with this report (Attachment E). The PEAR indicates that the Project will likely receive an environmental determination of an EIR under CEQA and EIS under NEPA.							
Legal Description	N/A	In Orange County on Route 241 from Oso Parkway to 0.7 mile south of La Novia Avenue and in Orange and San Diego Counties on Route 5 from 0.3-mile South of La Novia Avenue to 0.1 mile south of Basilone Road	In Orange County on Route 241 from Oso Parkway to 0.6 mile south of Avenida Vaquero and in Orange and San Diego Counties on Route 5 from 0.5-mile South of Avenida Vaquero to 0.1 mile south of Basilone Road	In Orange County on Route 241 from Oso Parkway to 0.3 mile south of Avenida Pico and in Orange and San Diego Counties on Route 5 from Avenida Pico to 0.1 mile south of Basilone Road	In Orange and San Diego Counties on Route 5 from 0.4 mile south of Bake Parkway to 0.1 mile south of Basilone Road	In Orange and San Diego Counties on Route 5 from 0.4 miles north of El Toro Road to 0.1 mile south of Basilone Road	In Orange County on new arterial facility from Route 73/Route 5 to Ortega Highway and Antonio Parkway	In Orange County on new arterial facility from Route 73/Route 5 to Los Patrones Parkway and on Crown Valley Parkway from Antonio Parkway to Los Patrones Parkway	In Orange County on a new Los Patrones Parkway extension from Cow Camp Road to La Pata Avenue and in Orange and San Diego Counties on Route 5 from Route 73 to 0.1 mile south of Basilone Road
Project Development Category	N/A	1							

Notes: Ranges are within +/- 10 percent of Total Cost.

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2 BACKGROUND

Descriptions of the facility and Project proponents, Project sponsors and local and regional agency involvement in the development of the purpose and need, and actions/commitments taken place to date regarding the proposed Project are summarized below and detailed in Section 9. Descriptions of the Context Sensitive Solutions and Complete Streets proponents are detailed in Section 6.

Project History

SR 241 is a state highway in Orange County, California, which currently runs from Rancho Santa Margarita to Yorba Linda, connecting with SR 133, SR 261, and SR 91, and travels parallel to I-5. For the entire limits of existing SR 241, from Oso Parkway to SR 91, is designated a toll road and is part of the National Highway System (NHS) and California Freeway and Expressway System.

The section of SR 241, connecting SR 91 to I-5 and completing the southern segment of SR 241, has been the subject of regional planning efforts for more than twenty years. The extension would provide an alternate route to I-5 for those traveling from Riverside, Corona, and southeast Orange County to points southward as well as those traveling from San Diego County northward.

This section of SR 241 has been included in the Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) since 1991, and the San Diego Association of Governments (SANDAG) RTP/SCS since 1994. Currently, the final segment of SR 241, between Oso Parkway and I-5, is included in the 2016 RTP/SCS, SCAG's 2017 Federal Transportation Improvement Program (FTIP), the Orange County Transportation Agency's (OCTA) Long Range Transportation Plan, SANDAG's 2016 Regional Transportation Improvement Program (RTIP), and SANDAG's 2050 RTP/SCS. Both SCAG and SANDAG are in the process of updating their current FTIPs and RTP/SCS's. The Project is being carried over into SCAG's Draft 2019 FTIP, SANDAG's Draft 2018 RTIP, SCAG's 2020 RTP/SCS, and SANDAG's 2019 update to the 2050 RTP/SCS.

In February 2006, via resolutions F2006-1 and F2006-2, the F/ETCA's Board of Directors, as the lead agency under the CEQA, certified the Subsequent Environmental Impact Report (SEIR) for South Orange County Transportation Infrastructure Improvement Project (SOCTIIP) where it selected the A7C-FEC-M (Green Alignment) as its Preferred Alternative.

The SOCTIIP (also referred to as Foothill Transportation Corridor-South and Foothill-South) environmental document was prepared in compliance with the requirements of CEQA. The purpose of the SOCTIIP was to provide improvements to the transportation infrastructure system that would help alleviate future traffic congestion and

accommodate the need for mobility, access, goods movement and future traffic demands on I-5 and the arterial network.

The SOCTIIP alternatives presented and evaluated in the SEIR included six corridor alternatives that extended the existing Foothill Transportation Corridor (SR 241) from Oso Parkway to I-5 near the Orange County/San Diego County boundary or at an intermediate point at an intersecting arterial road, one alternative to improve existing and master planned arterial highways and one alternative to widen I-5 from the County boundary north to the interchange with I-405. The six corridor alternatives evaluated in the SEIR represented extensive analysis and refinement to minimize harm to both the natural and built environment. As discussed extensively in the SEIR, an unprecedented number of alternatives were considered for implementation.

SOCTIIP required approvals from federal, state and local agencies which also triggered compliance with the NEPA, as well as CEQA. The environmental document for purposes of NEPA was an Environmental Impact Statement (EIS). FHWA was the lead federal agency in the preparation of the EIS. FHWA was assisted by several federal resource agencies including the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. The F/ETCA and the federal agencies participated in a collaborative process to define project alternatives and evaluate their environmental impacts, and to identify a least environmentally damaging practicable alternative. After a six-year collaborative process, the state and federal agency participants identified the A7C-FEC-M Alternative (“Green Alignment”) as the preliminary least environmentally damaging practical alternative.

Shortly after the F/ETCA Board certified the SEIR in 2006, three lawsuits were filed in state court. Two lawsuits, entitled *California State Parks Foundation et al. v. Foothill/Eastern Transportation Corridor Agency et al.*, San Diego County Superior Court Case No. GIN051194, and *People of the State of California et al. v. Foothill/Eastern Transportation Corridor Agency et al.*, San Diego County Superior Court Case No. GIN051371, alleged that the certification of the SOCTIIP SEIR did not comply with CEQA. A third lawsuit entitled *Native American Heritage Commission v. Foothill/Eastern Transportation Corridor Agency et al.*, San Diego County Superior Court Case No. GIN051370, alleged that the construction and development of SOCTIIP would violate certain provisions in the Public Resources Code related to Native American cultural resources.

In 2008, the California Coastal Commission (CCC) reviewed the Green Alignment for consistency with the Coastal Zone Management Act. The CCC objected to the F/ETCA’s consistency certification, and the F/ETCA appealed the objection to the U.S. Secretary of Commerce. In December 2008, the Secretary of Commerce sustained the CCC’s objection, thereby precluding construction of the Green Alignment. In light of the Secretary of Commerce’s decision, and pursuant to a tolling agreement, the three litigation matters filed in 2006 were dismissed without prejudice.

In 2013, via resolution 2013F-005, the F/ETCA approved an addendum to the SOCTIIP SEIR for a five-mile extension of SR 241 to Cow Camp Road, known as the Tesoro Extension. Upon the F/ETCA Board's approval, the three lawsuits originally filed in 2006 were reinitiated pursuant to the terms of the tolling agreement, and two additional lawsuits were filed in state court, both alleging that approval of the addendum did not comply with CEQA. The two additional lawsuits are entitled *California State Parks Foundation et al. v. Foothill/Eastern Transportation Corridor Agency et al.*, San Diego County Superior Court Case No. 37-2013-00049797-CU-WM-NC, and *People of the State of California, ex rel. Attorney General Kamala D. Harris v. Foothill/Eastern Transportation Corridor Agency et al.*, San Diego Superior Court Case No. 37-2013-000500001-CU-WM-NC.

In June 2013, the San Diego Region of the California Regional Water Quality Control Board (Regional Board) denied F/ETCA's application for waste discharge requirements for the Tesoro Extension. The F/ETCA subsequently petitioned the Regional Board's denial to the State Water Resources Control Board (State Board). In light of the Regional Board's denial and F/ETCA's subsequent petition to the State Board, the parties to the 2006 and 2013 litigation matters agreed to stay all litigation.

In 2014, the State Board remanded the matter back to the Regional Board for additional findings. The Regional Board adopted additional findings and reaffirmed its denial of the F/ETCA application. The F/ETCA petitioned the State Board, but the State Board declined to review the F/ETCA petition.

In 2015, F/ETCA commissioned an in-depth Community Ascertainment Study designed to dig deep into the local community conducting numerous one-on-one interviews with a variety of interested parties in South Orange County cities. The study found that there was widespread agreement that an I-5 mobility problem exists, but recommendations varied greatly as to how to address the issue. As a result, F/ETCA, in collaboration with other regional transportation agencies, embarked on a thorough public process to gather detailed information as to the types of transportation solutions desired. This process included multiple mobility workshops with environmental leaders as well as separate workshops with locally elected officials. In 2016, F/ETCA expanded these efforts to include public forums, three of which have been conducted to date.

On November 10, 2016, F/ETCA approved a settlement agreement resolving the five lawsuits challenging F/ETCA's approvals for the 2006 SOCTIIP SEIR and 2013 Tesoro Extension. Under the terms of that settlement agreement, F/ETCA was required to rescind the certification of the 2006 SEIR, the 2006 Approvals, the approval of the 2013 Addendum, and the 2013 Approvals. The F/ETCA rescinded these approvals at its December 8, 2016 Board of Directors meeting.

In addition to resolving the prior lawsuits, the 2016 environmental settlement agreement established a framework by which an alignment for the SR 241 Extension

Project can be identified, evaluated, and potentially advanced in a manner that is consistent with applicable laws, as well as meets the transportation needs of F/ETCA.

As the Project sponsor, F/ETCA, in cooperation with Caltrans is proactively seeking project improvements that serve South Orange County's (South County) increased and projected mobility needs. Opportunities to incorporate Multimodal Alternatives, Context Sensitive Solutions, and Complete Streets concepts are outlined in this PSR-PDS and supporting attachments. As the Project progresses through the project development cycle, viable concepts and alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions.

Community Interaction

In January 2016, F/ETCA approved and circulated the *South Orange County–Community Ascertainment Study Regarding Regional Mobility*. The Ascertainment Study was intended to serve as a first step in determining if and how the community wants to work together around its regional mobility needs.

The Community Ascertainment Study was conducted between May and November 2015 and consisted of forty-five in-person, confidential interviews with residents and active community-based leaders from the Orange County cities and unincorporated areas of San Clemente, San Juan Capistrano, Dana Point, Mission Viejo, Ladera Ranch, Coto de Caza, and Rancho Santa Margarita.

F/ETCA began implementing the recommendations from the Community Ascertainment Study in July 2016. Key findings, conclusions, and recommendations of the study included:

- Establishment of an inclusive process for South County city elected officials comprised of officials representing the cities affected by the I-5 congestion problem and whose interests are impacted by the problem;
- Development and implementation of a public information and communications plan to inform the community about the elected officials' process;
- Development and implementation of a comprehensive community involvement plan that facilitates the public being informed about congestion relief solutions under consideration and any potential alignments under consideration for the extension of the SR 241 toll road;
- Ensure that a process for working with Surfrider Foundation is implemented; and
- Reach out to and reengage with those individuals who actively participated in the prior public involvement process related to extending the SR 241.

This ongoing outreach program will continue throughout the ensuing development phases of the Project and will include collaboration among community leaders, partnerships with transportation agencies (F/ETCA, OCTA, and Caltrans), and

transparency with the public (i.e., Stakeholder Outreach, Public Forums, etc.). Specific local and regional agency involvement in the development of the purpose and need is detailed in Section 9.

Existing Facility

Within the Project limits:

- North of Oso Parkway, SR 241 is a four-lane tolled highway with features similar to those proposed for this Project. The existing SR 241 is owned and maintained by Caltrans, with tolling components operated by F/ETCA, through Cooperative Agreement No. 12-210 executed in May 1993;
- Oso Parkway is a six-lane arterial maintained by the County of Orange;
- South of Oso Parkway, the Los Patrones Parkway extension from Oso Parkway to Cow Camp Road is currently being constructed as a four-lane arterial by the County of Orange;
- La Pata Avenue is a four-lane arterial highway maintained by the County of Orange;
- SR 73 is a four-lane tolled highway. The existing SR 73 is owned and maintained by Caltrans, with tolling components operated by SJH/TCA, through Cooperative Agreement No. 12-079, executed in February 1993;
- Avery Parkway is a four-lane arterial maintained by the City of Mission Viejo;
- Antonio Parkway is a six-lane arterial maintained by the County of Orange;
- Crown Valley Parkway is a six-lane arterial maintained by the City of Mission Viejo and the County of Orange; and
- I-5 is an eight to ten-lane freeway, with a concrete median barrier that separates northbound and southbound traffic, owned and maintained by Caltrans. There are auxiliary lanes along many sections of the corridor. There are either one or two High Occupancy Vehicle (HOV) lanes in both directions of the corridor, except south of Avenida Pico, where there are no HOV lanes.

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3 PURPOSE AND NEED

Purpose

The purpose and fundamental objectives of the Project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on I-5 during peak commuting hours and weekends
- Provide additional north-south capacity in case of traffic incidents on I-5
- Provide additional north-south capacity in case of emergencies
- Enhance multi-modal mobility opportunities

Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5
- The lack of sufficient north-south capacity impairs evacuation and emergency response

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4 TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT

A Traffic Engineering Performance Assessment (TEPA) has been prepared to accompany this PSR-PDS (provided under a separate cover) and provides an assessment of readily-available traffic information and planning-level analysis relevant to this Project, as well as the proposed traffic analysis scoping for the PA&ED phase of the Project. Preliminary traffic data, for the purpose of comparing the project alternatives, is included; however, the PSR-PDS would not foreclose the study of any alternatives. The PR will serve as the approval mechanism for the “preferred” alternative. The TEPA serves as a reference document for this PSR-PDS and provides existing and forecasted traffic conditions in the Project area. The intent of the TEPA is to identify existing and Design Year (2050) deficiencies and their causes, provide a technical foundation for developing a preliminary purpose and need statement, recommend future improvements to address the purpose and need of the Project, and outline the scope and magnitude of the more detailed analyses to be conducted as part of subsequent project development efforts (PA&ED). It is assumed that a larger scale traffic engineering study with more detailed traffic analysis (e.g., simulation) will be performed during the PA&ED phase to refine Project Build Alternatives to maximize their operational benefits.

Preliminary assessments and key findings of the TEPA are summarized herein.

Project Study Limits

For the purpose of the TEPA, the Project limits include SR 241/Los Patrones Parkway from Oso Parkway to I- 5 in Orange County and I-5 from the I-405 connection in Irvine to the Orange/San Diego Countyline. It is noted that six of the Build Alternatives extend approximately one mile south of the Countyline, terminating at the Basilone Road/I-5 interchange in San Diego County. For the purpose of this PSR-PDS, the segment of I-5 in San Diego County was not included in the TEPA analysis; however, it will be included in the future traffic studies as part of the PA&ED phase. All the mainline segments and ramp junctions along the I-5 study corridor, and all the mainline segments, ramp junctions, and ramp terminal intersections along SR 241/Los Patrones Parkway study corridor, were evaluated at a macroscopic/planning level during the AM and PM peak hours on a typical weekday, under existing (2017) and Design Year (2050) conditions. Arterial roadway segments at selected locations were evaluated to understand daily traffic demand changes during a typical weekday. Arterial intersections are not included in the TEPA but will be included with detailed analysis during the PA&ED phase. In addition, weekend analysis was conducted at five mainline segments along I-5 during the Saturday (southbound direction) and Sunday (northbound direction) peak hours during existing (2017) and Design year (2050) conditions.

In addition to the operations evaluation at individual locations, the systemwide mobility metric, vehicle hours of delay (VHD), was also developed to evaluate traffic benefits

of three roadway systems in the South Orange County study area (i.e., south of the I-405/I-5 junction within Orange County): I-5 corridor (between I-405 and the Countyline); all arterial and local roadways; and all roadways (including freeways, toll roads, and arterial and local roadways). VHD was measured on a daily basis for weekdays for the study roadway facilities described above.

Traffic Forecasting and Analysis Methodology

For the purpose of this Project, the Orange County Transportation Analysis Model (OCTAM) Version 4.0 with constrained network was used to develop the Design Year (2050) traffic forecasts. Based on the raw model volumes from the Base Year (2012) and Future Year (2040) models, the average daily traffic (ADT) and peak hour traffic volumes were developed using the difference method contained in the *National Cooperation Highway Research Program Report 255: Highway Traffic Data for Urbanized Area Project Planning and Design* (Transportation Research Board, 1982). Since the current OCTAM future model reflects Year 2040 conditions, the Design Year (2050) were developed by applying the 10-year growth to the 2040 forecasts using a calculated annual growth rate between existing and the 2040 traffic forecasts.

Since the OCTAM model does not have a weekend module, the weekend ADT and peak hour traffic forecasts were developed based on a combination of historical weekend growth, historical weekday growth, and future weekday growth estimated from OCTAM.

In terms of operations analysis, the TEPA focuses on planning level mainline, ramp, and arterial operations. Freeway mainline and ramps were evaluated using Highway Capacity Software equivalent spreadsheet, while the intersections were analyzed using the Synchro traffic operations software. Both freeway and intersection analysis was conducted in accordance with the Highway Capacity Manual (Sixth Edition). In addition, the VHD data was obtained from the OCTAM.

For the purpose of this study, level of service (LOS) D is considered as the criteria for acceptable operations for the Project based on the LOS policies identified by Caltrans (jurisdiction for freeway mainline/ramp/ramp terminal intersection) and the County of Orange (jurisdiction for Los Patrones Parkway).

Existing Conditions Traffic Analysis

Existing traffic volumes and traffic data were obtained in 2017 from various sources, including Caltrans, OCTA, Caltrans Performance Measurement System (PeMS) and field data, and are detailed in the TEPA. Existing (2017) weekday peak hour and daily traffic volumes for freeway mainline segments and ramps are shown in Figure 2 of the TEPA (Attachment J). The weekend peak hour traffic counts (constrained volumes) and estimated peak hour demand volumes are shown in Table 3 of the TEPA (Attachment J) at the five study locations under the Saturday peak hour for southbound I-5 and Sunday peak hour for northbound I-5. In addition, daily weekday traffic

volumes were also obtained at key arterial segments from OCTA 2017 ADT map. The arterial ADT volumes and the year when the ADT were collected are summarized in Table 4 of the TEPA (Attachment J).

Summary of Traffic Operations Analysis and Findings

During the AM peak hour, the majority of the northbound I-5 study locations north of Avenida Vista Hermosa operate at LOS E or F conditions, including locations from Avenida Vista Hermosa slip on-ramp to Camino De Estrella off-ramp, from Camino De Estrella slip on-ramp to Camino Las Ramblas off-ramp, from Stonehill Drive on-Ramp to Ortega Highway off-Ramp, from Ortega Highway slip on-ramp to Junipero Serra Road off-ramp, from Oso Parkway slip on-ramp to La Paz Road off-ramp, and from Alicia Parkway off-ramp to Lake Forest Drive off-ramp. South of Avenida Vista Hermosa, northbound I-5 operate at acceptable LOS D or better. In the southbound direction, all the study locations operate acceptably at LOS D or better conditions, with the only exception at the mainline segment from the Oso Parkway on-ramp to the Crown Valley Parkway off-ramp.

During the PM peak hour, all the northbound I-5 study locations operate acceptably with LOS D or better, except for the Lake Forest Drive off-ramp. In the southbound direction, substantial traffic congestion is experienced at Alicia Parkway due to a combination of heavy traffic demand on I-5 and the lane drop to the Alicia Parkway off-ramp, resulting in substantial vehicle queue spillback to I-405. All the southbound I-5 segments between Alicia Parkway and I-405 operate at LOS E or F conditions. The congestion meters traffic travel to downstream locations, therefore, the majority of the southbound I-5 locations south of Alicia Parkway operate at acceptable conditions. However, multiple ramps and several mainline segments south of Alicia Parkway still operate at deficient LOS E or F conditions, including La Paz Road, Oso Parkway, Crown Valley Parkway, Camino Capistrano, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, and Avenida Palizada.

In addition, the I-5 study corridor south of SR 73 shows unique traffic pattern characteristics during the weekend conditions. Severe recurring congestion is currently experienced on Sunday mid-day to late afternoon along northbound I-5 from north of Avenida Vista Hermosa to the Countyline and beyond. The congestion currently starts at north of Avenida Vista Hermosa around 10:30 AM and continues for approximately six hours until 4:30 PM, resulting in substantial vehicle queues of eight to nine miles spillback to the Countyline and beyond. The two northbound I-5 segments between Cristianitos Road and Avenida Califia and between Avenida Pico and Avenida Vista Hermosa operate at LOS E or F conditions during the Sunday peak hour. In addition, if the unserved demand along northbound I-5 would travel to downstream locations, northbound I-5 between Crown Valley Parkway and Oso Parkway, would also operate unacceptably at LOS E during the Sunday peak hour.

Southbound I-5 also experiences substantial congestion on Saturdays from Camino De Estrella to Ortega Highway and beyond, resulting in vehicle queues along southbound

I-5 for approximately five hours and six miles on Saturdays and LOS E conditions between Stonehill Drive and Camino Capistrano during the Saturday peak hour. If the unserved demand along southbound I-5 would travel to downstream locations, southbound I-5 between Avenida Pico and Avenida Vista Hermosa would also operate unacceptably at LOS E during the Saturday peak hour.

The weekend peak hour (Saturday for southbound I-5 and Sunday for northbound I-5) results are summarized in Table 7 of the TEPA (Attachment J).

Detailed analysis during the PA&ED phase will evaluate how the operational deficiencies at upstream or downstream locations would affect operations and LOS at adjacent facilities and the entire study corridor.

Summary of Safety / Accident Data

Accident data was reviewed for the I-5 mainline segments and ramps within the Project Limits (I-405 to Countyline). For this Project, Traffic Accident Surveillance and Analysis System—Transportation System Network data was provided by Caltrans District 12 and included accidents that occurred between January 2012 through December 2014. Table 8 of the TEPA (Attachment J) shows the number of total accidents, fatalities, and injuries for both freeway mainline and ramps, as well as the actual three-year accident rates with a comparison to the statewide average accident rates on similar facilities.

A total of 4,068 accidents with 11 fatalities and 1,370 injuries occurred in the study area between January 2012 and December 2014. Most of the accidents (i.e., 84 percent) occurred on the I-5 mainline, while the remaining 16 percent occurred on the on- and off-ramps. Accident rates at 55 out of the 133 analyzed locations are higher than the statewide average for similar facilities. Among the 55 locations, the 22 locations had accident rates as high as twice of the statewide average rates (either fatalities accident rate, total fatalities, and injuries accident rate or total accident rate).

Tables 9A and 9B of the TEPA (Attachment J) summarizes the number of accidents by accident type for those occurred on I-5. Approximately 47 percent (1,912 accidents) of all the accidents occurred on Fridays through Sundays (3 of 7 days in a week) combining both northbound and southbound I-5 between I-405 and the Orange/San Diego Countyline, which is 7 percent higher than typical three weekdays (Tuesdays through Thursdays). Fridays and Saturdays showed the highest share of accidents on both northbound and southbound I-5, and the total accidents (combining both I-5 directions) occurred on Fridays and Saturdays were 19 percent and 18 percent of all the accidents, respectively. Northbound I-5 experienced 55 percent and 31 percent more accidents than southbound I-5 under Sundays and Mondays, respectively; while southbound I-5 showed 25 percent and 23 percent more accidents than the northbound direction under Fridays and Saturdays, respectively. Under the typical weekdays (Tuesdays through Thursdays), the accidents between northbound and southbound I-5 were similar, with variation of less than 15 percent.

In addition, the I-5 study corridor south of SR 73 shows unique traffic pattern characteristics during the weekend conditions. Accidents by day of week were also evaluated for the I-5 corridor south of SR 73 to the Orange/San Diego Countyline. This southern segment of I-5 experienced over 53 percent (1,001 out of 1,880 accidents) of all the accidents occurred on Fridays through Sundays combining both northbound and southbound I-5, which is 18 percent higher than typical three weekdays (Tuesdays through Thursdays). Saturdays showed the highest share of accidents of 20 percent (combining both I-5 directions), followed by Fridays (19 percent) and Sundays (15 percent). Under the typical weekdays (Tuesdays through Thursdays), the accidents were substantially lower with 11 to 13 percent of the total accidents.

Detailed collision rate and collision data are shown in Tables 8, 9A, and 9B of the TEPA (Attachment J), respectively.

Design Year (2050) Traffic Operations Analysis Summary

The TEPA includes one No-Build Alternative (two No-Build Alternative scenarios were evaluated; see PSR-PDS Section 7 for additional detail; also, these two scenarios are described below) and eight Build Alternatives proposed for consideration in the Project. Alternative descriptions are included in Section 7 of this PSR-PDS, accordingly. For the purpose of TEPA, the No-Build Alternative was analyzed under two scenarios: with and without the I-5 HOV Project from Avenida Pico to Countyline. The Build Alternatives were evaluated in comparison to the No-Build Alternative (e.g., No-Build Alternative without HOV). The No-Build Alternative with HOV Project scenario was only included in the TEPA for Project reference only.

Graphical representation of forecasted traffic volumes are provided in Figures 12A through 31 of the TEPA (Attachment J).

Results of the traffic analysis under Design Year 2050 conditions are detailed in Section 5 of the TEPA (Attachment J) and summarized below.

Summary of VHD Analysis

Three systemwide mobility metrics were developed to evaluate traffic benefits in the South Orange County study area described above: VHD on the I-5 corridor (between I-405 and the Countyline); VHD on all arterial and local roadways; and VHD on all roadway facilities (including freeways, toll roads, and arterial and local roadways). The daily VHD results under each Project Alternative are summarized in Table 10 of the TEPA (Attachment J).

Build Alternatives 14, 11, 12, and 21, are expected to have substantial VHD savings on I-5, with the daily delay savings of 1,500 vehicle hours or higher, through adding capacity to regional corridors (e.g., I-5 or SR 241) by either widening or extending the corridors. Moderate delay savings on I-5 of between 340-1,370 hours per day would result from other Build Alternatives.

Build Alternatives 17, 14, 11, 12, 18, and 21 would result in noticeable VHD savings of 500 vehicle hours or higher on the arterial and local roadways, as a result of the additional capacity along I-5 to relieve traffic demand and congestion along parallel north-south arterials or addition of the east-west arterial connecting SR 73 to SR 241/Los Patrones Parkway. Moderate delay savings on arterials would result from Built Alternative 9 as a result of the additional connections provided to the roadway network.

For all roadways as a whole, Build Alternatives 14, 11, 12, 18, and 21, are expected to have substantial VHD savings of greater than 2,000 vehicle hours on a daily basis, followed by Build Alternatives 17 and 9 with moderate delay savings. Among all the Project alternatives, Build Alternative 13 shows the least delay savings on the I-5 corridor, arterial/local system, and the entire study area.

Summary of I-5 Operational Analysis

Under the No-Build Alternative, operational deficiencies would occur with unacceptable LOS E or F conditions at 28 out of 52 study locations during the AM peak hour for northbound I-5, at 5 out of 52 study locations during the AM peak hour for southbound I-5, at 2 out of 51 study locations during the PM peak hour for northbound I-5, and at 41 out of 51 study locations during the PM peak hour for southbound I-5, accordingly.

The AM and PM peak hour density and LOS for the study freeway mainline segments and ramp junctions on northbound and southbound I-5 under Design Year (2050) conditions, are shown in Tables 11A and 11B, 12A, and 12B of the TEPA (Attachment J), respectively.

Combining the northbound and southbound directions, Build Alternative 11 shows the greatest benefit to I-5 operations. Build Alternatives 17, 14, 12, and 21 also show sufficient operational benefits to I-5. Build Alternatives 9 and 18 were proposed as arterial improvements and show the least traffic benefits to I-5 corridor, as expected.

Summary of SR 241/ Los Patrones Parkway Operational Analysis

Under the No-Build Alternative, Las Patrones Parkway would provide adequate capacity to accommodate the future demand and operate at LOS D or better conditions at all the study locations, including mainline segments and ramp junctions.

The AM and PM peak hour density and LOS for the mainline segments and ramp junctions on northbound and southbound SR 241 under Design Year (2050) conditions, are shown on Tables 13A, 13B, 14A, and 14B of the TEPA (Attachment J), respectively.

The SR 241/Los Patrones Parkway would provide sufficient capacity under the Build Alternatives to accommodate the future demand during both AM and PM peak hours, with the exception of the following locations: Build Alternative 14 (northbound Los Patrones Parkway off-ramp at Oso Parkway) would operate at LOS E in the AM peak

hour; Build Alternative 18 (northbound Los Patrones Parkway between SR 73 on-ramp and Crown Valley Parkway off-ramp) would operate at LOS E or F in the AM peak hour; and Build Alternative 21 (northbound Los Patrones Parkway off-ramp at Oso Parkway) would operate at LOS E in the AM peak hour.

Summary of SR 241/ Los Patrones Parkway Intersectional Analysis

Under the No-Build Alternatives and all the Build Alternatives, all ramp terminal intersections along SR 241/Los Patrones Parkway would operate acceptably at LOS D or better conditions under both AM and PM peak hours.

The AM and PM peak hour delay and LOS results at the SR 241 ramp terminal intersections under Design Year (2050) conditions are shown in Tables 15 and 16 of the TEPA (Attachment J), respectively.

Traffic control strategy at each ramp intersection is presented in the Intersection Control Evaluation (ICE) Stage I Memorandum (provided under separate cover), in which different traffic control options were evaluated for each ramp intersection under the Build Alternatives. Recommended traffic control strategies, as a result of the ICE Stage I evaluation, will be further studied during the ICE Stage II analysis as part of the PA&ED phase.

Summary of I-5 Weekend Analysis

Under the No-Build Alternative, future growth in weekend traffic would exacerbate traffic operations and result in LOS E or F conditions at all the five segments on northbound I-5. Build Alternatives 14 and 21 would substantially improve weekend operations and result in acceptable LOS D conditions at 4 out of 5 locations on northbound I-5 during the Sunday peak hour. Build Alternatives 13, 17, 11, and 12 would also provide noticeable improvements to the weekend operations and improve 3 out of 5 deficient locations to LOS D during the Sunday peak hour. Build Alternatives 9 and 18 would provide the minimal benefits to northbound I-5 during the Sunday peak hour.

For southbound I-5 during the Saturday peak hour, future growth in weekend traffic would exacerbate traffic operations and result in LOS E or F conditions at the three segments south of Camino Capistrano. Build Alternatives 13, 14, 11, 12, and 21 would substantially improve weekend operations and result in acceptable LOS D conditions at all five locations on southbound I-5 during the Saturday peak hour. Build Alternative 17 would also provide noticeable improvements and improve 2 out of 3 deficient locations to LOS D during the Saturday peak hour. Build Alternatives 9 and 18 would provide the minimal benefits to southbound I-5 during the Saturday peak hour.

Weekend forecasted Design Year (2050) peak hour volumes and weekend peak hour LOS on northbound I-5 on Sunday are shown in Tables 17 and 19 of the TEPA (Attachment J), respectively.

Weekend forecasted Design Year (2050) peak hour volumes and weekend peak hour LOS on southbound I-5 on Saturday are shown in Tables 18 and 20 of the TEPA (Attachment J), respectively.

Summary of Arterial ADT Analysis

The Design Year (2050) daily traffic volumes for the key arterial segments are shown in Table 21 of the TEPA (Attachment J). The No-Build Alternative provided a baseline for comparison with the Build Alternatives ADT.

Traffic patterns changes due to the SR 241 extension would substantially reduce traffic demand along Oso Parkway under Build Alternatives 13, 17, and 14. Moderate reduction would also be expected on Antonio Parkway north of Ortega Highway, Ortega Highway east of Antonio Parkway, and Avenida Vista Hermosa under Build Alternatives 17 and 14. Compared to the No-Build Alternative, Build Alternatives 13, 17, and 14 would reduce the arterial ADT on an average by 0.2 to 3.7 percent.

Build Alternatives 11 and 12 would provide marginal benefits to the key arterial segments. The east-west arterials such as Oso Parkway, Crown Valley Parkway, Ortega Highway, Avenida Vista Hermosa, and Avenida Pico are expected to increase in traffic demand due to anticipated increase in traffic using those east-west corridors to access the I-5 corridor when additional capacity becomes available. Compared to the No-Build Alternative, Build Alternatives 11 and 12 would increase the arterial ADT on an average by 0.8 to 1.3 percent.

Build Alternatives 9 and 18 would reduce traffic demand on other east-west arterials such as Oso Parkway, Crown Valley Parkway, Avenida Vista Hermosa, and Avenida Pico, with the addition of east-west arterial capacity. The roadway extension to Ortega Highway under Build Alternative 9 would result in an increase in volumes and exacerbate traffic congestion on Ortega Highway and Antonio Parkway. Compared to Build Alternative 9, Build Alternative 18 shows greater benefits to the key arterial segments.

Build Alternative 21 would reduce traffic demand for the majority of the key arterial segments and improve operations at already congested segments along Ortega Highway and Antonio Parkway. Build Alternative 21 would reduce the arterial ADT by 1.3 percent on an average compared to the No-Build Alternative.

Preliminary Assessment and Findings

Traffic metrics for the Project, under Design Year (2050), are presented in Table 22 of the TEPA (Attachment J) and key findings are summarized below. Additional traffic counts, updated traffic forecasts, and more detailed traffic analysis will be conducted during the PA&ED phase.

- For all roadways in the South Orange County study area, Build Alternative 11 shows the greatest delay savings (14,400 daily vehicle hours), followed by

Build Alternative 21 (5,500 daily vehicle hours), Build Alternative 12 (5,000 daily vehicle hours), and Build Alternative 14 (2,400 vehicle hours). Build Alternatives 17, 9, and 18 would also result in moderate delay savings. Build Alternative 13 shows the lowest delay savings among all the alternatives. A similar trend is shown for the VHD savings along the I-5 corridor, except that Build Alternative 18 anticipates substantial delay savings to arterial/local roadways due to additional east-west capacity from SR 73 to Los Patrones Parkway.

- For the peak hour operations, Build Alternative 11 shows the most operational benefits to peak directions of the I-5 corridor (northbound I-5 during the AM peak hour and southbound I-5 during the PM peak hour), with the most locations (77 locations) operating at LOS D or better conditions and improving 56 percent of the deficient locations (LOS E or F) under the No-Build Alternative by at least one LOS grade. Build Alternatives 17, 14, 12, and 21 would also result in substantial benefits to the I-5 corridor, with improved conditions (either improved LOS, reduced vehicle density, or reduced volume/capacity) at 56 to 93 percent of study locations, and improving more than 20 percent of the deficient locations under the No-Build Alternative by at least one LOS grade. Build Alternatives 9 and 18 show the least benefits to I-5 during the peak hour.
- All Build Alternatives would provide adequate capacity along SR 241/Los Patrones Parkway with acceptable LOS D or better at all segments between Oso Parkway and I-5, with the exception of Build Alternative 14 (at Oso Parkway off-ramp on northbound), Build Alternative 18 (between SR 73 on-ramp and Crown Valley off-ramp on northbound), and Build Alternative 21 (at Oso Parkway off-ramp on northbound), for which the higher demand would result in LOS E or F conditions during the AM peak hour.
- Along SR 241/Los Patrones Parkway, all the ramp terminal intersections between Oso Parkway and I-5 would provide adequate capacity and result in LOS D or better conditions under all Build Alternatives.
- During emergency evacuations (e.g., fire, flood, other evacuations) along I-5, Build Alternatives 13, 17, 14, 11, 12, and 21 would provide additional north-south capacity (e.g., additional capacity along I-5 and/or via access to SR 241) to I-5. Build Alternatives 9 and 18 would not provide any alternate capacity to I-5 in case of emergency evacuations.
- During incidents on I-5 that block some of all lanes, Build Alternatives 13, 17, and 14 would provide alternate north-south capacity (e.g., additional capacity via access to SR-241) to I-5; Build Alternatives 11, 12, and 21 would provide partial alternate capacity (e.g., additional capacity on I-5); and Build Alternatives 9 and 18 would not provide any additional capacity to I-5.
- Under weekend conditions, Build Alternatives 13, 14, 12, and 21 would substantially improve weekend operations and result in acceptable conditions at the two I-5 segments south of Avenida Vista Hermosa. Build Alternatives 17 and 11 would also provide noticeable improvements to the weekend operations.

Build Alternatives 9 and 18 would provide negligible benefits to I-5 during the weekend.

- Overview of all the performance measures indicates that substantial traffic benefits would result from Build Alternatives 14, 11, 12, and 21. Build Alternatives 9 and 18 would show the least traffic benefits..

Design Features and Traffic Infrastructure

The following design features may be considered during the PA&ED and Plans, Specifications and Estimates (PS&E) phases of the Project to improve operations and safety within the corridor:

- HOV Ingress/Egress Locations and Merging;
- Acceleration/Deceleration Lanes;
- Bicyclist, Pedestrian, and Transit Facilities;
- Traffic Signals;
- Protective Railings/Barriers;
- Lighting;
- Ramp Metering and Detection Systems;
- California Highway Patrol (CHP) Enforcement Areas;
- On- and off-ramp Location Analysis;
- Goods Movement Enhancements; and
- ITS Enhancements.

Scope of Future Traffic Engineering and Studies, Activities, and Tasks

The scope of future traffic engineering and studies, activities, and tasks for the PA&ED phase are detailed in Section 7 of the TEPA (Attachment J).

The traffic analysis that will be prepared for the Project during PA&ED will study weekday and weekend conditions for existing (2018), opening year (2027), and long-range (2050) conditions. The following analyses include, but are not limited to, the following:

- Capacity;
- Delay;
- Queue;
- Level of Service;
- Signal Warrants;
- Ramp Merge/Diverge;
- Weave Analysis;
- Special Truck Studies;
- Ramp Metering Analysis; and
- Railroad Preemption Analysis.

Key deliverables to be prepared at the PA&ED phase are also included in Section 7 of this PSR-PDS, accordingly (Studies/Actions Required for All Alternatives—Engineering Studies).

Other Traffic Considerations and Coordination

In addition to the traffic analyses listed above, traffic-related design considerations not included in the scope of this PSR-PDS but requiring further study during PA&ED include, but are not limited to, the following:

- Electrical systems, including traffic signals, safety lighting, and overhead sign structures;
- Coordination with Caltrans and Cities regarding signal coordination and connection to City Traffic Management Centers;
- Transportation Management Plan Data Sheets; and
- Stage Construction.

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5 DEFICIENCIES

Under existing conditions, traffic operations deficiency resulted from the heavy traffic demand is observed on the peak directions of the I-5 corridor: northbound direction during the AM peak hour and southbound direction in the PM peak hour.

During the AM peak hour, northbound I-5 between Camino De Estrella and Junipero Serra Road operate at deficient LOS E or F conditions due to the heavy demand on the I-5 mainline. North of SR 73, commuters experience substantial congestion along northbound I-5 from Oso Parkway to Lake Forest Drive, operating deficiently at LOS E or F conditions. The deficient locations for northbound I-5 are shown in Table 5-1.

**Table 5-1: Existing Conditions (2017) Deficient Locations—Northbound I-5
Weekday AM Peak Hour**

Location	Type	V/C	Density	LOS
Avenida Vista Hermosa Slip On-Ramp	Merge	0.92	35.6	E
Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.94	39.5	E
Camino De Estrella Off-Ramp	Diverge	0.89	37.0	E
Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	0.94	40.7	E
Stonehill Dr On-Ramp	Merge	1.04	-	F
Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	1.00	-	F
Camino Capistrano Off-Ramp	Diverge	1.00	-	F
Camino Capistrano/Valle Rd On-Ramp	Merge	0.89	-	F
Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	0.99	43.8	E
Ortega Highway Off-Ramp	Diverge	1.06	-	F
Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	0.88	35.2	E
Junipero Serra Rd Off-Ramp	Diverge	0.90	37.3	E
Oso Parkway Slip On-Ramp	Merge	0.89	35.6	E
Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.88	35.4	E
La Paz Road Off-Ramp	Diverge	0.88	35.3	E
Alicia Parkway Off-Ramp	Diverge	0.86	-	F
Alicia Parkway Loop On-Ramp	Merge	0.76	-	F
Alicia Parkway Slip On-Ramp	Merge	0.82	-	F
Alicia Parkway Slip On-Ramp to El Toro Road Off-Ramp	Basic	0.85	-	F

**Table 5-1: Existing Conditions (2017) Deficient Locations—Northbound I-5
Weekday AM Peak Hour (Cont.)**

Location	Type	V/C	Density	LOS
El Toro Road Off-Ramp	Diverge	0.85	-	F
El Toro Road Loop On-Ramp	Merge	0.93	-	F
El Toro Road Slip On-Ramp	Merge	0.93	-	F
Lake Forest Drive Off-Ramp	Diverge	1.19	-	F

Source: Fehr & Peers, 2017

Notes: Bold font indicates unacceptable LOS E or F conditions.

During the PM peak hour, substantial traffic congestion is experienced from the current bottleneck at Alicia Parkway and extend back all the way to I-405 on southbound I-5. The congestion at Alicia Parkway meters traffic travel to downstream locations, therefore, the majority of the southbound I-5 mainline segments south of Alicia Parkway operate at acceptable conditions. However, multiple ramps and several mainline segments south of Alicia Parkway operate at deficient LOS E or F conditions, including La Paz Road, Oso Parkway, Crown Valley Parkway, Camino Capistrano, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, and Avenida Palizada. The deficient locations for southbound I-5 are shown in Table 5-2.

In addition, the I-5 study corridor south of SR 73 shows unique traffic pattern characteristics during the weekend conditions. Severe recurring congestion is currently experienced on Sunday mid-day to late afternoon along northbound I-5 from north of Avenida Vista Hermosa to the Countyline and beyond. The congestion currently starts at north of Avenida Vista Hermosa around 10:30 AM and continues for approximately 6 hours until 4:30 PM, resulting in substantial vehicle queues of 8-9 miles spillback to the Countyline and beyond. In addition, if the unserved demand along northbound I-5 would travel to downstream locations, northbound I-5 between Crown Valley Parkway and Oso Parkway, would also operate unacceptably at LOS E during the Sunday peak hour.

Southbound I-5 also experiences substantial congestion on Saturdays from Camino De Estrella to Ortega Highway and beyond, resulting vehicle queues along southbound I-5 for approximately 5 hours and 6 miles on Saturdays. If the unserved demand along southbound I-5 would travel to downstream locations, southbound I-5 between Avenida Pico and Avenida Vista Hermosa would also operate unacceptably at LOS E during the Saturday peak hour. Table 5-3 shows the deficient locations at the I-5 mainline segments during the weekend peak hours.

**Table 5-2: Existing Conditions (2017) Deficient Locations—Southbound I-5
Weekday PM Peak Hour**

Location	Type	V/C	Density	LOS
I-405 to Bake Pkwy	Mainline	0.75	27.5	F*
Bake Parkway to Lake Forest Drive	Mainline	0.75	27.8	F*
Lake Forest Drive to El Toro Road	Mainline	0.85	32.9	F*
El Toro Road to Alicia Parkway	Mainline	1.07	-	F
Alicia Parkway Off-Ramp	Diverge	1.07	-	F
Alicia Parkway Loop On-Ramp	Merge	0.81	-	F
Alicia Parkway Slip On-Ramp	Merge	0.68	-	F
La Paz Road Loop On-Ramp	Merge	0.96	41.6	E
La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	1.01	-	F
Oso Parkway Off-Ramp	Diverge	1.03	-	F
Oso Parkway Slip On-Ramp to Crown Valley Parkway Off-Ramp	Basic	0.98	43.1	E
Crown Valley Parkway Off-Ramp	Diverge	0.98	43.1	E
Camino Capistrano Off-Ramp	Diverge	1.00	-	F
Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	0.96	41.2	E
Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	0.91	37.0	E
Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.04	-	F

Source: Fehr & Peers, 2017

Notes: Bold font indicates unacceptable LOS E or F conditions.

* Southbound I-5 between El Toro and I-405 has congested speed of less than 35 miles per hour during the PM peak hour due to queue spillback from Alicia Parkway; therefore, those locations operate at LOS F conditions.

By Design Year (2050), the ADT traffic demand on the I-5 study corridor would increase from approximately 240,000 to 275,000 by 15 percent, resulting in an annual growth of 0.5 percent on I-5. Even with the potential roadway improvements along the I-5 corridor as indicated in the OCTA's 2014 Long Range Transportation Plan (LRTP), the increase in demand by 2050 would result in more deficient locations on the I-5 corridor during both weekday and weekend conditions.

12 - Ora - 241 – 2.1/14.4
 12 - Ora - 73 – 10.34/11.28
 12 - Ora - 5 – 0.0/20.5
 11 - SD - 5 – 71.3/72.4

Table 5-3: Existing Conditions (2017) Deficient Locations—Weekend Peak Hour

Mainline Segment	Northbound (Sunday)			Southbound (Saturday)		
	V/C	Density	LOS	V/C	Density	LOS
I-5: Cristianitos Road – Avenida Califa	0.99	43.6	E	0.87	34.6	D
I-5: Avenida Pico – Avenida Vista Hermosa	1.08	-	F	0.97	42.3	E
I-5: Stonehill Drive – Camino Capistrano	0.86	33.9	D	0.97	42.6	E
I-5: Crown Valley Parkway – Oso Parkway	0.98	43.1	E	0.85	33.1	D

Source: Highway Capacity Manual (Transportation Research Board, Sixth Edition)

Notes: Bold font indicates unacceptable LOS E or F conditions.

* Density was reported in number of vehicles per hour per lane.

6 CORRIDOR AND SYSTEM COORDINATION

The South County Traffic Relief Effort is consistent with planning efforts at all levels of government. Note that an updated freeway maintenance agreement will be prepared to delineate maintenance responsibilities between the F/ETCA and the State once a preferred alternative is selected.

Corridor Overview

The Project improvement limits include SR 241 in Orange County, from Oso Parkway in Rancho Santa Margarita to I-5 in San Clemente, and I-5 from the I-405 connection in Irvine to Basilone Road in San Diego County. SR 241 is a state highway designated as a toll road and I-5 is a major north-south route of the Interstate Highway System. SR 241 and I-5 are part of the NHS and California Freeway and Expressway System, adopted by the CTC and included in the Surface Transportation Assistance Act Trucks National Network. In 1988, SR 241 Route adoption was granted in a major thoroughfare agreement, from 0.4 miles south of the Oso Parkway centerline to State Route 91. This Project will require access control, new right-of-way, and adoption of the route location by the CTC and State Highway Agreements.

CTC requires that Corridor System Management Plans (CSMPs) be developed for corridors with projects funded by the Corridor Mobility Improvement Account, which was created by the passage of Proposition 1B in November 2006. As part of the statewide effort, Caltrans District 12 has developed a CSMP for the I-5 corridor within the Project limits. The primary purpose of the I-5 CSMP is to develop strategies to manage the corridor and sustain existing transportation investments. Operational improvements are included in its management strategies to be pursued to manage I-5. The Project objectives are consistent with the CSMP objectives described above, as the Project aims to reduce travel time and delays, and reduce traffic congestion.

In addition, the Transportation Concept Report (TCR) is a long-range planning document which outlines the conceptual improvement options for a specific route over a 20-year period. TCRs identify current and projected operating conditions and enhancements needed to sustain the multimodal system. The document is developed with the goals of improving safety and mobility for all users and meeting community and environmental needs along the corridor. The alternatives connecting I-5 to SR 241 are included in the TCR as part of the long-range projects for I-5 corridor within the Project limits (adopted in 2000).

Freeway-to-freeway interchanges, along with local road interchanges, within the Project limits are summarized in Section 7. Addition or modification of local road interchanges will have minimal impact to the Project. However, understanding of these planned projects will allow access points to be configured to ensure compatibility with the associated interchange improvements.

Funding and construction of numerous transportation improvements within the Project limits are currently planned or under construction and are summarized in Table 6-1.

State Planning

The Federal State Transportation Improvement Program (FSTIP) and the FTIP carry out the California Transportation Plan. The FSTIP is programmed by CTC from the FTIPs prepared by the regional Metropolitan Planning Organizations (MPOs). The Project is currently included in the federally-adopted 2017 FTIP and it is included in the 2017 California FSTIP. SCAG is in the process of updating its current FTIPs. The Project is being carried over into SCAG's Draft 2019 FTIP.

The Project is privately funded in the FTIP and FSTIP; therefore, no Statewide Transportation Improvement Program (STIP) dollars are programmed for it nor does it need to be included in the STIP.

Regional Planning

SCAG is the federally designated MPO for the six-county region, which includes Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties. SANDAG is the federally designated MPO for San Diego County. As the MPOs, SCAG and SANDAG are required to adopt and update a RTP at least every four years. The South County Traffic Relief Efforts were originally included in the SCAG RTP/SCS and the SANDAG RTP/SCS since 1991 and 1994, respectively, and are currently shown on the SCAG 2016 RTP/SCS and the SANDAG 2050 RTP/SCS.

As part of the SCAG 2016 RTP/SCS and SANDAG 2050 RTP/SCS, the Project is part of each region's Sustainable Communities Strategy (SCS) required under SB 375 to reduce greenhouse gas (GHG) emissions due to passenger vehicles. The population and employment growth served by the Project is identified in the SCS. The SCS also includes the Project in its transportation network designed to reduce regional VMT and GHG emissions. Both SCAG and SANDAG are in the process of preparing an update to their RTP/SCS's. The Project is being carried over into the modeling for SCAG's 2020 RTP/SCS, as well as the SANDAG's 2019 update to the 2050 RTP/SCS.

SCAG and SANDAG also prepare and implement the FTIP. The South County Traffic Relief Effort is programmed and modeled as part of SCAG's 2017 FTIP and SANDAG's 2016 RTIP. Both SCAG and SANDAG are in the process of updating their current FTIPs. The Project is being carried over into SCAG's Draft 2019 FTIP and SANDAG's Draft 2018 RTIP.

Local Planning

Coordination for the Project construction phase will be conducted with all local jurisdictions within the Project limits.

Table 6-1: Existing and Future Projects within Project Limits

Project ID	Post Mile	Project Description
12-0F96C4	12 - Ora - 5 – 3.7/6.2	Add one HOV lane on I-5 from South of Avenida Vista Hermosa to South of Pacific Coast Highway
12-0F96E4	12 - Ora - 5 – 6.2/8.7	Add one HOV lane on I-5 from South of Pacific Coast Highway to San Juan Creek Road
Oso Parkway Bridge	12 – Ora – 241	Overcrossing bridge structure at Oso Parkway and mainline roadway between southern terminus of SR 241 and northern terminus of Los Patrones Parkway
Los Patrones Parkway	N/A	Four-lane arterial from Oso Parkway to Cow Camp Road
SR 74		Widen Ortega Highway from one lane each way to two lanes each way
Avenida La Pata, Phase II	N/A	Add one lane in each direction from Ortega Highway (SR 74) to Prima Deshecha Landfill
12-0K0224	12 – Ora – 5 – 14.5/17.1	Add one GP lane in each direction on I-5 from south of Oso Parkway OC to south of Alicia Parkway OC
12-0K0234	12 – Ora – 5 – 17.1/18.9	Add one HOV lane and one GP lane in each direction on I-5 from south of Alicia Parkway OC to north of El Toro Road UC
12-0K0214	12 – Ora – 5 – 12.4/14.5	Add one GP lane in each direction on I-5 from south of Avery Parkway UC to north of Crown Valley Parkway OC
12-0K0231	12 - Ora - 5 – 17.1/18.9	Extending the second HOV lane from Alicia Parkway to El Toro Road; reestablishing existing auxiliary lanes; and constructing new ones; and improving several existing on-ramps and off-ramps

Complete Streets

Caltrans Deputy Directive 64-Revision (DD-64R) provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities on the State Highway System. The Department views all transportation improvements (new and retrofit) as opportunities to improve safety, access, and mobility for all travelers and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system. It aims to provide safe mobility for all users, including motorists, bicyclists, pedestrians and transit riders. The Project is consistent with its policies by satisfying the following objectives:

- Providing options and access for non-drivers: The proposed improvements include enhancements to pedestrian and bicycle facilities, improving pedestrian and bicycle circulation.
- Decreasing vehicle trips, air pollutants and GHG emissions: The proposed Project improves traffic circulation by reducing delays thereby reducing air pollutants and greenhouse gas emissions.

Context Sensitive Solutions

Caltrans uses Context Sensitive Solutions as an approach to plan, design, construct, maintain, and operate its transportation system. These solutions use innovative and inclusive approaches that integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals. The Project is consistent with this approach by promoting multimodal transportation and coordinating its design with the urban boundary, rural character and future development within and adjacent to the Project limits.

7 ALTERNATIVES

During the conceptual analysis and preliminary engineering stage of this Project, many transportation ideas were investigated and summarized in the *South County Traffic Relief Initial Screening* (Attachment I). Due to limited traffic relief to I-5 or arterial highways accessing I-5, several of the considered transportation ideas were withdrawn from further study. The transportation ideas that showed greater traffic relief benefit, to I-5 or arterial highways, have been advanced for further consideration are discussed below.

This PSR-PDS is not a substitute for the formal environmental analysis which would be conducted in the next phase of project development. Preliminary traffic data, for the purpose of comparing the project alternatives, is included; however, the PSR-PDS would not foreclose the study of any alternatives. As the Project progresses through the project development cycle, viable alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions. The Project intends to incorporate Context Sensitive Solutions that integrate and consider community, aesthetic, multimodal and environmental values with transportation safety, maintenance, and performance goals. Based on the conceptual analysis and preliminary engineering studies, eight build alternatives are proposed in addition to a “No-Build” alternative. A brief discussion of ideas considered but rejected from further consideration prior to PA&ED of this Project is also included for reference. The PR will serve as the approval mechanism for the “preferred” alternative.

ALTERNATIVES CONSIDERED PRIOR TO PA&ED

Eight Build Alternatives were analyzed in this PSR-PDS and are proposed for consideration prior to the PA&ED phase of the Project:

- *Alternative 1 – No-Build Alternative*
- *Alternative 13 – Build Idea 13 (ID13): Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)*
- *Alternative 17 – Build Idea 17 (ID17): Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)*
- *Alternative 14 – Build Idea 14 (ID14): Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)*
- *Alternative 11 – Build Idea 11 (ID11): Add I-5 General Purpose Lanes From I-405 to San Diego County*
- *Alternative 12 – Build Idea 12 (ID12): Add I-5 High-Occupancy/Toll (HOT) Lane From I-405 to San Diego County*
- *Alternative 9 – Build Idea 9 (ID9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73*
- *Alternative 18 – Build Idea 18 (ID18): Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241*

- *Alternative 21 – Build Idea 21 (ID21): Los Patrones Parkway Extension and I-5 HOT Lanes*

The Build Alternatives and Idea Numbers correspond to the ideas studied in the *South County Traffic Relief Effort Initial Screening* (Attachment I) and Idea 21 as identified in Section 9 of this PSR-PDS. For the purpose of this report, the Alternatives will be referred to using the Alternative Number only.

The conceptual plans, cross sections, and lane diagrams for each of the build alternatives are found in Attachment C.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 13: Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would

cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 13 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet Highway Design Manual (HDM) standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange on SR 241 at Camino Las Ramblas, including northbound and southbound connections;
- Add a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (between Avenida California and Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (South of Cow Camp Road to Avenida La Pata as well as between San Juan Hills High School to Camino Del Rio).

I-5 Improvements

- Modify ten existing interchanges along I-5 at Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Modify existing northbound on-ramp to I-5 at Stonehill Drive to accommodate the widening of I-5;
- Convert one HOV lane to one HOT and add one HOT lane in each direction on I-5 from La Novia Avenue to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino Las Ramblas to proposed SR 241/Camino Las Ramblas interchange; and
- Extend existing La Novia to proposed SR 241/Camino Las Ramblas interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, Americans with Disabilities Act (ADA) ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.8-\$2.3 billion for capital construction and \$220-\$280 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 13 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-1.

Table 7-1: Structures within the Project Limits—Alternative 13

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	
Avenida Presidio	002.31	55 0204	Avenida Presidio UC					X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC					X	
Avenida Pico	003.39	55 0207	Avenida Pico UC		X			X	
Avenida Vista Hermosa EB	004.10	55 0610R	Avenida Vista Hermosa OC (R)	X			X		
Avenida Vista Hermosa WB	004.08	55 0610L	Avenida Vista Hermosa OC (L)	X			X		
Avenida Vaquero	004.97	55 0223	Avenida Vaquero UC		X			X	
Camino De Estrella	005.80	55 0224	Camino De Estrella OC	X			X		
Via California	006.62	55 0225	Via California OC	X			X		
I-5 over PCH WB Off-Ramp	006.69	55 0226	5/N5-N1 Connector Separation		X			X	
I-5 over PCH	006.76	55 0511	Route 5/1 Separation		X			X	
Stonehill Dr	007.34	55 0227	Camino Capistrano UC		X			X	

Table 7-1: Structures within the Project Limits—Alternative 13 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
SR 241/I-5/Vista Marina Connector	N/A	N/A	SR 241/I-5/Visa Marina Connector	X			X		
Camino Las Ramblas	N/A	N/A	Camino Las Ramblas UC	X			X		
La Pata Ave	N/A	N/A	La Pata Ave UC	X			X		
Prima Deshecha Landfill	N/A	N/A	Ranch Rd OC 458	X			X		
Prima Deshecha Landfill	N/A	N/A	Ranch Rd OC 505	X			X		
Ortega Hwy	N/A	N/A	Ortega Hwy UC	X			X		
San Juan Creek	N/A	N/A	San Juan Creek Bridge	X			X		
Cow Camp Rd	N/A	N/A	Cow Camp Rd OC	X			X		
'I' St	N/A	N/A	'I' St OC	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-2.

Table 7-2: Design Standards Risk Assessment—Alternative 13

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	302.1 (Shoulder Width)	Low
3	501.3 (Interchange Spacing)	High
4	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium
5	309.1 (Horizontal Distance – Clear Recovery Zone)	High
6	501.3 (Interchange Spacing)	High
7	502.2 (Local Street Interchanges – Isolated Off-Ramps and Partial Interchanges)	Medium

Alternative 17: Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 17, would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Camino De Los Mares, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Camino De Los Mares to Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Ortega Highway as well as from Prima Deshecha Landfill to Camino Las Ramblas).

I-5 Improvements

- Modify eight existing interchanges along I-5 at Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Convert one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from Avenida Vaquero to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino De Los Mares to proposed SR 241/Camino De Los Mares interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.1-\$1.5 billion for capital construction and \$220-\$280 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 17 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-3.

Table 7-3: Structures within the Project Limits—Alternative 17

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	
Avenida Presidio	002.31	55 0204	Avenida Presidio UC					X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC					X	
Avenida Pico	003.39	55 0207	Avenida Pico UC		X			X	
Avenida Vista Hermosa EB	004.10	55 0610R	Avenida Vista Hermosa OC (R)	X			X		
Avenida Vista Hermosa WB	004.08	55 0610L	Avenida Vista Hermosa OC (L)	X			X		

Table 7-3: Structures within the Project Limits—Alternative 17 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Avenida Vaquero	004.97	55 0223	Avenida Vaquero UC		X			X	
SR 241/I-5 Connector	N/A	N/A	SR 241/I-5 Connector	X			X		
Camino De Los Mares	N/A	N/A	Camino De Los Mares UC (L/R)	X			X		
Camino Las Ramblas	N/A	N/A	Camino Las Ramblas UC (L/R)	X			X		
La Pata Ave	N/A	N/A	La Pata Ave UC (L/R)	X			X		
Prima Deshecha Landfill	N/A	N/A	Ranch Rd OC 458	X			X		
Prima Deshecha Landfill	N/A	N/A	Ranch Rd OC 505	X			X		
Ortega Hwy	N/A	N/A	Ortega Hwy UC (L/R)	X			X		
San Juan Creek	N/A	N/A	San Juan Creek Bridge (L/R)	X			X		
Cow Camp Rd	N/A	N/A	Cow Camp Rd OC	X			X		
'I' St	N/A	N/A	'I' St OC	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12

approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-4.

Table 7-4: Design Standards Risk Assessment—Alternative 17

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	302.1 (Shoulder Width)	Low
3	501.3 (Interchange Spacing)	High
4	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium
5	201.1 (Horizontal Alignment and Stopping Sight Distance)	Medium
6	203.3 (Alignment Consistency and Design Speed)	Medium
7	309.1 (Horizontal Distance – Clear Recovery Zone)	High
8	501.3 (Interchange Spacing)	High
9	502.2 (Local Street Interchanges – Isolated Off-Ramps and Partial Interchanges)	Medium

Alternative 14: Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be

incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 14 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Calle Saluda, including northbound and southbound connections;
- Add one new interchange at Calle Del Cerro, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Calle Del Cerro to Prima Deshecha Landfill, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as from the Prima Deshecha Landfill to Camino Del Rio).

I-5 Improvements

- Modify seven existing interchanges along I-5 at Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real; Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Calle Saluda to proposed SR 241/Calle Saluda interchange, including a new roundabout; and

- Extend existing Calle Del Cerro to proposed SR 241/Calle Del Cerro interchange, including a new roundabout.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.0-\$1.4 Billion for capital construction and \$100-\$130 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 14 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-5.

Table 7-5: Structures within the Project Limits—Alternative 14

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	

Table 7-5: Structures within the Project Limits—Alternative 14 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Avenida Presidio	002.31	55 0204	Avenida Presidio UC					X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC					X	
SR 241/I-5 Connector/ Avenida Pico	N/A	N/A	SR 241/I-5 Connector OC	X			X		
Calle Frontera	N/A	N/A	Calle Frontera OC	X			X		
Calle Del Cerro	N/A	N/A	Calle Del Cerro OC	X			X		
Camino Vera Cruz	N/A	N/A	Camino Vera Cruz UC (L/R)	X			X		
Avenida Vista Hermosa	N/A	N/A	Avenida Vista Hermosa UC (L/R)	X			X		
Calle Saluda	N/A	N/A	Calle Saluda OC	X			X		
La Pata Ave	N/A	N/A	La Pata Ave UC (L/R)	X			X		
Prima Deshecha Landfill	N/A	N/A	Landfill UC 400 (L/R)	X			X		
Ortega Hwy	N/A	N/A	Ortega Hwy UC (L/R)	X			X		
San Juan Creek	N/A	N/A	San Juan Creek Bridge (L/R)	X			X		
Cow Camp Rd	N/A	N/A	Cow Camp Rd OC	X			X		
Camino Del Rio	N/A	N/A	Camino Del Rio UC (L/R)	X			X		
'I' St	N/A	N/A	'I' St OC	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-6.

Table 7-6: Design Standards Risk Assessment—Alternative 14

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	302.1 (Shoulder Width)	Low
3	501.3 (Interchange Spacing)	High
4	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium
5	309.1 (Horizontal Distance – Clear Recovery Zone)	High
6	501.3 (Interchange Spacing)	High
7	502.2 (Local Street Interchanges – Isolated Off-Ramps and Partial Interchanges)	Medium

Alternative 11: Add I-5 General Purpose Lane (From I-405 to San Diego County)

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of

its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 11 would include the following improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-three existing interchanges along I-5 at Lake Forest Drive, El Toro Road, Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.3-\$1.6 billion for capital construction and \$570-\$710 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 11 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-7.

Table 7-7: Structures within the Project Limits—Alternative 11

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X

Table 7-7: Structures within the Project Limits—Alternative 11 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	
Avenida Presidio	002.31	55 0204	Avenida Presidio UC					X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC					X	
Avenida Pico	003.39	55 0207	Avenida Pico UC		X			X	
Avenida Vista Hermosa EB	004.10	55 0610R	Avenida Vista Hermosa OC (R)	X			X		
Avenida Vista Hermosa WB	004.08	55 0610L	Avenida Vista Hermosa OC (L)	X			X		
Avenida Vaquero	004.97	55 0223	Avenida Vaquero UC		X			X	
Camino De Estrella	005.80	55 0224	Camino De Estrella OC	X			X		
Via California	006.62	55 0225	Via California OC	X			X		
I-5 over PCH WB Off-Ramp	006.69	55 0226	5/N5-N1 Connector Separation		X			X	
I-5 over PCH	006.76	55 0511	Route 5/1 Separation		X			X	
Stonehill Dr	007.34	55 0227	Camino Capistrano UC		X			X	
San Juan Creek Rd	008.80	55 0298	San Juan Creek UC		X			X	
San Juan Creek	008.87	55 0228	San Juan Creek		X			X	

Table 7-7: Structures within the Project Limits—Alternative 11 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
El Horno Creek	009.51	55 0330	El Horno Creek UC		X			X	
Ortega Hwy	009.60	55 1104	Route 74		X			X	
El Horno St	010.00	55 0230	El Horno St UC		X			X	
Junipero Serra Rd	010.91	55 0231	Junipero Serra Rd UC		X			X	
Trabuco Creek	011.45	55 0289	Trabuco Creek UC		X			X	
Route 73	012.51	55 0719G	N5-N73 Connector Viaduct		X			X	
Avery Parkway	012.94	55 1111	Avery Parkway UC		X			X	
Crown Valley Parkway	013.78	55 0444	Crown Valley Parkway OC	X			X		
Oso Creek	014.79	55 0233	Oso Creek UC		X			X	
Oso Parkway	015.22	55 0509	Oso Parkway OC	X			X		
Railroad UC	016.36	55 0221	El Toro Overhead		X			X	
La Paz Rd NB off-ramp	016.36	55 1108S	La Paz Rd NB off-ramp				X		
La Paz Rd	016.53	55 1109	La Paz Rd UC		X			X	
Alicia Parkway	017.47	55 0591	Alicia Parkway OC	X			X		
Aliso Creek	017.75	55 0014	Aliso Creek UC		X			X	
Los Alisos Blvd	017.94	55 0631	Los Alisos Blvd OC	X			X		
El Toro Road	018.69	55 0235	El Toro Road UC		X			X	
Lake Forest Dr	019.89	55 0548	N5-Bake Parkway	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-8.

Table 7-8: Design Standards Risk Assessment—Alternative 11

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	301.1 (Lane Width)	Low
3	302.1 (Shoulder Width)	Low
4	501.3 (Interchange Spacing)	High
5	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium

Alternative 12: Add I-5 HOT Lane (From I-405 to San Diego County)

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 12, those HOV lanes would be incorporated into the Alternative 12 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 12 would include the following additional improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-one existing interchanges along I-5 at Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.2-\$1.6 billion for capital construction and \$250-\$320 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 12 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-9.

Table 7-9: Structures within the Project Limits—Alternative 12

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		

Table 7-9: Structures within the Project Limits—Alternative 12 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	
Avenida Presidio	002.31	55 0204	Avenida Presidio UC					X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC					X	
Avenida Pico	003.39	55 0207	Avenida Pico UC		X			X	
Avenida Vista Hermosa EB	004.10	55 0610R	Avenida Vista Hermosa OC (R)	X			X		
Avenida Vista Hermosa WB	004.08	55 0610L	Avenida Vista Hermosa OC (L)	X			X		
Avenida Vaquero	004.97	55 0223	Avenida Vaquero UC		X			X	
Camino De Estrella	005.80	55 0224	Camino De Estrella OC	X			X		
Via California	006.62	55 0225	Via California OC	X			X		
I-5 over PCH WB Off-Ramp	006.69	55 0226	5/N5-N1 Connector Separation		X			X	
I-5 over PCH	006.76	55 0511	Route 5/1 Separation		X			X	
Stonehill Dr	007.34	55 0227	Camino Capistrano UC		X			X	
San Juan Creek Rd	008.80	55 0298	San Juan Creek UC		X			X	
San Juan Creek	008.87	55 0228	San Juan Creek		X			X	
El Horno Creek	009.51	55 0330	El Horno Creek UC		X			X	
Ortega Hwy	009.60	55 1104	Route 74		X			X	
El Horno St	010.00	55 0230	El Horno St UC		X			X	
Junipero Serra Rd	010.91	55 0231	Junipero Serra Rd UC		X			X	

Table 7-9: Structures within the Project Limits—Alternative 12 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Trabuco Creek	011.45	55 0289	Trabuco Creek UC		X			X	
Route 73	012.51	55 0719G	N5-N73 Connector Viaduct		X			X	
Avery Parkway	012.94	55 1111	Avery Parkway UC		X			X	
Crown Valley Parkway	013.78	55 0444	Crown Valley Parkway OC	X			X		
Oso Creek	014.79	55 0233	Oso Creek UC		X			X	
Oso Parkway	015.22	55 0509	Oso Parkway OC	X			X		
Railroad UC	016.36	55 0221	El Toro Overhead		X			X	
La Paz Rd NB off-ramp	016.36	55 1108S	La Paz Rd NB off-ramp				X		
La Paz Rd	016.53	55 1109	La Paz Rd UC		X			X	
Alicia Parkway	017.47	55 0591	Alicia Parkway OC		X			X	

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-10.

Table 7-10: Design Standards Risk Assessment—Alternative 12

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	301.1 (Lane Width)	Low
3	302.1 (Shoulder Width)	Low
4	501.3 (Interchange Spacing)	High
5	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium

Alternative 9: Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

Alternative 9 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new intersection at the proposed arterial roadway and Antonio Parkway, including a signalized intersection; and
- Add one new intersection at the proposed arterial roadway and Ortega Highway, including a signalized intersection.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and

- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73, bicycles would not be permitted.

Estimated costs associated with this alternative include \$0.6-\$0.8 billion for capital construction and \$250-\$320 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 9 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-11.

Table 7-11: Structures within the Project Limits—Alternative 9

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
SR 73/I-5	N/A	N/A	SR 73 Connector OC	X			X		
Ladera Ranch/ Golden Ridge Ln	N/A	N/A	N/A	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-12.

Table 7-12: Design Standards Risk Assessment—Alternative 9

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	304.1 (Side Slopes)	Medium
2	305.1 (Median Standards)	High

Alternative 18: Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

Alternative 18 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new interchange at the proposed arterial roadway and Los Patrones Parkway, including northbound and southbound connections; and
- Extend Crown Valley Parkway and add one new interchange at the Los Patrones Parkway, including northbound and southbound connections.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73 or a connection to a high-speed ramp to Los Patrones Parkway, bicycles would not be permitted.

Estimated costs associated with this alternative include \$0.6-\$0.8 billion for capital construction and \$240-\$300 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 18 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-13.

Table 7-13: Structures within the Project Limits—Alternative 18

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
SR 73/I-5	N/A	N/A	SR 73 Connector OC	X			X		
Los Patrones Parkway	N/A	N/A	Los Patrones Parkway Connector	X			X		
Crown Valley Parkway	N/A	N/A	Crown Valley Parkway OC	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-14.

Table 7-14: Design Standards Risk Assessment—Alternative 18

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	304.1 (Side Slopes)	Medium
2	305.1 (Median Standards)	High

Alternative 21: Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basiline Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 21 would include the following additional improvements to the identified portion of the corridor:

Los Patrones Parkway Improvements

- Construct a new interchange at 'I' Street and Los Patrones Parkway (the northern limit of this alternative is the limit of work required to construct the on- and off ramps at the 'I' Street interchange);
- Construct a grade separated interchange at the Vista Montana intersection to allow traffic on Avenida La Pata to proceed northbound and southbound without stopping, and provide on- and off- ramps for northbound and southbound access to Vista Montana; and

- Reconfigure the northbound access road from Prima Deshecha Landfill to provide grade separated “braided ramps” between the new northbound off ramp to Vista Montana and the existing northbound access road.
- Subject to further study, in the next phase of project development, this alternative may include the addition of tolling equipment along Los Patrones Parkway.

I-5 Improvements

- Modify sixteen existing interchanges along I-5 at SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway /Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans’ Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this alternative include \$1.0-\$1.3 billion for capital construction and \$70-\$90 million for right-of-way; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

Alternative 21 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-15.

Table 7-15: Structures within the Project Limits—Alternative 21

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Basilone Rd	R071.38	57 0570	Basilone Rd OC		X			X	
San Mateo Creek	R071.94	57 0001	San Mateo Creek UC		X	X		X	X

Table 7-15: Structures within the Project Limits—Alternative 21 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
Cristianitos Rd	R072.28	57 0726	Cristianitos Rd OC		X			X	
Avenida San Dimas	000.49	55 0513	Avenida San Dimas Ped OC	X			X		
Avenida San Luis Rey	000.65	55 0151	Avenida San Luis Rey OC	X			X		
Avenida Mendocino	001.13	55 0463	Avenida Mendocino OC	X			X		
S El Camino Real	001.63	55 0203	El Camino Real UC		X			X	
Avenida Presidio	002.31	55 0204	Avenida Presidio UC		X			X	
E Avenida Palizada	002.66	55 0205	Avenida Palizada UC		X			X	
Avenida Pico	003.39	55 0207	Avenida Pico UC		X			X	
Avenida Vista Hermosa	004.08 004.10	55 0610L 55 0610R	Avenida Vista Hermosa OC (L/R)	X			X		
Avenida Vaquero	004.97	55 0223	Avenida Vaquero UC		X			X	
Camino De Estrella	005.80	55 0224	Camino De Estrella OC	X			X		
Via California	006.62	55 0225	Via California OC	X			X		
I-5 over PCH WB Off-Ramp	006.69	55 0226	5/N5-N1 Connector Separation		X			X	
I-5 over PCH	006.76	55 0511	Route 5/1 Separation		X			X	
Stonehill Dr	007.34	55 0227	Camino Capistrano UC		X			X	
San Juan Creek Rd	008.80	55 0298	San Juan Creek Rd UC		X			X	
San Juan Creek	008.87	55 0228	San Juan Creek Bridge (L/R)		X			X	
El Horno Creek	009.51	55 0230	El Horno Creek UC		X			X	
Ortega Hwy	009.60	55 1104	Route 74		X			X	
Junipero Serra Rd	010.91	55 0231	Junipero Serra Rd UC		X			X	
Trabuco Creek	011.45	55 0289	Trabuco Creek UC		X			X	

Table 7-15: Structures within the Project Limits—Alternative 21 (cont.)

Location	Post Mile	Bridge No.	Bridge Name	Southbound (Left)			Northbound (Right)		
				Rebuild/New	Outside Widening	Median Widening	Rebuild/New	Outside Widening	Median Widening
NB La Pata	N/A	N/A	NB La Pata On-Ramp	X			X		
La Pata	N/A	N/A	Vista Montana	X			X		
La Pata/Los Patrones Parkway	N/A	N/A	La Pata Connector	X			X		
East La Pata	N/A	N/A	Service Road 1	X			X		
Ortega Hwy	N/A	N/A	Service Road 2	X			X		
Ortega Hwy	N/A	N/A	Ortega Hwy	X			X		
San Juan Creek	N/A	N/A	San Juan Creek Bridge	X			X		
Cow Camp Rd	N/A	N/A	Cow Camp Rd OC	X			X		
'I' Street	N/A	N/A	'I' Street OC	X			X		

Structures that require work for the Project will be further evaluated during the PA&ED phase, including preparation of advanced planning studies and assessing additional seismic retrofit requirements.

Studies/Actions Required for Approval of Design Exceptions

The engineering analysis performed during the PSR-PDS phase is preliminary and based on a low level of design detail and as such, the list of non-standard features is not comprehensive. As a result, many of the potential nonstandard design features have been identified using engineering judgment and past experiences on similar projects rather than detailed analysis. Likewise, the probability of design exception approval has been assessed using engineering judgment. The design coordinator and District 12 approval authority should be consulted early during the PA&ED phase to discuss potential design exceptions and reassess the probability of design exception approval.

At this preliminary stage, a design standards risk assessment for the anticipated proposed non-standard design features that do not meet Caltrans HDM standards are summarized in Table 7-16.

Table 7-16: Design Standards Risk Assessment—Alternative 21

No.	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High)
1	203.1 (Stopping Sight Distance Standards)	Medium
2	302.1 (Shoulder Width)	Low
3	501.3 (Interchange Spacing)	High
4	502.2 (Isolated Off-Ramps and Partial Interchanges)	Medium
5	304.1 (Side Slopes)	Medium
6	305.1 (Median Standards)	High

Common Proposed Engineering Features for All Build Alternatives

The placement of Maintenance Vehicle Pullouts (MVPs) will be provided at specific locations where there is available right-of-way. MVPs will be provided where there is a need for access to electrical cabinets, irrigation controls, overhead sign structures, changeable message sign boards, control boxes, and near access to drainage features. The exact locations would be determined during final design, but would be within the Project footprint analyzed in the environmental documents.

CHP enforcement along the mainline would be accommodated via the ten-foot-wide right shoulders. CHP enforcement on metered on-ramps would be accommodated via standard CHP enforcement pads. CHP turnaround locations in the median will be coordinated with the local CHP office. Additional details regarding locations of median CHP observation and enforcement areas will be developed in greater detail during the PA&ED phase of the Project.

Retaining Walls along the alignment that could be accessible to vandalism will be treated with an anti-graffiti finish.

Improvements associated with this Project are not expected to affect the movement of oversized loads. There will be no impact of oversize loads on existing SR 241 or I-5.

HOT lanes will be buffer separated from the General Purpose lanes. It is anticipated that the buffers will generally be four-foot wide and will have plastic delineators to help deter movement of vehicles between the HOT lanes and the General-Purpose lanes except at designated locations. Design and operational details including location of ingress/egress zones and details for the buffers will be developed during the PA&ED phase of the Project.

Drainage management measures would be included in the Project to address the impacts to drainage patterns associated with new construction. Proposed major drainage design features would include: maintaining existing drainage flow patterns

and incorporate existing drainage systems to the maximum extent practical; provide drainage facilities that will accommodate future improvements; and provide drainage facilities to prevent and/or reduce substantial erosion or siltation on- or off-site. Some of the existing systems may be abandoned or removed to accommodate Project construction. All runoff from elevated structures would be collected and carried to the next treatment device or stabilized discharge location. Drainage management, in conjunction with storm water and hydromodification practices, will be further evaluated during the PA&ED phase, including preparation of a Drainage Report.

The Project will include best management practices (BMPs) to address storm water requirements and treatment of the added impervious area created by the Project. These considered BMPs include biofiltration swales, natural infiltration areas, and detention devices. Storm water treatment will be further evaluated during the PA&ED phase, including preparation of a Storm Water Data Report (SWDR) and assessing additional hydromodification requirements. Additional detail for the Project is provided below.

Landscaping and erosion control would be included in the Project to address the creation of new and modification of existing slopes. The Project will be constructed to minimize erosion, including use of cut and fill slopes flat enough to allow re-vegetation and limit erosion to pre-construction rates; and collection of concentrated flows in stabilized drains and channels. Various slope and surface protection measures will be used to address site soil stabilization and reduce deposition of sediments in the adjacent surface waters.

Studies/Actions Required for All Alternatives

Engineering Studies

The following engineering studies are anticipated to obtain approval of Build Alternatives during the PA&ED phase of the Project:

- Fact Sheets for proposed exceptions to design standards;
- Modified Access Report;
- Right of Way Data Sheets including Utility Information Sheet and Railroad Information Sheet;
- Advanced Planning Studies for all bridges and non-standard retaining walls;
- Preliminary materials and geotechnical design reports;
- Life-Cycle Cost Analysis for pavement design;
- Preliminary Drainage Report to address existing and proposed hydrology and hydraulic designs;
- Preliminary Geotechnical Report;
- SWDR (PA&ED level);
- Existing Traffic Data Inventory Memorandum;
- Traffic Forecasting and Operations Analysis Methodology Memorandum;
- ICE Stage II Memorandum;
- Traffic Volume Report;

- Transportation Analyses Report;
- Noise Study Report and Noise Abatement Decision Report; and
- Traffic Management Plan (TMP) and Ramp Closure Study.

Life Cycle Cost Analysis for Pavement

Selection of the pavement structure on this Project and final decision on pavement type should be based on life cycle cost analysis. Life cycle cost analysis for pavement shall be performed during the PA&ED phase of the Project.

Aesthetics

Design of the proposed improvements during the PA&ED phase will include aesthetic elements consistent with Caltrans and local agency master plans for aesthetics and landscaping, if applicable. The corridor theme will be applied to Project elements including structures, slope paving, walls, lighting (roadway and pedestrian), landscaping, and hardscaping.

Intelligent Transportation Systems

The Project Intelligent Transportation Systems (ITS) elements will be further studied during the PA&ED phase. The ITS elements may include electronic tolling, 511 traveler information, changeable message signs, closed circuit televisions (CCTVs), Active Traffic Management (ATMs), Title-21 and automated vehicle/occupancy detection/monitoring technology improvements.

The communication trunk line could serve ramp meters, Changeable Message Signs (CMSs), CCTV cameras and traffic monitoring stations within the Project limits. Specific items that will be installed include conduit innerducts, cables, traffic monitoring stations, count stations, CCTV cameras with pole and cabinet, traffic related communication pull boxes, cable nodes and Type 334 cabinets. CCTV cameras can be installed on existing and new overhead signs.

In addition, implementation of ATM strategies will be part of each alternative. ATM is a proactive traffic management approach which uses various strategies to dynamically manage and control traffic based on prevailing conditions for recurrent and non-recurrent congestion. These strategies include speed harmonization, queue warning, junction control, part-time shoulder use, dynamic re-routing and traveler information. These strategies will improve mobility and enhance safety by using real-time data, technology, and decision support structures for system operators to make informed, performance-driven decisions on how to manage traffic flow.

Transportation System Management/Transportation Demand Management

The Project Transportation System Management (TSM)/Transportation Demand Management (TDM) components will be further studied during the PA&ED phase. The TSM/TDM elements may include ITS components, as noted above in addition to improved ramp metering hardware and software and CCTVs for viewing ramps and nearby arterials; at locations of interchange improvements, upgraded traffic signals

interconnected and coordinated with adjacent signals and ramp meters; additional way-finding signs on freeways and arterials, and improved safety features; design of on- and off-ramps to limit impacts to non-motorized travel and preserve access to bike lanes and trails, where applicable; video detection systems; and vehicle detection systems for volume, speed, and vehicle classification; traveler Information Management System improvements to enhance dissemination of real-time information on roadway conditions.

Transportation Management Plan

Based on the initial examination of items related to the TMP Data Sheet, lane closures will be required, and lane requirement charts will be included in Caltrans Standard Special Provisions. It may be necessary to temporarily close on/off-ramps and connectors during the Project construction. Detour plans, staging plans, and traffic handling plans would be developed during the PS&E phase.

Supporting traffic counts for rerouting traffic during construction will be developed during PA&ED. TMP data sheets will be further developed during the PA&ED phase to recommend specific methods of reducing construction and circulation impacts.

Construction Staging

It is anticipated the Project will be designed and constructed as separate phases to facilitate Project delivery based on available funding. Each Project phase would include construction staging to minimize impacts to existing traffic. The same number of existing mainline lanes will be maintained open to traffic during construction whenever feasible.

Detailed stage construction and detour plans will be developed in the PA&ED phase. Detailed stage construction plans and traffic handling plans will also be developed in PS&E.

Storm Water Management

A SWDR has been prepared to accompany this PSR-PDS and is based on the viable alternatives (provided under separate cover). The Project study area is located within the Santa Ana River and San Juan Hydrologic Units and eleven Planning Areas. The anticipated storm water project risk level was determined as Level 2 for eight of the Planning Watersheds and as Level 3 for Planning Watersheds 480110000 (East Coastal Plain Hydrologic Sub-Area), 4901140000 (Dana Point Hydrologic Sub-Area), and 4901310000 (San Clemente Hydrologic Sub-Area). The Project is required to implement treatment BMPs to treat the Project targeted design constituents. It is anticipated that post-Project State right-of-way will provide adequate area for BMPs. If it is determined that adequate post-Project State right-of-way is not available, then a cost estimate to obtain the required right-of-way, and any other pertinent site-specific treatment BMP feasibility information for selected BMPs, would be included in the PA&ED and PS&E phases. The SWDR will be updated during both the PA&ED and PS&E phases to confirm the risk level, disturbed soil area, change in amount of

impervious area and specific BMPs to be implemented for design pollution prevention, treatment and construction. The contractor will prepare and implement a Storm Water Pollution Prevention Plan to address construction site BMPs. For this phase, permanent BMPs have been evaluated from a corridor scoping level and locations have been indicated on the Project BMP Deployment plans in the SWDR prepared for the Project (provided under separate cover). Applicable existing and future plans within the study area were used as references to identify proposed BMP locations and types of treatment BMPs.

The receiving water bodies within the Project limits include: unnamed tributary to Cañada Gobernadora Creek; Cañada Chiquita Creek; an unnamed tributary to San Juan Creek Aliso Creek; San Juan Creek; Horno Creek; Prima Deshecha Creek; Segunda Deshecha Creek; Arroyo Trabuco Creek; Oso Creek (at Mission Viejo Golf Course); Oso Creek (lower); and San Mateo Creek (San Diego County). Receiving waterbodies that are listed on the *Final 2014/2016 Integrated Report Clean Water Act Section 303(d) List* (State Water Resources Control Board, 2017) for water quality impairments with required Total Maximum Daily Loads are summarized in Table 7-17.

Table 7-17: Impaired Receiving Waterbodies within the Project Limits

Waterbody	Pollutant	TMDL Status
San Juan Creek	DDE (Dichlorodiphenyldichloroethylene)	TMDL required
	Indicator Bacteria	EPA Approved TMDL
	Phosphorus	TMDL required
	Benthic Community Effects	TMDL required
	Selenium	TMDL required
	Nitrogen	TMDL required
	Toxicity	TMDL required
San Mateo Creek (San Diego County)	Indicator Bacteria	TMDL required
	Invasive Species	TMDL required
Aliso Creek	Indicator Bacteria	EPA Approved TMDL
	Benthic Community Effects	TMDL required
	Nitrogen	TMDL required
	Malathion	TMDL required
Oso Creek (at Mission Viejo Golf Course)	Chloride	TMDL required
	Sulfates	TMDL required
	Total Dissolved Solids	TMDL required

Table 7-17: Impaired Receiving Waterbodies within the Project Limits (cont.)

Waterbody	Pollutant	TMDL Status
Oso Creek (Lower)	Selenium	TMDL required
	Toxicity	TMDL required
	Nitrogen	TMDL required
	Phosphorus	TMDL required
Arroyo Trabucco Creek	Toxicity	TMDL required
	Phosphorus	TMDL required
	Indicator Bacteria	TMDL required
	Malathion	TMDL required
	Nitrogen	TMDL required
	Benthic Community Effects	TMDL required
Prima Deshecha Creek	Cadmium	TMDL required
	Malathion	TMDL required
	Nitrogen	TMDL required
	Selenium	TMDL required
	Indicator Bacteria	TMDL required
	Phosphorus	TMDL required
	Turbidity	TMDL required
Segunda Deshecha Creek	Indicator Bacteria	TMDL required
	Malathion	TMDL required
	Benthic Community Effects	TMDL required
	Nitrogen	TMDL required
	Selenium	TMDL required
	Phosphorus	TMDL required
	Toxicity	TMDL required
	Turbidity	TMDL required

The total disturbed soil area varies from approximately 400 to 1,400 acres, with Build Alternative 13 having the largest footprint of all the alternatives.

The post-construction treatment area (PCTA) ranges from approximately 54 to 330 acres based on the alternative implemented. Build Alternatives 13, 11, 12, 9, 18, and 21 would result in treating greater than 100 percent of the PCTA, whereas Build Alternatives 17 and 14 would only treat 40 and 44 percent, respectively. Measurements for avoiding or reducing potential storm water impacts are discussed in the SWDR prepared for the Project (provided under separate cover).

Permits

It is anticipated that the following regulatory permits/approvals will be required for the Project:

- Clean Water Act Section 401 Water Quality Certification (Regional Water Quality Control Boards);
- Clean Water Act Section 404 Nationwide Permit (U.S. Army Corps of Engineers);
- Section 1602 Lake or Streambed Alteration Agreement (California Department of Fish and Wildlife [CDFW]);
- Comply with National Pollutant Discharge Elimination System (NPDES) Permits (Caltrans Statewide NPDES Permit Order No. 99-06-DWQ as amended by Order No. 2012-0011-DWQ, Order No. 20147-0006-EXEC, Order No. 2014-0077-DWQ, and Order No. 2015-0036-EXEC, NPDES No. CAS000003; Statewide General Permit for Storm Water Discharge Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ, NPDES No. CAS000002; Waste Discharge Requirements for The County of Orange, Orange County Flood Control District and The Incorporated Cities of Orange County within the Santa Ana Region Area-wide Urban Storm Water Runoff Orange County NPDES Permit Order No. R8-2009-0030, as amended by Order No. R8-2010-0062, NPDES No. CAS618030; Waste Discharge Requirements from the Municipal Separate Storm Sewer Systems (MS4s) Drainage the Watersheds within the San Diego Region Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266) (State Water Resources Board);
- Coastal Development Permit (California Coastal Commission) (applicable to Alternatives 13, 17, 14, 11, 12, and 21);
- Section 7 Consultation with USFWS for listed species under the Federal Endangered Species Act; and
- CDFW 2080.1 Consistency Determination for listed species under the California Endangered Species Act.

Hazards

The Initial Site Assessment prepared during PA&ED will identify any contaminated sites that require site investigation and mitigation and anticipated entry permits. Permits would be required for residential, commercial, and industrial properties.

The Aerially Deposited Lead testing, analysis, and reporting will be completed during the PS&E phase of the Project. Testing for lead-based paint and asbestos containing material surveys will be required.

A Preliminary Site Investigation (PSI) will be conducted for the environmental document during the PA&ED phase. A Hazardous Waste Work Plan is required prior to preparing the PSI and must be reviewed and concurred by Caltrans. During the design phase, before commencement of any acquisition activities, comprehensive Phase I environmental site assessments should be conducted for all properties that will potentially be acquired.

Geology and Soils

A District Preliminary Geotechnical Report will be prepared as part of the PA&ED phase to identify potential geotechnical/seismic constraints and design considerations to be included in the Project to address these constraints.

Noise & Vibration

A detailed Noise Study Report (NSR) will be prepared in accordance with the Caltrans Traffic Noise Analysis Protocol (May 2011) to determine the Project's potential short-term and long-term noise impacts. The locations of noise abatement measures will be determined after the completion of the detailed NSR. A Noise Abatement Decision Report will likely be required to determine the reasonableness of the feasible noise barriers.

Agreements

Freeway and Maintenance agreements will be required between Caltrans and local jurisdictions for maintenance of the Project. No relinquishments are anticipated for the Project.

Cooperative Agreement No. 12-210 was executed for this Project in May 1993 between the Department and the F/ETCA.

In July 1993, a Resolution Adopting Location of State Highway HRA 94-1 was executed for SR 241 by the California Transportation Commission for the portion of SR 241 from 0.4 mile south of Oso Parkway to 1.4 miles north of Portola Parkway.

A Section 129 Toll Agreement was entered into between the Department, FHWA and the F/ETCA in 2005.

ADDITIONAL ENGINEERING FEATURES REQUIRING FURTHER EVALUATION

Design features currently not included in the scope of this Project but require further consideration include, but are not limited to, the following:

- Median concrete barrier will be evaluated between Southbound and Northbound traffic in locations where the median width is less than sixty feet from edge of traveled way to edge of traveled way;
- Metal Beam Guardrail will be evaluated at cantilever overhead sign locations. To facilitate maintenance of overhead signs and guardrail, maintenance pull out areas will be designed with a five-foot hinge point between the edge of pavement and fill slope;
- Construction of park-and-ride lots or upgrading/enlarging existing park-and-ride lots will be evaluated along SR 241;
- Regional Bike Path Connections/Connectivity and Wildlife Crossing/Fencing;
- Tolling Scenarios;
- Phasing Scenarios;
- Remedial grading/landslides; and
- Sound Walls.

IDEAS CONSIDERED BUT REJECTED FROM FURTHER CONSIDERATION PRIOR TO PA&ED

Alternatives considered during for this PSR-PDS that were determined not to be studied further include the following:

Reversible Lanes

The Project is required to demonstrate that reversible lanes were considered when submitting a capacity-increasing project or a major street or highway lane realignment project by Caltrans or a regional transportation planning agency to the CTC for approval, per Assembly Bill (AB) 2542, signed into law on September 23, 2016 and effective as of January 1, 2017 (Senate Rules Committee, Office of Senate Floor Analysis, Senate Floor Analysis AB 2542, 2016).

The purpose of AB 2542 is “to encourage the use of reversible lanes when they are the best option. Reversible lanes reduce congestion and prevent unnecessary road expansions. Road expansions can exacerbate our infrastructure backlog and have detrimental effects on the environment.” As described by the California Senate Floor Analysis on AB 2542, “Reversible lanes add peak-direction capacity to a two-way road and decrease congestion by utilizing available lane capacity from the other (off-peak) direction. The lanes are particularly beneficial where the cost to increase capacity is especially expensive (e.g., bridges, dense urban areas).” Based on the purpose of AB 2542, reversible lanes in the context of the Project are considered an alternative option to constructing additional lanes along SR 241 and I-5; hence, reversible lanes are analyzed without consideration of the construction of additional lanes to minimize environmental effects and reduce the cost to increase capacity.

Reversible flow lanes are most appropriate on facilities that experience large directional traffic imbalances. Reversible facilities are best suited for long-distance trips with

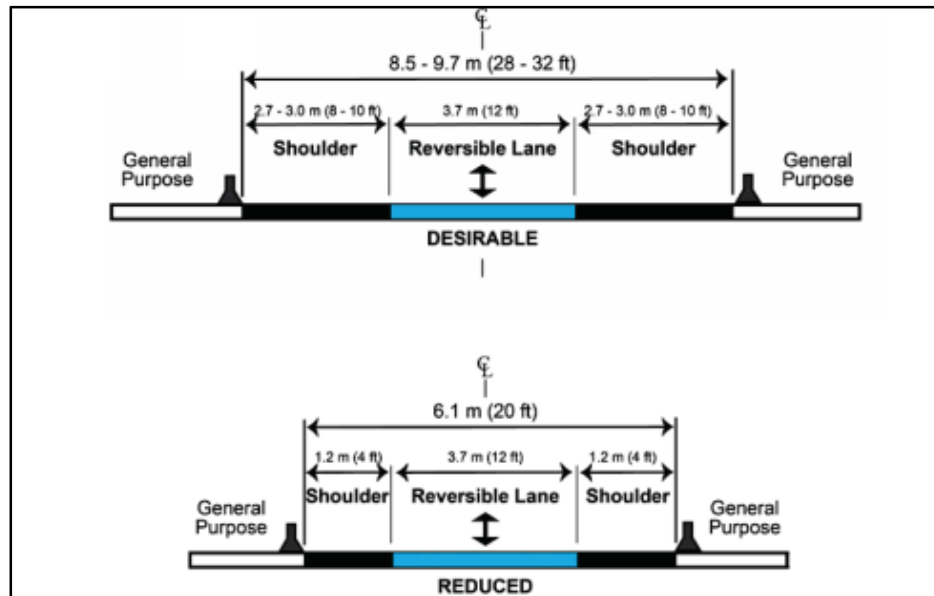
limited intermediate access needs along the affected route to minimize traffic disruptions (Freeway Management and Operations Handbook, FHWA, 2011). All freeway reversible lanes must be separated by "Jersey" barriers in a high-speed roadway setting. They are typically constructed in the median of freeway facilities and may be one, two, or more lanes wide. To meet the purpose of AB 2542 in reducing cost and minimizing environmental impacts, a single-lane minimum option is considered for the Project.

Potential benefits of the reversible lanes include a reduction in capital cost of construction because reversible lanes would be implemented within the existing freeway median; and a reduction in environmental impacts because the idea would be mostly constructed within the existing freeway right-of-way.

SR 241 and I-5 Improvements

Reversible lanes were considered within the freeway median under no-build conditions, and for SR 241 under the Build Alternatives where the Project proposed to extend SR 241 south of Cow Camp Road, including Build Alternatives 13, 17, 14, and 21. Under the other Build Alternatives, SR 241/Los Patrones Parkway would remain between Oso Parkway and Cow Camp and would not be featured by the Project. Figure 7-1 illustrates a typical cross section for a single reversible lane.

Figure 7-1: Cross Section for a Single-Lane Reversible Flow



Source: AASHTO, Guide for High-Occupancy Vehicle (HOV) Facilities, 2004

Screening Results

The Design Year (2050) Peak Hour Direction Splits are shown in Table 7-18. LOS and Demand Volume-to-Capacities are detailed in the TEPA (Attachment J). The Design Year (2050) Peak Hour Directional Split for I-5 is less than 59 percent under both AM and PM peak hour conditions. SR 241 is more directional, as expected with the Design Year (2050) Peak Hour Direction Splits higher than 60 percent for Build Alternatives 13, 17, 14, and 21, however, the SR 241 mainline segments would have adequate capacity and operate acceptably under the four Build Alternatives. Based on the Design Year (2050) Peak Hour Directional Splits, in combination with the LOS and Demand Volume-to-Capacity data, reversible lanes are not anticipated to be required for Project and have been determined not to be studied further in the PA&ED phase.

Table 7-18: Design Year (2050) Peak Hour Directional Split

Segment	Alternative	Design Year (2050) Peak Hour Traffic Directional Split	
		AM	PM
I-5	No-Build Alternative	55.4%	58.7%
SR 241	Build Alternative 13	64.5%	61.8%
	Build Alternative 17	66.3%	63.8%
	Build Alternative 14	66.7%	64.0%
	Build Alternative 21	62.4%	61.6%

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8 RIGHT-OF-WAY

Additional right-of-way would be required for the construction of the Build Alternatives.

Conceptual Right-of-Way Cost Estimates have been prepared for each Build Alternative to accompany this PSR-PDS (Attachment G) and provide an assessment of readily-available existing land use information along each alignment and planning-level analysis relevant to this Project, as well as right-of-way scoping for the PA&ED phase of the project. The intent of the Conceptual Right-of-Way Cost Estimates (Attachment G) are to identify a range of potential right-of-way costs (approximate) for programming purposes, consistent with this PSR-PDS approach.

At this preliminary stage, the anticipated right-of-way impacts ratings within the Project limits are summarized in Table 8-1 and are based on the estimated range of parcels impacted.

Table 8-1: Anticipated Right-of-Way Impacts Ratings within the Study Area

Alternative	Estimated Right-of-Way Impacts			Right-of-Way Impacts Ratings
	Residential	Non-Residential	Undeveloped Land	
1	None	None	None	Not Applicable
13	0-50	0-50	50-100	Moderate
17	50-100	0-50	50-100	High
14	0-50	0-50	0-50	Low
11	100-150	100-150	0-50	High
12	50-100	50-100	0-50	High
9	50-100	0-50	0-50	Moderate
18	50-100	0-50	0-50	Moderate
21	0-50	0-50	0-50	Low

Notes: Low = impacts to 0-50 parcels for each category; Moderate = impacts to 0-50 parcels for two categories and 50-100 parcels for one category; and High = impacts to 50-100 parcels or greater for two or more categories.

More precise right of way information will be developed as more detailed information is available during the PA&ED phase. Storm Water BMPs and existing utility conflicts shall be considered which may potentially require drainage easements, temporary construction easements and/or utility easements which will be confirmed during the PA&ED phase.

Right-of-Way Data Sheets will be prepared during the PA&ED phase.

Additional right-of-way components are summarized below.

Utilities

Both underground and above ground utility conflicts are anticipated within the Project area. Based on as-built plans obtained from the Department of Transportation for portions of study area along SR 241, SR 73, and I-5 and available utility as-built plans provided by various utility owners and field visits for undeveloped portions of the study area, the anticipated utility impacts within the Project limits are summarized in Table 8-2 through Table 8-9.

Positive location will be performed during PA&ED for underground utilities in the Project vicinity that may be in close proximity or conflict with proposed improvements as determined from as-built plans and utility company records.

Relocation or addition of towers may be required for the overhead electrical lines.

Numerous drainage culverts and appurtenances may be affected. Some existing utilities may also be affected, though no major relocations are expected. Specific utility relocations, impacts and dispositions of drainage culverts, utilities and appurtenances will be verified during the follow-on PA&ED phase. As-built plans were used to identify other existing utilities and major drainage culverts (diameter greater than 48 inches) and channels within the Project limits. Coordination with the identified utility companies shall be carried out during the PA&ED, PS&E, and construction phases.

Table 8-2: Anticipated Impacts to Utilities within the Study Area—Alternative 13

No.	Alternative	Utility Owner and/or Contact Name	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	13	AT&T	D	Cable, Telephone	UG Cable, UG Telephone, Telephone, 24" Concrete Casing
2	13	Caltrans	D	Fiber Optic	Fiber Optics
3	13	COSC	W	Water, Sewer	16" Water, 16" AC Water, 21" Sewer, 24" Water, 12" VCP Sewer, 8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 21" VCP Sewer, 18" VCP Sanitary Sewer
4	13	COSJC	W	Sewer	12" Sewer in 22" Casing, 8" Sewer in 18" HDPE Casing
5	13	COX	D	Fiber Optic, Cable, TV, Fiber Optic	UG Fiber Cable, Cable Television, Fiber Optic

**Table 8-2: Anticipated Impacts to Utilities within the Study Area—Alternative 13
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
6	13	JT Regional	W	Water	28" Water
7	13	SCE	D	Electric	220-kV OH Electric, 12-kV OH Electric
8	13	SCG	W	Gas	10" Gas, 6" Gas, 6" HP Gas, 4" Gas in 8" Casing, 12" Gas
9	13	SCWD	W	Water, Sewer	27" CML&C STL Water with 48" ID x 5/8" Thick Casing, 10" ACP Water, 27" CCP Water, 10" ACP Water, 21" Water I 36" Casing, 24" Water I 42" Casing, 10" Water in 16" Casing, 8" VCP Sewer
10	13	SCWD/TCMWD	W	Water	27" CCP Water
11	13	TCMWD	W	Water	27" CCP Water
12	13	SDG&E	D	Electric	12 kV Electric, OH Electric, 138-kV OH Electric, 12-kV OH Electric, Planned 230-kV Electric Transmission, UG Electric, OH Electric
13	13	Unknown	W	Water	16" Recycled Water
14	13	Unknown	D	Electric	OH Electric

Table 8-3: Anticipated Impacts to Utilities within the Study Area—Alternative 17

No.	Alternative	Owner	Wet (W) / Dry (D)	Type(s)	Description
1	17	AT&T	D	Cable, Telephone	UG Cable, UG Telephone
2	17	Caltrans	D	Fiber Optic	Fiber Optics
3	17	COSC	W	Water	8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 16" Water, 24" Water, Water*, 12" VCP Sewer, 18" VCP Sanitary Sewer, 21" VCP Sewer
4	17	COX	D	Fiber Optic	UG Fiber Cable
5	17	JT Regional	W	Water	28" Water
6	17	SCE	D	Electric	220-kV OH Electric, 12-kV OH Electric
7	17	SCG	D	Gas	6" Gas, 10" Gas, 12" Gas
8	17	SCWD	W	Water	10" ACP Water, 27" CCP Water, 27" CML&C STL Water with 48" ID x 5/8" Thick Casing

**Table 8-3: Anticipated Impacts to Utilities within the Study Area—Alternative 17
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
9	17	SDG&E	D	Electric	12-kV Electric, UG Electric, 138-kV OH Electric, 12-kV OH Electric, Planned 230-kV Electric Transmission
10	17	Unknown	W	Water	16" Recycled Water

Table 8-4: Anticipated Impacts to Utilities within the Study Area—Alternative 14

No.	Alternative	Owner	Wet (W) / Dry (D)	Type(s)	Description
1	14	AT&T	D	Cable	UG Cable
2	14	Caltrans	D	Fiber Optic	Fiber Optics
3	14	CSC	W	Water, Sewer, Reclaimed Water	8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 12" VCP Sewer
4	14	SCE	D	Electric	220-kV OH Electric
5	14	SCG	D	Gas	12" Gas
6	14	SCWD	W	Water	27" CML&C STL Water with 48" ID x 5/8" Thick Casing
7	14	SDG&E	D	Electric	12-kV Electric, Planned 230-kV Electric Transmission

Table 8-5: Anticipated Impacts to Utilities within the Study Area—Alternative 11

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	11	AT&T	D	Cable, Telephone, Electric, Communications	UG Cable, UG Telephone, 24" Concrete Casing, Telephone, AT&T Conduit (3107), 2-4" Conduits, Telephone Conduit, 24-4" Conduits and 3-1" Conduits, UG Telephone Conduit, 4#18 Shield Telephone Conduit, 2#3/0 Telephone Conduit, UG Telephone (16 Conduits), UG Telephone (20 Conduits), Telephone (22 Conduits), 2-4" Duct and Bu CO, 3-4" C-PC, 1 Bur Conduit
2	11	AT&T/ Level 3/ Qwest	D	Communications	18 MCD Telephone
3	11	ATS	D	Electric	ATS Conduit (3507)

**Table 8-5: Anticipated Impacts to Utilities within the Study Area—Alternative 11
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
4	11	Caltrans	D	Electric, Communications	Electric OH, Traffic Camera, Ramp Meter Signaling, Ramp Meter Signaling (NB & SB)
5	11	COSC	W	Water, Sewer	12" VCP Sewer, 8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 18" VCP Sanitary Sewer, 16" AC Water, 16" Water, 21" Sewer
6	11	COSJC	W	Sewer	12" Sewer in 22" Casing, 8" Sewer in 18" HDPE Casing
7	11	COX	D	Fiber Optic, Cable, Television	UG Fiber Cable, Cable Television, Fiber Optic, Cable Conduit
8	11	CSJC	W	Sewer	8" VCP Sewer (3211), 10" Sewer (3211), 8" Sewer (3271), 12" Sewer (3081)
9	11	CSJS	W	Sewer	8" Sewer (3125)
10	11	CVWD	W	Water	14" ACP Water (3175), 3" Water (3124), 8" Water (3126), 14" Water, 16" Water, 6" Water, 12" Water, 10" Water, 24" Water, 16" Water in 30" Steel Casing
11	11	ETWD	W	Sewer, Water	6" ACP Sewer, 20" Water, 8" ACP Water, 16" ACP Water, 10" VCP Sewer, 16" Water, 21" RCP Water, 21" Sewer (Aliso Creek Effluent Transmission Main), 21" Clay Sewer, 1/2" Water, 10" Sewer, 2-16" Water, 18" Sewer, 8" Sewer
12	11	IRWD	W	Water, Sewer	10" Water, 8" Sewer
13	11	JT Regional	W	Water	28" Joint Regional Water Supply System
14	11	KM-SFPP	W	Oil	16" Fuel Line
15	11	MCC	W	Water	8" Water
16	11	MNWD	W	Water, Sewer, Reclaimed Water	39" Sewer, 8" Water, 33" Sewer, 14" DIP Water, 27" VCP Sewer, 12" ACP Water in 48" Steel Encasement, 12" VCP Sewer in 48" Steel Encasement, 8" VCP Sewer in 24" Casing, 24" Water in 36" Casing, 15" VCP Sewer in 30" Casing, 12" Water, Water, 10" Sewer in 30" Casing, 21" Water, 8" Sewer, 12" Steel Reclaimed Water with 20" Casing, 54" Water with 84" Shield, 14" Water, 18" Water, 8" VCP Sewer
17	11	PacBell	D	Telephone	Telephone Conduit, PacBell Conduit, PacBell Duct

**Table 8-5: Anticipated Impacts to Utilities within the Study Area—Alternative 11
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
18	11	SCE	D	Electric	66-kV Electric Transmission OH, 12-kV Electric Distribution UG 2-4" Conduits, Electric Distribution OH, Utility Pole with Guy Wire, Utility Pole, 8-5" UG Electric, UG Electric, Buried Power Conduit, 2-2" Communication Conduits, 4-5" Ducts, 2-5" Ducts, 7-5" Ducts, 2-2" Ducts, OH Power Lines, 2-3" Ducts, UG Electric Conduit, Street Light Conduit, 66-kV Electric Transmission OH Poles for OH Lines, 66-kV Power Poles, 66-kV Power Metal Poles
19	11	SCG	D	Gas, Oil	4" Gas, 6" Gas, 3" Gas, 2" Gas, Petroleum Line, 6" MP Gas, 30" HP Gas, 4" MP Gas, 8" Gas Line in 12' Casing, 12" Gas MP 60 PSIG
20	11	SCWD	W	Water, Sewer	27" CML&C STL Water with 48" ID x 5/8" Thick Casing, 10" ACP Water, 27" CCP Water, 8' VCP Sewer, 21" Water I 36" Casing, 24" Water I 42" Casing, 10" Water in 16" Casing, 30" Gas HP 564 PSIG
21	11	SCWD/TCMWD	W	Water	27" CCP Water
22	11	SDG&E	D	Electric	12-kV Aerial, 138-kV Aerial, 12-kV Conduit, 42-kV Aerial, 138-kV Electrical Transmission UG 6-5", 12-kV Electric Distribution OH, 12-kV Electric Facility UG, 138 KV Conduit OH Utility Pole, Electrical Transmission UG, UG Circuit, OH Power Lines, UG Electric, 12-kV Electric, Electric OH, 12-kV OH Electric
23	11	SFPP	D	Gas	16" Gas Line
24	11	SMWD	W	Water, Sewer, Reclaimed Water	20" ACP Recycled Water, 12" ACP Recycled Water, 8" ACP Recycled Water, 27" Sewer, 20" Sewer, 42" Water
25	11	SOCAL	D	Gas	30" HP Gas
26	11	TCMWD	W	Water	27" CCP Water
27	11	TMTV	D	Cable	TMTV Cable, TMTV Conduit
28	11	Verizon	D	Telephone	Telephone UG Conduit

**Table 8-5: Anticipated Impacts to Utilities within the Study Area—Alternative 11
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
29	11	Unknown	W	Water	16" Recycled Water, Water, 16" Water, 10" Water, 12" Water, 8" Water, 8" VCP Sewer, Sewer*, 21" Water, 48" Concrete Sanitary Sewer, 21" Sewer Line (Aliso Creek Effluent Transmission Main)
30	11	Unknown	D	Electric	OH Electric, 2-Electrical Wires, Electric Distribution OH, Railroad Signaling, UG Electric Conduit, Utility Pole

Table 8-6: Anticipated Impacts to Utilities within the Study Area— Alternative 12

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	12	AT&T	D	Cable, Telephone, Electric, Communications	UG Cable, UG Telephone, 24" Concrete Casing, Telephone, AT&T Conduit, 2-4" Conduits, Telephone Conduit, 24-4" Conduits and 3-1" Conduits, UG Telephone Conduit, 4#18 Shield Telephone Conduit, 2#3/0 Telephone Conduit
2	12	AT&T/ Level 3/ Qwest	D	Communication	18 MCD Telephone
3	12	ATS	D	Electric	ATS Conduit
4	12	Caltrans	D	Electric, Communications, Fiber Optics	Aerial, Traffic Camera, Ramp Meter Signaling, Fiber Optics
5	12	COSC	W	Water, Sewer	12" VCP Sewer, 8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 21" VCP Sewer, 18" VCP Sanitary Sewer, 16" AC Water, 16" Water, 21" Sewer
6	12	COSJC	W	Sewer	12" Sewer in 22" Casing, 8" Sewer in 18" HDPE Casing
7	12	COX	D	Fiber Optic, Cable, Television	UG Fiber Cable, Cable Television, Fiber Optic, Cable Conduit
8	12	CSJC	W	Sewer	8" VCP Sewer, 10" Sewer, 8" Sewer, 12" Sewer
9	12	CSJS	W	Sewer	8" Sewer

**Table 8-6: Anticipated Impacts to Utilities within the Study Area— Alternative 12
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
10	12	CVWD	W	Water	14" ACP Water, 3" Water, 8" Water, 14" Water, 16" Water, 6" Water, 12" Water, 10" Water, 24" Water, 16" Water in 30" Steel Casing
11	12	ETWD	W	Sewer	6" ACP Sewer
12	12	IRWD	W	Sewer	8" Sewer
13	12	JT Regional	W	Water	28" Joint Regional Water Supply System
14	12	KM-SFPP	W	Oil	16" Fuel Line
15	12	MCC	W	Water	8" Water
16	12	MNWD	W	Water, Sewer, Reclaimed Water	39" Sewer, 8" Water, 33" Sewer, 14" DIP Water, 27" VCP Sewer, 12" ACP Water in 48" Steel Encasement, 12" VCP Sewer in 48" Steel Encasement, 8" VCP Sewer in 24" Casing, 24" Water in 36" Casing, 15" VCP Sewer in 30" Casing, 12" Water, Water, 10" Sewer in 30" Casing, 21" Water, 8" Sewer, 12" Steel Reclaimed Water with 20" Casing, 54" Water with 84" Shield, 14" Water, 18" Water, 8" VCP Sewer
17	12	PacBell	D	Telephone	Telephone Conduit, PacBell Conduit, PacBell Duct
18	12	SCE	D	Electric	66-kV Electric Transmission OH, 12-kV Electric Distribution UG 2-4" Conduits, Electric Distribution OH, Utility Pole with Guy Wire, Utility Pole
19	12	SCG	D	Gas, Oil	4" Gas, 6" HP Gas, 6" Gas, 10" Gas, 12" Gas, Petroleum Line, 6" MP Gas, 30" HP Gas, 4" MP Gas, 4" Gas in 8" Casing, 8" Gas Line in 12' Casing, 12" Gas MP 60 PSIG, 30" Gas HP 564 PSIG
20	12	SCWD	W	Water, Sewer	27" CML&C STL Water with 48" ID x 5/8" Thick Casing, 10" ACP Water, 27" CCP Water, 8' VCP Sewer, 21" Water I 36" Casing, 24" Water I 42" Casing, 10" Water in 16" Casing
21	12	SCWD/TCMWD	W	Water	27" CCP Water

**Table 8-6: Anticipated Impacts to Utilities within the Study Area— Alternative 12
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
22	12	SDG&E	D	Electric	12-kV Aerial, 138-kV Aerial, 12-kV Conduit, 42-kV Aerial, 138-kV Electrical Transmission UG 6-5", 12-kV Electric Distribution OH, 12-kV Electric Facility UG, 138 KV Conduit OH Utility Pole, Electrical Transmission UG, UG Circuit, OH Power Lines, UG Electric, 12-kV Electric, Electric OH, 12-kV OH Electric
23	12	SFPP	D	Gas	16" Gas Line
24	12	SMWD	W	Water, Sewer, Reclaimed Water	20" ACP Recycled Water, 12" ACP Recycled Water, 8" ACP Recycled Water, 27" Sewer, 20" Water, 26" Sewer
25	12	SOCAL	D	Gas	30" HP Gas
26	12	TCMWD	W	Water	27" CCP Water
27	12	TMTV	D	Cable	TMTV Cable, TMTV Conduit
28	12	Unknown	W	Water	16" Recycled Water, Water, 16" Water, 10" Water, 12" Water, 8" Water, Water, 8" VCP Sewer, Sewer*
29	12	Unknown	D	Electric	OH Electric, 2-Electrical Wires, Electric Distribution OH, Railroad Signaling

Table 8-7: Anticipated Impacts to Utilities within the Study Area— Alternative 9

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	9	AT&T	D	Telephone	UG Telephone Conduit, UG Telephone Ducts
2	9	MNWD	W	Sewer, Reclaimed Water	Sewer Main, Reclaimed Water, Potable Water
3	9	SDG&E	D	Electric	UG Electric Conduit
4	9	SMWD	W	Sewer	Sewer Main
5	9	Unknown	D	Electric	Transmission Utility Pole, Utility Pole, OH Transmission Line, OH Utility Lines
6	9	Unknown	W	Water, Reclaimed Water	Potable Water, Reclaimed Water,

Table 8-8: Anticipated Impacts to Utilities within the Study Area— Alternative 18

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	18	AT&T	D	Telephone	UG Telephone Conduit, UG Telephone Ducts
2	18	MNWD	W	Water, Sewer, Reclaimed Water	Sewer Main, Reclaimed Water, Potable Water
3	18	SDG&E	D	Electric	UG Electric Conduit
4	18	SMWD	W	Sewer	Sewer Main
5	18	Unknown	D	Electric	Transmission Utility Pole, Utility Pole, OH Transmission Lines, OH Utility Lines, UG Electric Conduit, UG Telephone Ducts, 12" Gas
6	18	Unknown	W	Water, Reclaimed Water	Potable Water, Reclaimed Water, Sewer Main

Table 8-9: Anticipated Impacts to Utilities within the Study Area— Alternative 21

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
1	21	AT&T	D	Cable, Telephone, Electric	UG Cable, UG Telephone, 24" Concrete Casing, Telephone, AT&T Conduit
2	21	ATS	D	Electric	ATS Conduit
3	21	Caltrans	D	Fiber Optics	Fiber Optics
4	21	COSC	W	Water, Sewer, Reclaimed Water	12" VCP Sewer, 8" Water, 12" Reclaimed Water with 24" Tunneled/Jacked Casing, 21" VCP Sewer, 18" VCP Sanitary Sewer, 16" AC Water, 16" Water, 21" Sewer, 24" Water, 6" Reclaimed Water
5	21	COSJC	W	Sewer	12" Sewer in 22" Casing, 8" Sewer in 18" HDPE Casing
6	21	COX	D	Fiber Optic, Cable, Television	UG Fiber Cable, Cable Television, Fiber Optic
7	21	CSJC	W	Sewer	8" VCP Sewer, 10" Sewer, 8" Sewer, 12" Sewer
8	21	CSJS	W	Sewer	8" Sewer
9	21	CVWD	W	Water	14" ACP Water, 3" Water, 8" Water, 14" Water, 16" Water, 6" Water, 12" Water, 10" Water, 24" Water
10	21	JT Regional	W	Water	28" Water

**Table 8-9: Anticipated Impacts to Utilities within the Study Area— Alternative 21
(cont.)**

No.	Alternative	Utility Owner	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description
11	21	MCC	W	Water	8" Water
12	21	MNWD	W	Water, Sewer	39" Sewer, 8" Water, 33" Sewer
13	21	PacBell	D	Telephone	Telephone Conduit, PacBell Conduit, PacBell Duct
14	21	SCG	D	Gas	6" HP Gas, 6" Gas, 10" Gas, 12" Gas, 6" MP Gas, 30" HP Gas, 4" MP Gas, 4" Gas in 8" Casing
15	21	SCWD	W	Water, Sewer	27" CML&C STL Water with 48" ID x 5/8" Thick Casing, 10" ACP Water, 27" CCP Water, 8" VCP Sewer, 21" Water I 36" Casing, 24" Water I 42" Casing, 10" Water in 16" Casing
16	21	SCWD/TCMWD	W	Water	27" CCP Water
17	21	SDG&E	D	Electric	12-kV Aerial, 138-kV Aerial, 12-kV Conduit, 12-kV Electric Distribution OH, UG Electric, 12-kV Electric, Electric OH, 12-kV OH Electric, Planned 230-kV Electric Transmission
18	21	TCMWD	W	Water	27" CCP Water
19	21	TMTV	D	Cable	TMTV Cable, TMTV Conduit
20	21	Unknown	W	Water, Oil	16" Recycled Water, Water, 16" Water, 10" Water, 12" Water, 8" Water, 16 Oil/10" Fuel, 12" Water
21	21	Unknown	D	Electric	OH Electric, 2-Electrical Wires

Railroad

The Los Angeles—San Diego—San Luis Obispo Rail (LOSSAN) Corridor in general, parallels the I-5 between San Clemente and Laguna Hills. Some of the alternatives would have impacts on the LOSSAN corridor, particularly near Camino Capistrano, San Onofre, and the I-5/SR 73 interchange where the freeway is in close proximity to the rail corridor. In addition, the El Toro Rail overcrossing, south of the La Paz Road interchange would be widened under some of the alternatives.

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9 STAKEHOLDER INVOLVEMENT

Building from the 2016 Community Ascertainment Study, a collaborative multi-faceted, broad-based stakeholder and public engagement process has been established as part of the Project to include: collaboration with environmental stakeholders (e.g., Save San Onofre Coalition); collaboration with local stakeholders (South Orange County Mobility Working Group); public forums; collaboration with regional stakeholders; online engagement; implementation of a comprehensive community involvement plan; and development of transportation ideas from collaborative public engagement.

The key Project stakeholders include F/ETCA and Caltrans. F/ETCA has been working in partnership with Caltrans to originate the Purpose and Need and to initiate the PSR-PDS effort subsequent to completion of the Community Ascertainment Study in 2016.

Project stakeholders have been participating in Project development, and features included in the alternatives/build ideas discussed in this PSR-PDS are based upon the input received to date.

The first two public forums were held on June 16, 2016, and October 5, 2016, to present data regarding transportation issues and to solicit input from the public for transportation solutions. These two public forums resulted in sixteen ideas brought forward for a more detailed evaluation. The sixteen ideas were grouped into six packages: Alternative Modes and Operations (Ideas 1-5), Arterial Widening (Ideas 1-7), Substantial Roadway Projects (Ideas 1-9), I-5 Options (Ideas 1-7 and 10-12), SR 241/I-5 Options (Ideas 1-7 and 13-15, and Technology (efficiency enhancement; Idea 16). A preliminary traffic evaluation (including daily congested vehicle miles traveled and daily vehicle hours of delay) was presented to the public regarding the performance of the six packages.

On November 16, 2016, F/ETCA submitted a transmittal letter and the sixteen ideas with supporting documentation to OCTA and Caltrans District 12 for review and comment. The supporting documentation included figures with alignments of the sixteen ideas, preliminary traffic data that evaluated the performance of the 6 packages, and fact sheets that ranked the packages and listed benefits, challenges, funding sources, and estimated costs.

Idea 17 was developed by F/ETCA in January 2017.

On April 4, 2017, the City of San Clemente submitted a letter to F/ETCA recommending evaluation of an additional idea (Idea 18).

In 2017, F/ETCA established the website called Get Moving Orange County (<http://getmovingoc.com/>) to provide the public with information regarding upcoming public forums as well as videos of previous public forums and to provide a method to provide feedback to F/ETCA regarding the public forums.

A third public forum was conducted on June 5, 2017. This forum consisted of two discussion panels and responses to questions submitted by the attendees. The first panel discussed the Settlement Agreement (signed in November 2016) and the second panel discussed the Project development process, evaluation of ideas, and coordination with Caltrans District 12 and OCTA. All written questions were answered and posted on the Get Moving Orange County website. Ideas 19 and 20 were suggested at this meeting.

On December 14, 2017, F/ETCA circulated the *South County Traffic Relief Initial Screening* (Attachment I) which evaluated the 20 ideas suggested by the public during the three public forums. Seven build ideas and a no-build were recommended for further study as a conclusion of the screening document, and these are being evaluated in this PSR-PDS.

On February 8, 2018, an additional transportation idea called Idea 21 (Build Alternative 21) was introduced by F/ETCA during the its Board Meeting. Based upon discussions during that Board Meeting, this Build Alternative has been added to the list of alternatives under consideration in this PSR-PDS.

The Project is currently in the PID phase. Future evaluation of Project Build Alternatives will occur during the PA&ED phase. Public and agency involvement will be performed during various public comment and public meeting phases of the CEQA/NEPA process of the Project as well. Additional public outreach will be performed at subsequent stages to inform the local community and stakeholders regarding the Project.

10 ENVIRONMENTAL DETERMINATION/DOCUMENT

A Preliminary Environmental Analysis Report (PEAR) has been prepared for this Project, and is included as Attachment E. The PEAR includes an initial evaluation of the Project, summarizes key environmental issues, and identifies the environmental documentation that could be required for the Project. This PSR-PDS is not a substitute for the formal environmental analysis which would be conducted in the next phase of project development.

Based on the preliminary evaluation conducted as part of the PEAR, the Project is anticipated to have substantial impacts on the environment. Therefore, the anticipated environmental document to comply with CEQA is an Environmental Impact Report (EIR). This determination is based on review of preliminary geometric plans and other available information. Under NEPA, an EIS is anticipated.

Based on the results of initial environmental studies included in the PEAR, it is unknown at this time if all potential impacts associated with the build alternatives could be reduced or mitigated. Potential mitigation measures and permits associated with the build alternatives are preliminary at this time because the extent of required mitigation has still not been confirmed. Completion of the environmental process is expected to require approximately 42 months.

The preliminary analysis of the build alternatives has identified the potential for impacts related to existing and future land use; Section 4(f) properties; growth; farmlands; community character and cohesion; relocations; utilities; emergency services; visual/aesthetics; cultural resources; hydrology and floodplain; water quality and storm water runoff; geology and soils; paleontology; hazardous waste/materials; transportation and traffic; air quality; noise and vibration; energy and climate change; the biological environment, including special-status species and jurisdictional waters; and cumulative projects.

Studies/Actions Required for All Alternatives

Environmental Studies

The following environmental studies are anticipated to obtain approval of the Build Alternatives during the PA&ED phase of the Project:

- Air Quality Analysis Report;
- Air Quality Conformity Report;
- Alternatives Analysis Report;
- Growth Impact Analysis;
- Farmland Impact Analysis Report;
- Energy and Climate Change Technical Report;
- District Preliminary Geotechnical Report;
- Community Impact Assessment;

- Cumulative Impact Analysis;
- Historic Property Survey Report;
- Archaeological Survey Report;
- Historical Resources Evaluation Report;
- Finding of Effect;
- Memorandum of Agreement (if there would be adverse effects to historical resources);
- Initial Site Assessment;
- Preliminary Site Investigation;
- Location Hydraulic Study/Floodplain Encroachment or Evaluation Report;
- Preliminary Drainage Study;
- Natural Environment Study;
- Jurisdictional Delineation Report;
- Wildlife Corridor Study;
- Biological Assessment;
- Noise Study Report;
- Noise Abatement Decision Report;
- Paleontological Identification Report/Paleontological Evaluation Report;
- Paleontological Mitigation Plan;
- Relocation Impact Report (Draft and Final);
- Section 4(f) Evaluation;
- Visual Impact Assessment; and
- Water Quality Assessment Report.

Environmental Commitments for all Alternatives are identified below:

- Community Impacts: Implementation of a Public Outreach Program, Transportation Management Plan, and Relocation Plan.
- Visual Impacts: Incorporation of aesthetic treatments consistent with adopted plans and Caltrans policies and requirements.
- Cultural Resources: Monitoring during construction and proper handling of buried resources and/or human remains.
- Water Quality: Incorporation of Treatment BMPs for storm water runoff.
- Paleontological Resources: Monitoring during construction and proper handling of paleontological resources.
- Hazardous Waste: Removal and disposal of hazardous waste, consistent with State and federal regulations and Caltrans guidance.
- Air Quality: Compliance with standard construction emissions requirements consistent with South Coast Air Quality Management District and Caltrans requirements.
- Noise Abatement: Compliance with standard construction noise reduction requirements and reconstruction of existing sound barriers impacted by the Build Alternatives. Additional sound barriers may be required.

- Biological Resources: Implementation of avoidance, protective, and compensatory measures to offset potential adverse impacts on biological resources, including compensatory measures for habitat loss and special status species impacts. It is anticipated that once a preferred alternative is selected in the Final EIR/EIS, detailed mitigation measures shall be developed in the Biological Resource Management Plan, subject to US Fish and Wildlife Service and CDFW review and approval and consistent with any resource agency approval documentation/permits. These measures may include, but are not limited to, the following:
 - Providing habitat preservation and/or restoration
 - Designing and installing wildlife crossings
 - Providing specific compensation actions for special status species (e.g., plant species relocation, den closing/relocation, pool/pond creation and relocation of aquatic species).

Mitigation and Compliance Cost Estimates for the Build Alternatives are provided in Attachment C of the PEAR (PSR-PDS Attachment E).

On March 29, 2017, Governor Brown signed into law AB 28 (Frazier), which added Section 820.1 back to the California Streets and Highways Code, reinstating the waiver of immunity and consent to the jurisdiction of federal courts for actions taken by Caltrans in performing federal environmental responsibilities under the NEPA. The Legislature included a sunset clause to repeal Section 820.1 on January 1, 2020.

Since 2007, Caltrans has performed these duties under the program known as NEPA Assignment, pursuant to two Memoranda of Understanding (MOU) signed by the FHWA. The 23 USC 327 MOU allows Caltrans to approve Environmental Assessments (EA), EIS, and any Categorical Exclusion that cannot be approved as a 326 CE.

On March 30, 2017, the FHWA acknowledged receipt of the certifications and that the waiver of immunity is adequate. As a result, Caltrans is once again authorized to participate in the NEPA Assignment Program and is the NEPA Lead Agency.

In conjunction with documenting compliance with CEQA requirements, an EIR will be the appropriate environmental document. An EIS will be the appropriate environmental document for NEPA compliance. The Draft EIR and EIS will be prepared as a combined Environmental Document (EIR/EIS). See Attachment E for the PEAR.

If the scope of work (including utility relocation requirements—if any) or limits for this Project change, prior to completion of the PA&ED Phase, during the PS&E phase, or during the Construction phase, a determination must be made by the District's Division of Environmental Planning, as to whether the environmental compliance documentation for CEQA and NEPA remains sufficient and valid. In conjunction with

confirming if the environmental documentation for CEQA compliance and NEPA compliance documentation remains sufficient and complete, additional Technical Studies may be required, and/or existing Technical Studies may need to be revised, and/or performance of an Environmental Re-Evaluation may be required. The type of documentation for CEQA compliance and NEPA compliance required for the Project may be changed as a result.

It is required that the Environmental Commitments Record (ECR) prepared in conjunction with completion of the PA&ED phase (included as an appendix in the Caltrans approved Environmental Document for this Project), be referenced and completed timely throughout the PS&E and Construction phases of the Project, and updated as necessary based on direct coordination with the Caltrans Environmental Planner Generalist and Caltrans Senior Environmental Planner assigned to the Project. The Caltrans Senior Environmental Planner assigned to the Project is responsible for approving changes to the ECR.

An Environmental Certification will be required at the end of the PS&E phase, and a Certificate of Compliance will be required following completion of construction of the Project.

11 FUNDING

It has been determined that this Project is not eligible for Federal-aid funding.

F/ETCA may seek Transportation Infrastructure Finance and Innovation Act (“TIFIA”) funding for the Project to allow TIFIA loan proceeds to be used to pay a portion of the purchase price for the acquisition of the Project by F/ETCA and defeat all of the outstanding bond indebtedness of F/ETCA incurred in connection with the acquisition, construction and refinancing. Approval of TIFIA credit assistance will enhance the financial capacity of F/ETCA to construct the future improvements.

Local funding for the Project would be through toll revenue bonds issued by F/ETCA.

The PR will serve as the appropriate document from which the remaining support and capital components of the Project will be programmed. For the cost summary, see Attachment D.

Capital Outlay Project Estimate

The level of detail available to develop these capital outlay project estimates is only accurate to within the ranges shown in Table 11-1 and is useful for long-range planning purposes only. The capital outlay project estimates should not be used to program or commit State-programmed capital outlay funds.

Table 11-1: Capital Outlay Estimate

Alternative	Range of Estimate		Development Impact Fees, Toll Revenue Bond Funds	
	Construction	Right-of-Way	Construction	Right-of-Way
1 – No-Build	\$0	\$0	\$0	\$0
13	\$1.8-\$2.3B	\$220-\$280M	TBD	TBD
17	\$1.1-\$1.5B	\$220-\$280M	TBD	TBD
14	\$1.0-\$1.4B	\$100-\$130M	TBD	TBD
11	\$1.3-\$1.6B	\$570-\$710M	N/A*	N/A*
12	\$1.2-\$1.6B	\$350-\$440M	TBD	TBD
9	\$0.6-\$0.8B	\$250-\$320M	N/A*	N/A*
18	\$0.6-\$0.8B	\$240-\$300M	N/A*	N/A*
21	\$1.0-\$1.3B	\$70-\$90M	TBD	TBD

Notes: Ranges are within +/- 10 percent of Total Cost.

*Funding not identified.

Capital Outlay PA&ED Support Estimate

Capital outlay support estimate for programming PA&ED in 2018 for this Project is shown in Table 11-2.

Table 11-2: Capital Outlay PA&ED Support Estimate

Alternative	Range of Estimate
	Support
1 – No-Build	\$0
13	\$100M-\$110M
17	\$90M-\$100M
14	\$90M-\$100M
11	\$100M-\$110M
12	\$100M-\$110M
9	\$50M-\$60M
18	\$50M-\$60M
21	\$80M-\$90M

Congestion Mitigation and Air Quality Program Funding

It has been determined that this Project is not eligible for Congestion Mitigation and Air Quality Program funding.

12 DELIVERY SCHEDULE

The Project schedule includes several Project development milestones outlined in Table 12-1 below:

Table 12-1: Project Milestone Schedule

Project Milestones		Milestone Delivery Date (Month, Year)
Program Project	M015	August 2018
Begin Environmental	M020	January 2019
Notice of Intent / Notice of Preparation	M030	January 2019
Circulate DED Externally (Begin / End)	M120 / M140	January 2021 / March 2021
Project Approval and Environmental Document (PA&ED) Approval	M200	January 2022
Draft Structures Plans, Specifications and Estimates (PS&E)	M378	December 2022
Project Plans, Specifications and Estimates (PS&E)	M380	December 2023
Right-of-Way Certification	M410	June 2024
Ready-To-List	M460	January 2024
Award	M495	March 2024
Approve Contract/Begin Construction	M500	July 2024
Contract Acceptance/End Construction	M600	July 2027
End Project	M800	September 2027

The anticipated funding fiscal year for construction is 2024/2027.

The estimated schedule is based on one design/bid/build contract with full construction funding and full right-of-way acquisitions. Pending availability of Project construction funding, the Project may be implemented in phases and procured under one or more contracts, including the option of using design/build or public/private contract authority. These phasing and delivery approaches would extend the overall Project schedule accordingly.

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13 RISKS

A Risk Register (Level 1 and 2) has been prepared for this Project to assist the Project team in identifying, analyzing, and managing potential impacts on the schedule, cost, scope and quality of this Project. The Risk Register is included as Attachment H. The Risk Register is a living document and will be updated throughout the subsequent phases of the Project development.

Key risk categories identified in the Project risk register include Environmental, Engineering Services, Design, Construction, Organizational, Right-of-Way, and External Risks.

The environmental risks are mainly associated with changes to the Project scope that are outside the parameters contemplated in the Environmental Document, which may result in a change in the Project footprint. Results of the environmental Technical Studies represent a risk related to impacts and required mitigation measures. Changes in design configuration or construction of storm water BMPs may require additional easements which could potentially modify the Project footprint. In order to minimize these risks, the Project footprint will be further refined during the PA&ED phase and mitigation measures will be identified for potential right-of-way and environmental impacts.

The engineering and design risks are associated with changes in design standards, additional requirements to evaluate seismic retrofit for existing structures, changes in assumptions for preliminary cost estimates, Project staging, approval of design exceptions and changes in the delivery schedule. Coordination meetings and on-going discussions with Caltrans, FHWA, and local agencies will help avoid some of these risks. Although, major utilities within the Project area have been identified, field identification of these utilities by potholing and coordination with the utility owners during the PS&E phase is recommended to verify that utility relocation costs and associated schedule impacts are taken into consideration.

Organizational risks such as deviation of toll revenues from the anticipated revenues and unavailability of capital funds for construction also pose a potential risk. Updates to Traffic and Revenue forecasts and Financial Analysis should be considered when major elements of the Project are modified to ensure Project feasibility.

External Risks are mainly associated with stakeholder involvement and their expectations. Changes from stakeholders or requests for additional information/education, late in the Project development process, pose a risk to the Project schedule. Early stakeholder input and continuous public outreach during Project development and after the Project opening can minimize these risks. F/ETCA plans to continue the ongoing public education/outreach effort to keep the stakeholders engaged throughout the Project development phases.

To address these risks the PR developed during the PA&ED phase shall include risk management techniques, including avoiding, mitigating and accepting risks.

As shown in Attachment H, the Project Development Team has identified 47 potential risks, all threats. While the probability and impact varies with each one, these risks require close attention throughout the Project development. These risks will be monitored and updated during the PA&ED, PS&E, and the construction phases.

14 FHWA COORDINATION

The Project is considered to be a High Profile Project which requires FHWA oversight in accordance with the current FHWA and Caltrans Joint Stewardship and Oversight Agreement due to its unique Toll Lane component and potential non-traditional revenue sources (Toll Revenue Bonds and potential TIFIA loan). The Project cost is over \$100 million; therefore, a Financial Plan will be required for the Project. Access modification and Exception to Mandatory Design Standards proposed on the Interstate System are also required for FHWA approval.

FHWA staff has been apprised of the proposed Project and several meetings were held at District 12 offices of the Department of Transportation to review the proposed alternatives.

See the latest Stewardship and Oversight Agreement on Project Assumption and Program Oversight between the FHWA—California Division, and Caltrans for the Project actions assumed by Caltrans and the Project actions where FHWA has retained their authority as well as the detail associated with the various oversight responsibilities. Project actions are identified in the “Project Action Responsibility Matrix” within the stewardship agreement.

The Project requires the following additional coordination:

US Army Corps of Engineers

Department of the Army Permit for:
Clean Water Act Section 404

General Permits (Regional Permit, Nationwide Permit or Programmatic Permit)

Standard Permits (Individual Permit or Letter of Permission)
Section 9 Permit

California Department of Fish and Wildlife

California Fish and Game Code Section 1602
Lake or Streambed Alteration Agreement

California Coastal Commission and/or Local Coastal Program

California Public Resources Code Division 20 (California Coastal Act)
Coastal Development Permit

Regional Water Quality Control Board

Clean Water Act Section 401
Water Quality Certification

Local Agency

Freeway and Maintenance agreements will be required between Caltrans and local jurisdictions for maintenance of the Project. No relinquishments are anticipated for the Project.

Cooperative Agreement No. 12-210 was executed for this Project in May 1993 between Caltrans and the F/ETCA.

In July 1993, a Resolution Adopting Location of State Highway HRA 94-1 was executed for SR 241 by the California Transportation Commission for the portion of SR 241 from 0.4 mile south of Oso Parkway to 1.4 miles north of Portola Parkway.

A Section 129 Toll Agreement was entered between the Department, FHWA and the F/ETCA in 2005.

A Cooperative Agreement No. 12-721 was executed for this Project in July 2016 between the Department and the F/ETCA for State Independent Quality Assurance.

Railroads

Railroad involvement and agreements are anticipated for interchanges where the I-5 freeway is in close proximity to the LOSSAN rail corridor.

15 PROJECT REVIEWS

Field Review <u>Not Applicable</u>	Date _____
District Maintenance <u>Bobi Hettick</u>	Date _____
District Traffic Safety Engineer <u>Bryan Sorensen</u>	Date _____
Headquarters Project Delivery Coordinator <u>Carl Anderson</u>	Date _____
Project Manager <u>Leo Chen</u>	Date _____
FHWA <u>Tay Dam</u>	Date _____
District Safety Review <u>Gary Slater</u>	Date _____
Constructability Review <u>Patricia Ruiz</u>	Date _____
District Design <u>Kamran Mazhar</u>	Date _____
District Right-of-Way <u>Linda Lundblad</u>	Date _____

FHWA

FHWA staff have participated in Project Development Team meetings through which FHWA staff has communicated the Project concept. The results of these reviews are included in the Agency's document control system which is accessible by the Project team.

Caltrans

Caltrans headquarters and District staff have participated in Project Development Team meetings through which Caltrans staff has communicated the Project concept. The results of these reviews are included in the Agency's document control system which is accessible by the Project team.

Local Agencies

The F/ETCA member agencies participate in Board and Committee meetings through which Agency staff has communicated the Project concept. The final design will also be reviewed by the local agencies as the Project advances.

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16 PROJECT PERSONNEL

Project personnel are outlined in Table 16-1 below:

Table 16-1: Project Personnel

Name	Title	Phone Number
Farid Nowshiravan	Project Manager, Office of Program and Project Management	(657) 328-6303
Ahmed Abou-Abdou	Project Manager, Office of Program and Project Management	(657) 328-6296
Carl Anderson	Senior Transportation Engineer, Headquarters Project Delivery Coordinator	(530) 949-8730
Christopher Le	Senior Transportation Engineer, Design Branch B/H & Utility Engineering, District Design Liaison	(657) 328-6113
Kamran Mazhar	Senior Transportation Engineer, Design Branch F/I	(657) 328-6106
Alma Olguin	Transportation Engineer, Design Branch F/I	(657) 328-6107
Ferdinand Agbayani	Senior Transportation Engineer, Advance Planning – Project Studies, Branch B	(657) 328-6259
Janilee Jablonski	Transportation Engineer, Advance Planning – Project Studies, Branch B	(657) 328-6273
Kim Robinson	Transportation Engineer, Advance Planning – Project Studies, Branch A	(657) 328-6269
Grace Pina-Garrett	Senior Transportation Engineer, National Pollutant Discharge Elimination System Branch	(657) 328-6159
Melody Battaglia	Assistant Right of Way Agent Local Programs	(657) 328-6348
Linda Lundblad	Branch Chief, Right-of-Way Local Programs	(657) 328-6344
Ricky Rodriguez	Office Chief, Office of Right-of-Way	(657) 328-6345
Chris Flynn	Deputy District Director, Environmental Analysis	(657) 328-6133
Smita Deshpande	Senior Environmental Planner, Environmental Analysis – Generalist Branch	(657) 328-6151

Table 16-1: Project Personnel (cont.)

Name	Title	Phone Number
Scott Shelley	Associate Environmental Planner (Generalist), Coastal Liaison	(657) 328-6164
Cameron Palm	Transportation Planner	(657) 328-6286
Yatman Kwan	Senior Transportation Planner, System Planning-Travel Forecasting- Freight Mobility	(657) 328-6277
Steven Sowers	Senior Transportation Engineer, Traffic Operations Southwest	(657) 328-6432
Gary Slater	Senior Transportation Engineer, Traffic Operations Southeast	(657) 328-64xx
Lisa Ramsey	Acting Deputy District Director, Capital Outlay Program	(657) 328-6462
Lan Zhou	Deputy District Director, Planning and Local Assistance	(657) 328-6239
Erik Dickson	Senior Transportation Engineer, Landscape Architect	(657) 328-6201
Phi Dinh	Senior Transportation Engineer, Hydraulics	(657) 328-6172
Tay Dam	Federal Highway Administration	Tay.Dam@dot.gov
Imad Abu-Markhieh	Senior Bridge Engineer, Office of Special Funded Projects – Structures of Local Assistance	(916) 227-4491
Angela Ezekiel	Project Liaison Engineer, Program/Project Management & Office Engineer	(916) 227-8439
Bob Hettick	Senior Transportation Engineer, Maintenance Engineering Branch B	(657) 328-6217
Patricia Ruiz	Senior Transportation Engineer, Project Quality Control	(657) 328-6046
Bryan Sorensen	Transportation Engineer, District Traffic Safety Engineer (Acting)	(949) 724-2883

17 ATTACHMENTS (NUMBER OF PAGES)

Attachment A: Project Maps

Attachment A-1: Project Location Map (1)

Attachment A-2: Project Alternatives Map (1)

Attachment B: Not Used

Attachment C: Conceptual Geometric Plans

Attachment C-1.1: Alternative 1 – Lane Diagrams (2)

Attachment C-2.1: Alternative 13 – Layouts (1)

Attachment C-2.2: Alternative 13 – Cross Sections (7)

Attachment C-2.3: Alternative 13 – Lane Diagrams (2)

Attachment C-3.1: Alternative 17 – Layouts (1)

Attachment C-3.2: Alternative 17 – Cross Sections (7)

Attachment C-3.3: Alternative 17 – Lane Diagrams (1)

Attachment C-4.1: Alternative 14 – Layouts (1)

Attachment C-4.2: Alternative 14 – Cross Sections (5)

Attachment C-4.3: Alternative 14 – Lane Diagrams (1)

Attachment C-5.1: Alternative 11 – Layouts (1)

Attachment C-5.2: Alternative 11 – Cross Sections (6)

Attachment C-5.3: Alternative 11 – Lane Diagrams (2)

Attachment C-6.1: Alternative 12 – Layouts (1)

Attachment C-6.2: Alternative 12 – Cross Sections (6)

Attachment C-6.3: Alternative 12 – Lane Diagrams (2)

Attachment C-7.1: Alternative 9 – Layouts (1)

Attachment C-7.2: Alternative 9 – Cross Sections (1)

Attachment C-7.3: Alternative 9 – Lane Diagrams (1)

Attachment C-8.1: Alternative 18 – Layouts (1)

Attachment C-8.2: Alternative 18 – Cross Sections (1)

Attachment C-8.3: Alternative 18 – Lane Diagrams (1)

Attachment C-9.1: Alternative 21 – Layouts (1)

Attachment C-9.2: Alternative 21 – Cross Sections (6)

Attachment C-9.3: Alternative 21 – Lane Diagrams (2)

Attachment D: Cost Estimates – Capital Outlay Project Estimates

Attachment D-1: Alternative 13 – Capital Outlay Project Estimate (6)

Attachment D-2: Alternative 17 – Capital Outlay Project Estimate (6)

Attachment D-3: Alternative 14 – Capital Outlay Project Estimate (5)

Attachment D-4: Alternative 11 – Capital Outlay Project Estimate (6)

Attachment D-5: Alternative 12 – Capital Outlay Project Estimate (6)

Attachment D-6: Alternative 9 – Capital Outlay Project Estimate (4)

Attachment D-7: Alternative 18 – Capital Outlay Project Estimate (4)

Attachment D-8: Alternative 21 – Capital Outlay Project Estimate (6)

Attachment E: Preliminary Environmental Analysis Report (PEAR) (154)

Attachment F: Transportation Planning Scoping Information Sheet (12)

Attachment G: Conceptual Cost Estimates Right-of-Way Component

Attachment G-1:	Alternative 13 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-2:	Alternative 17 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-3:	Alternative 14 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-4:	Alternative 11 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-5:	Alternative 12 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-6:	Alternative 9 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-7:	Alternative 18 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment G-8:	Alternative 21 – Conceptual Cost Estimates Right-of-Way Component (4)
Attachment H:	Risk Register (9)
Attachment I:	South County Traffic Relief Effort Initial Screening (22)
Attachment J:	Traffic Engineering Performance Assessment (TEPA) (4192)

18 REFERENCE DOCUMENTS (NUMBER OF PAGES)

1. Storm Water Data Report (SWDR) (129)
2. Caltrans Division of Engineering Services (DES) PSR-PDS Scoping Checklist (59)
3. Quality Management Plan (QMP) (10)
4. ICE Step I Memorandum (130)

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT A:
PROJECT MAPS**

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT A-1:
PROJECT LOCATION MAP**

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Project Location Map

South County Traffic Relief Effort PSR-PDS

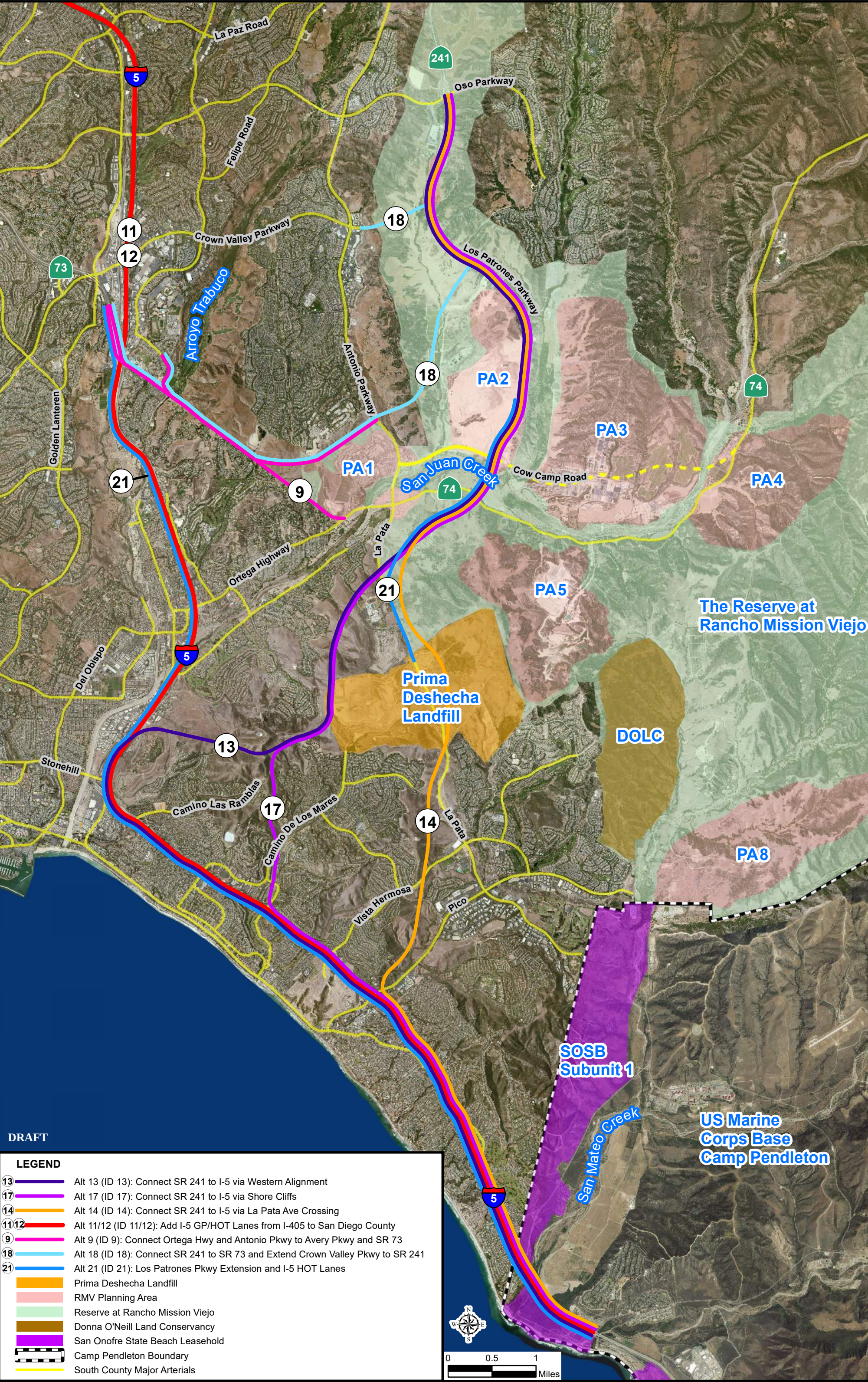
Attachment A

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT A-2:
PROJECT ALTERNATIVES MAP**

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DRAFT

LEGEND

Alt 13 (ID 13): Connect SR 241 to I-5 via Western Alignment

Alt 17 (ID 17): Connect SR 241 to I-5 via Shore Cliffs

Alt 14 (ID 14): Connect SR 241 to I-5 via La Pata Ave Crossing

Alt 11/12 (ID 11/12): Add I-5 GP/HOT Lanes from I-405 to San Diego County

Alt 9 (ID 9): Connect Ortega Hwy and Antonio Pkwy to Avery Pkwy and SR 73

Alt 18 (ID 18): Connect SR 241 to SR 73 and Extend Crown Valley Pkwy to SR 241

Alt 21 (ID 21): Los Patrones Pkwy Extension and I-5 HOT Lanes

Prima Deshecha Landfill

RMV Planning Area

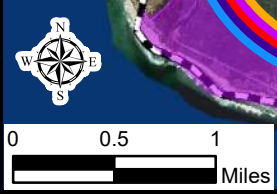
Reserve at Rancho Mission Viejo

Donna O'Neill Land Conservancy

San Onofre State Beach Leasehold

Camp Pendleton Boundary

South County Major Arterials



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT B:
NOT USED**

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C:
CONCEPTUAL GEOMETRIC PLANS**

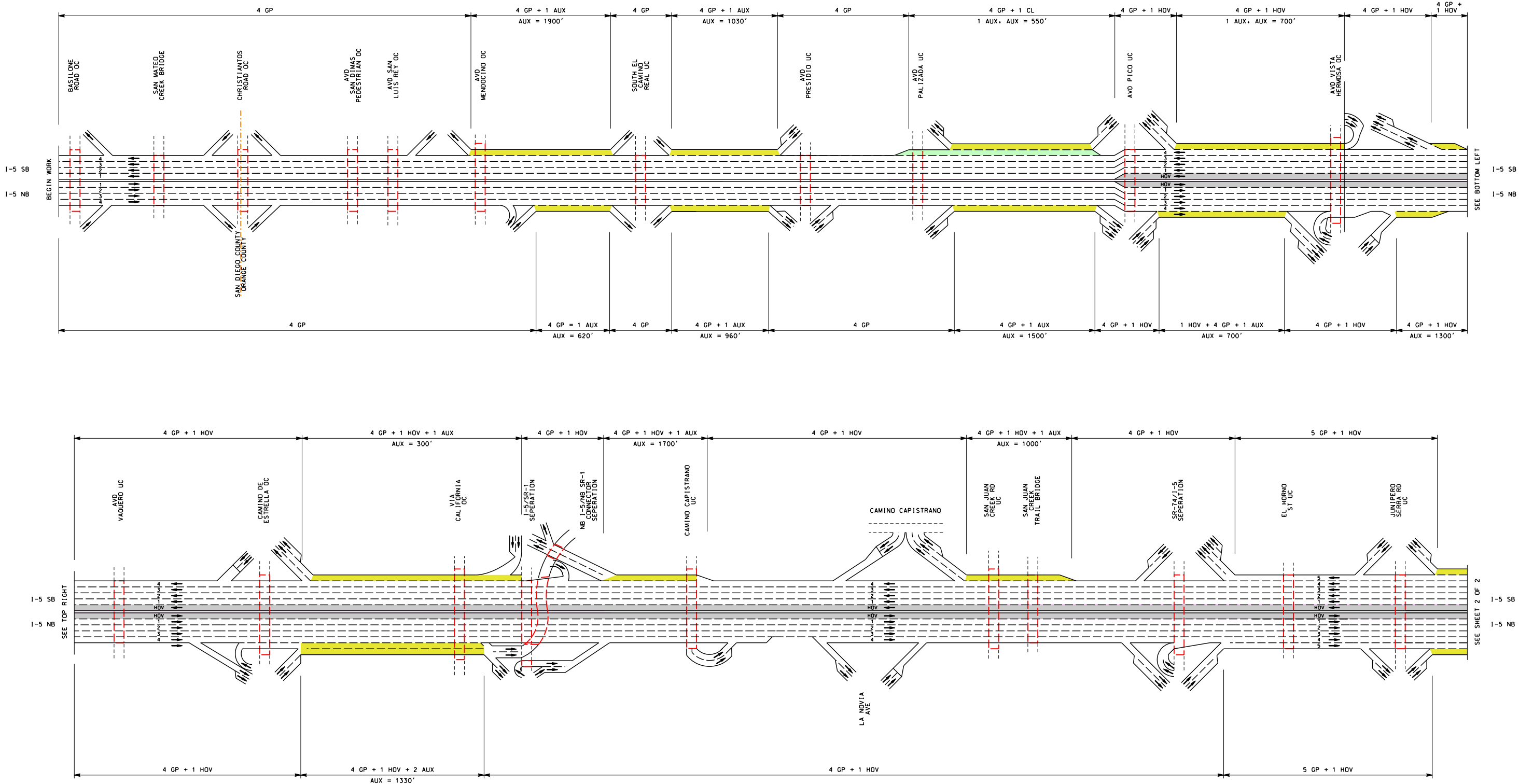
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-1.1:
ALTERNATIVE 1 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-1.1
ALTERNATIVE 1 – LANE DIAGRAMS
WITHOUT HOV
SHEET 1 OF 2

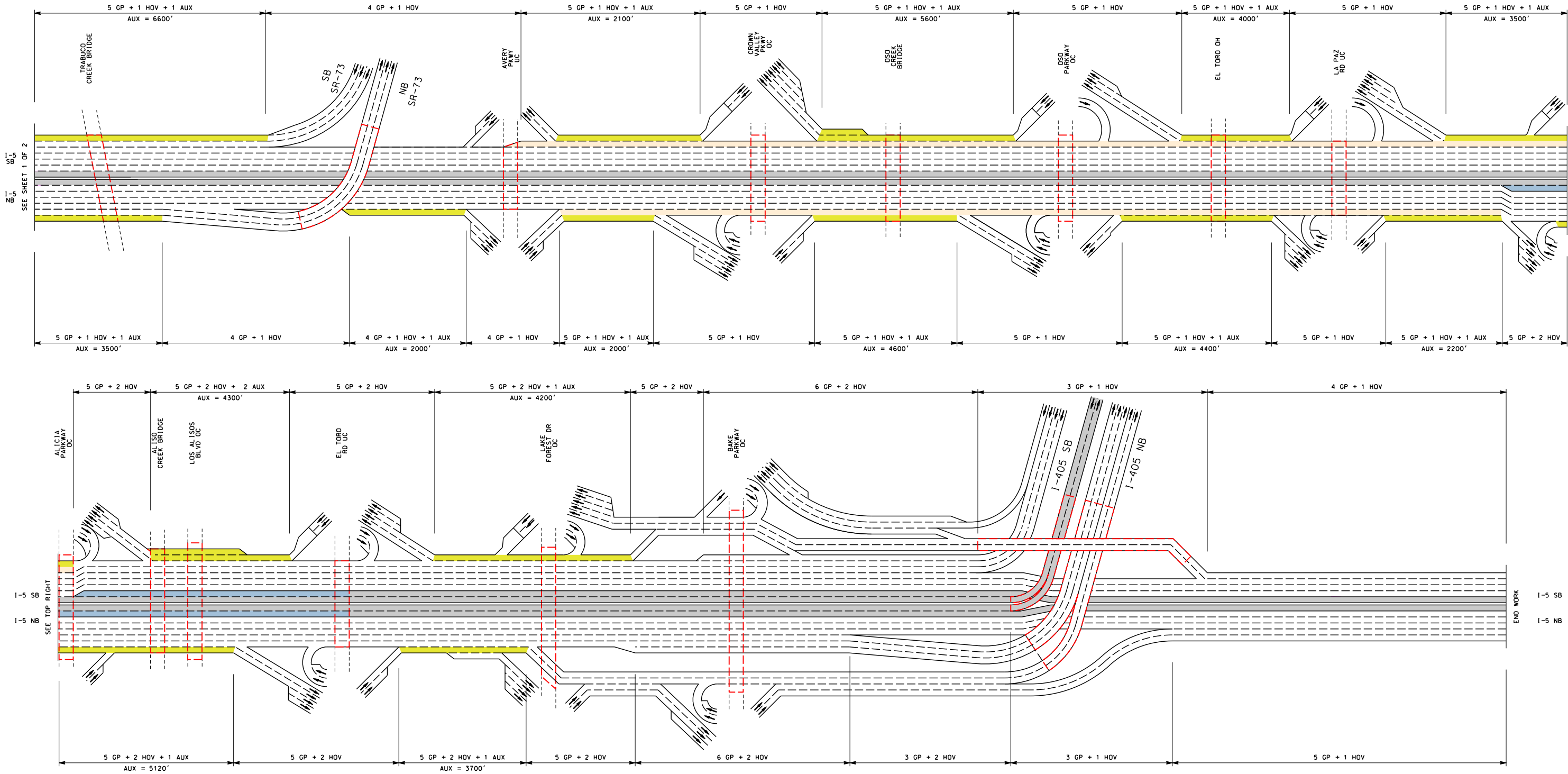
LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILLARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

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 STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION 1325 PACIFIC CALIFORNIA IRVINE, CA 92618	CALTRANS - DESIGN OVERSIGHT		TCA - DESIGN-MANAGER		CHECKED BY	DATE	REVISED BY	DATE	REVISED BY	DATE
	REGISTRATION No.		DAVID LOWE, P.E.							
	DATE									

SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING CLIMBING LANE (CL)		PROPOSED CLIMBING LANE (CL)		DIRECTION OF TRAFFIC		PROPOSED HOV LANE	
GENERAL PURPOSE LANE ADDITION		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		NEW STRUCTURE		PROPOSED ARTERIAL LANE	
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)		PROPOSED INGRESS / EGRESS LANE (I/E)		EXISTING STRUCTURE			
MANAGED LANE (ML), TOLL LANE OR HOV LANE											

ATTACHMENT C-1.1
ALTERNATIVE 1 - LANE DIAGRAMS
WITHOUT HOV
SHEET 2 OF 2

12-ORA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

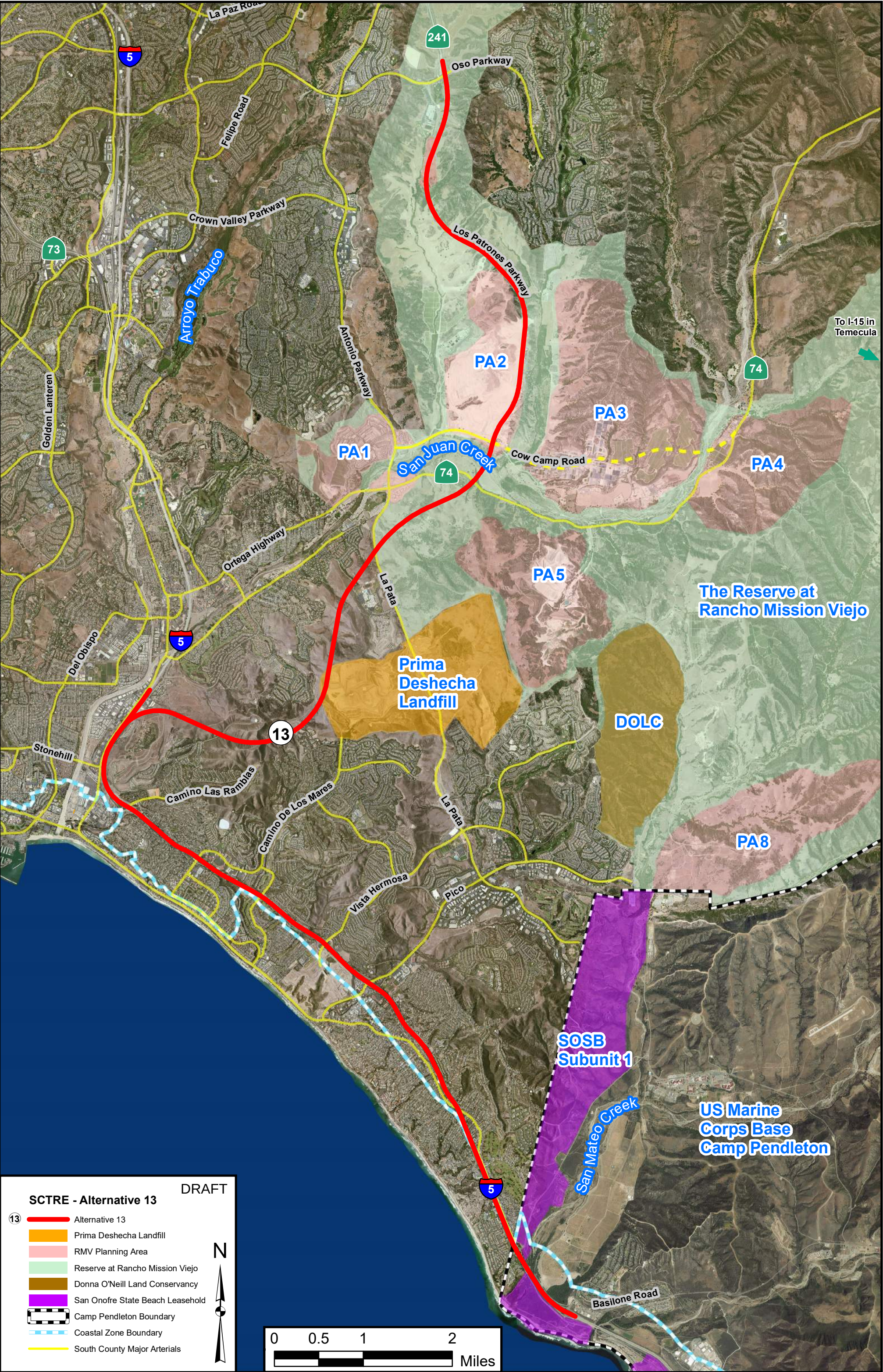
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-2.1:
ALTERNATIVE 13 – LAYOUTS**

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Attachment C-2.1: Alternative 13 - Layouts



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-2.2:
ALTERNATIVE 13 – CROSS SECTIONS**

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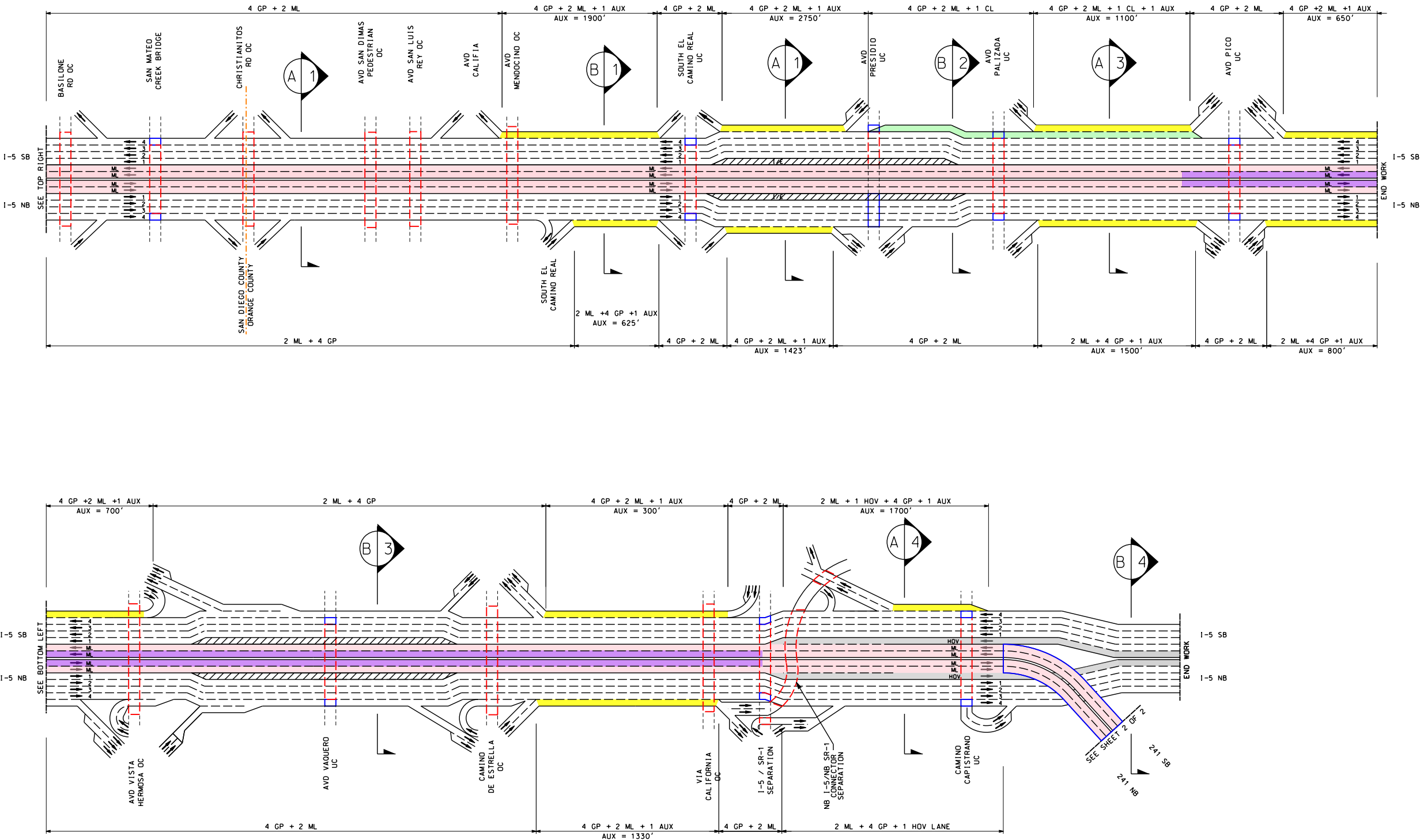
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-2.3:
ALTERNATIVE 13 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT

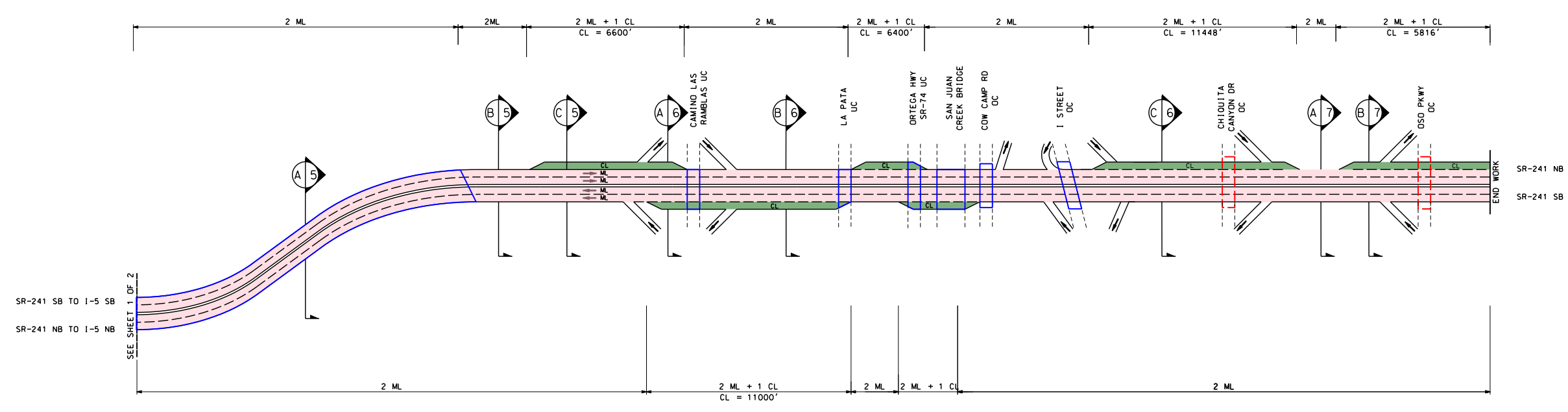


LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILLARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-2.3
ALTERNATIVE 13 – LANE DIAGRAMS
SHEET 2 OF 2

LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILLARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

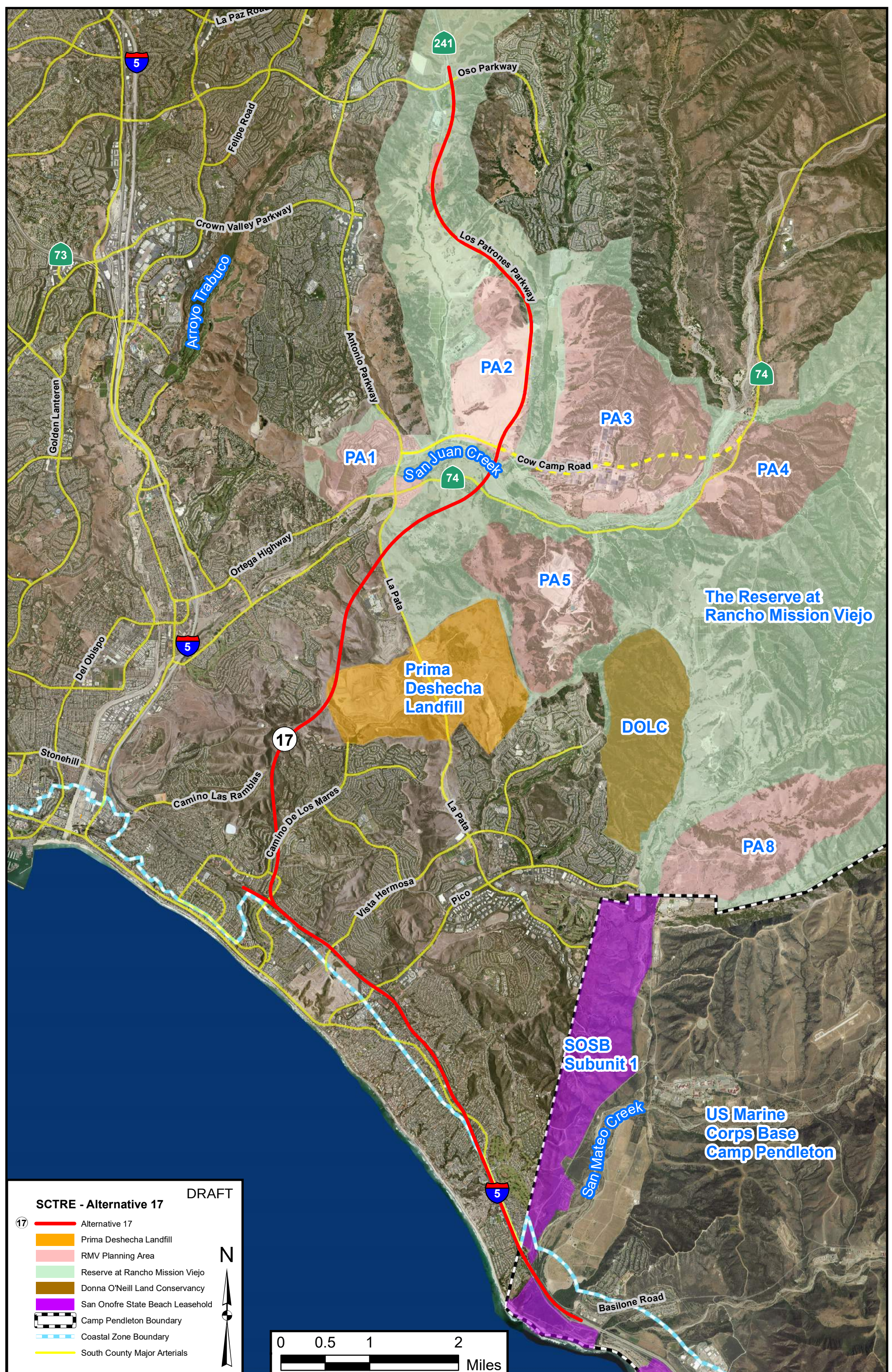
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-3.1:
ALTERNATIVE 17 – LAYOUTS**

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Attachment C-3.1 - Alternative 17 - Layouts



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-3.2:
ALTERNATIVE 17 –CROSS SECTIONS**

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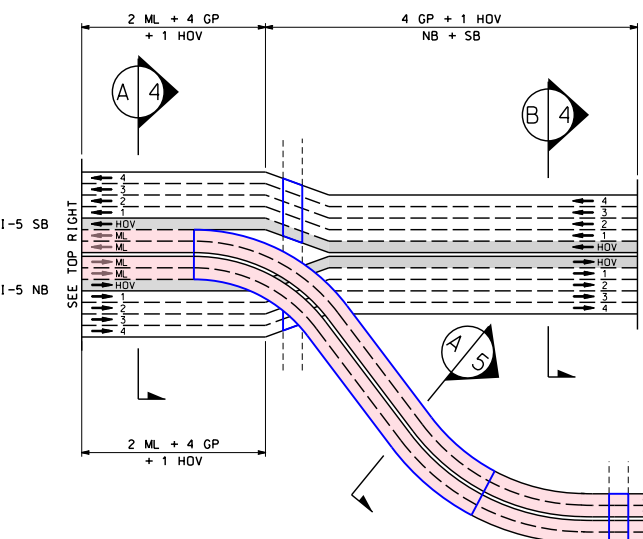
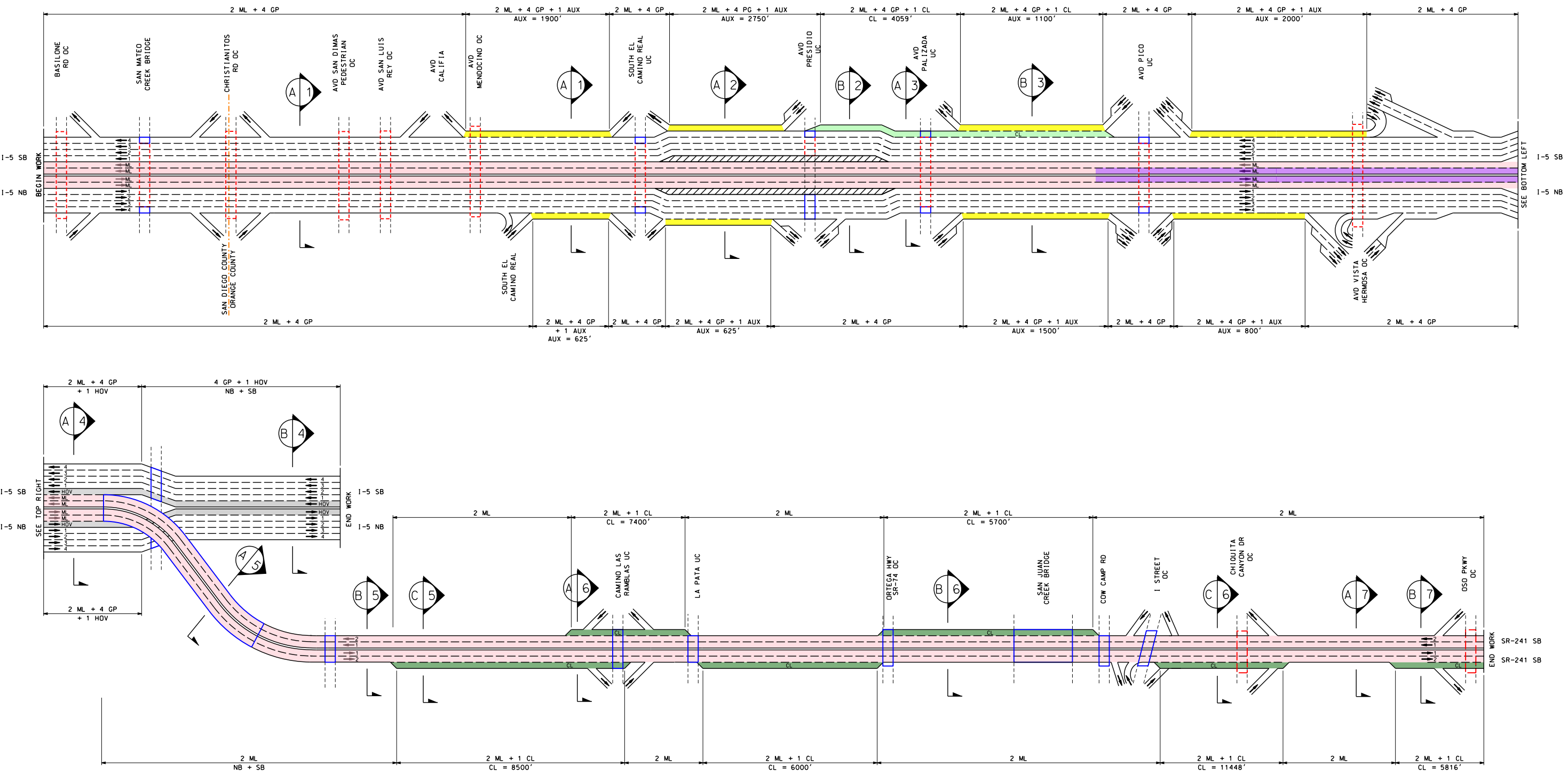
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-3.3:
ALTERNATIVE 17 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:							
	GENERAL PURPOSE LANE ADDITION		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING AUXILLARY LANE (AUX)		PROPOSED CLIMBING LANE (CL)
	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)		PROPOSED INGRESS / EGRESS LANE (I/E)
					DIRECTION OF TRAFFIC		PROPOSED HOV LANE
					NEW STRUCTURE		PROPOSED ARTERIAL LANE
					EXISTING STRUCTURE		

ATTACHMENT C-3.3
ALTERNATIVE 17 – LANE DIAGRAMS

SHEET 1 OF 1

12-ORA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

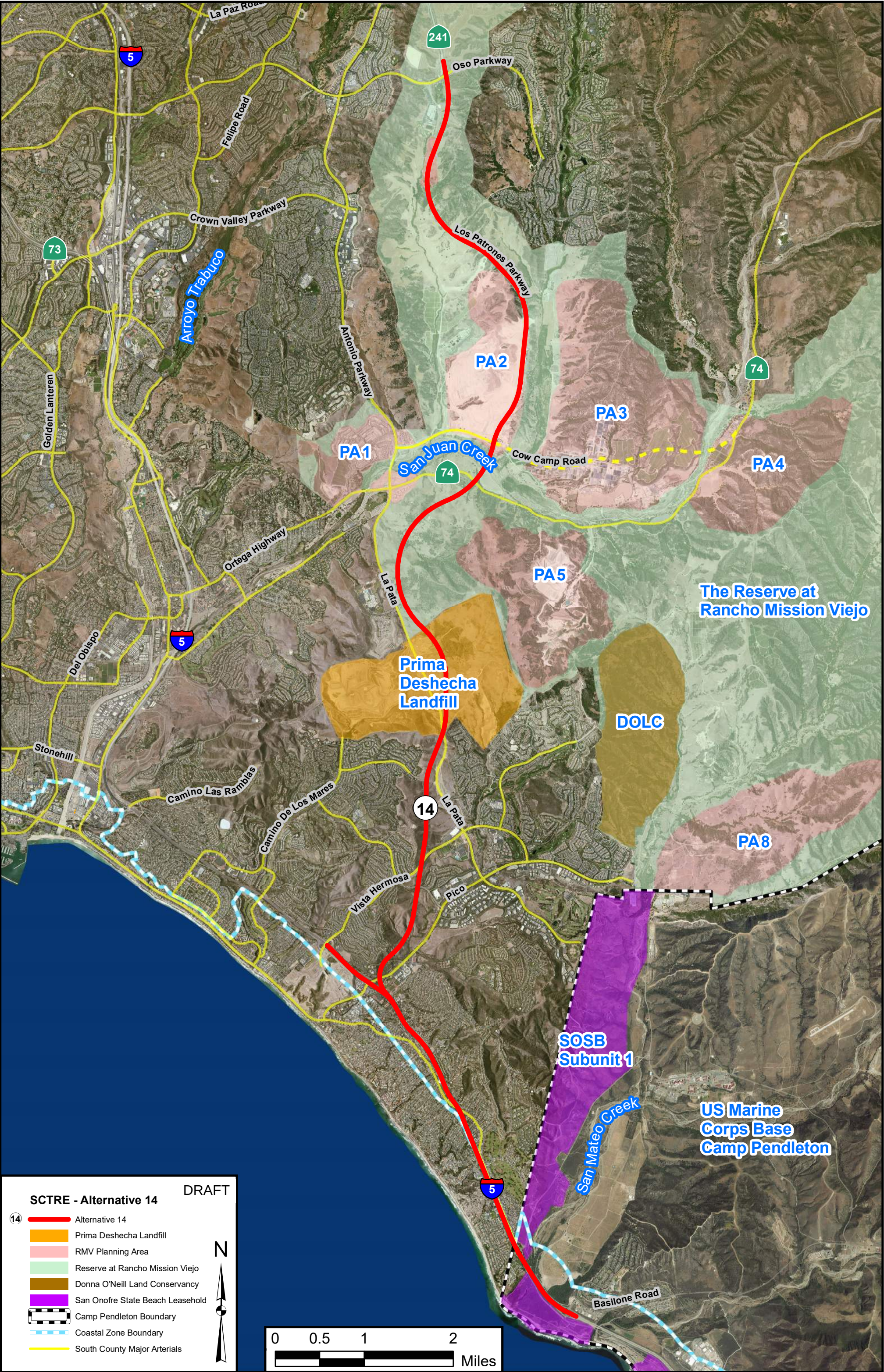
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-4.1:
ALTERNATIVE 14 – LAYOUTS**

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Attachment C-4.1: Alternative 14 - Layouts



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-4.2:
ALTERNATIVE 14 – CROSS SECTIONS**

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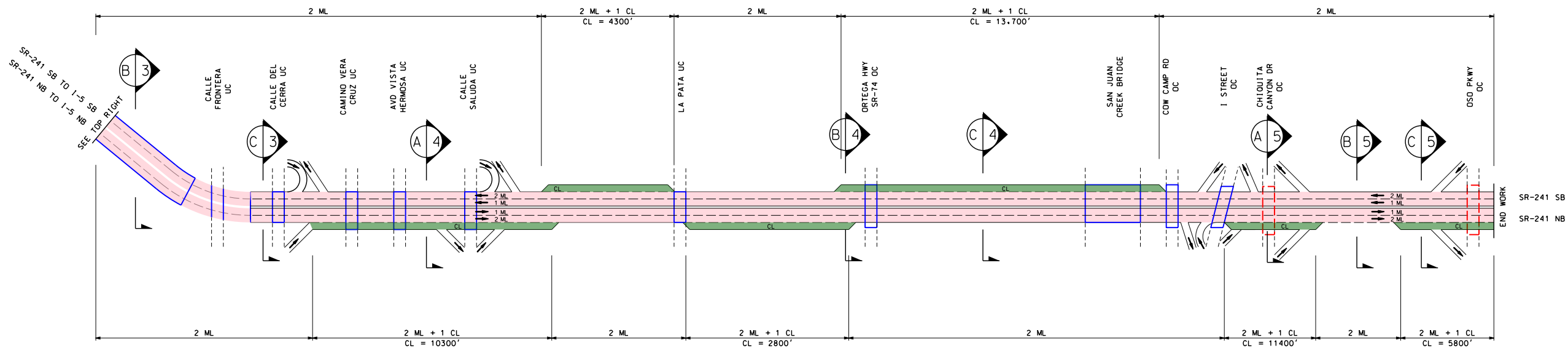
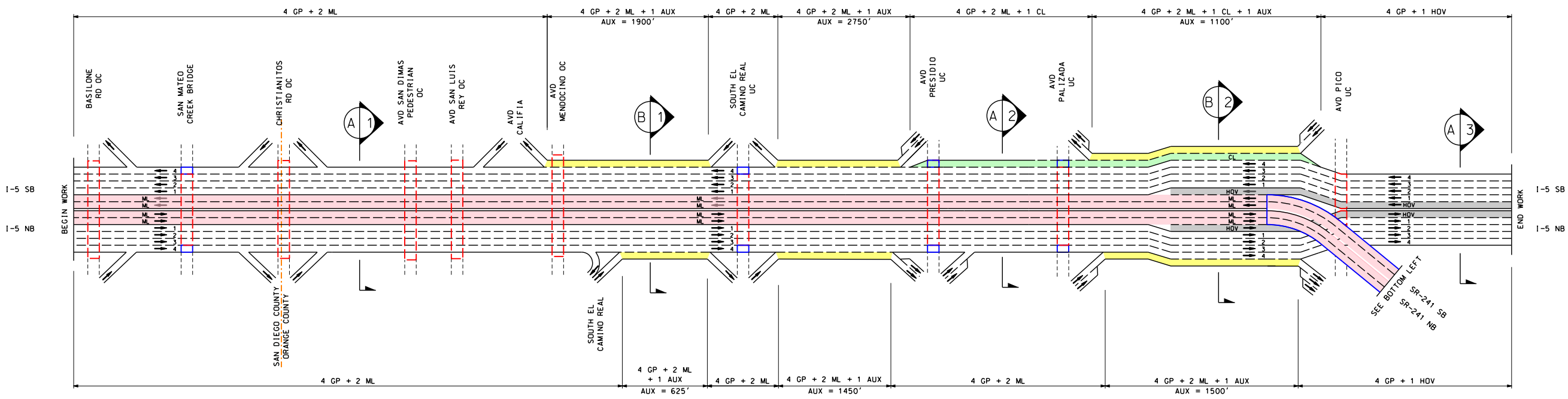
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-4.3:
ALTERNATIVE 14 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:					
	GENERAL PURPOSE LANE ADDITION		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING AUXILLARY LANE (AUX)
	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)
					PROPOSED CLIMBING LANE (CL)
					PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD
					PROPOSED INGRESS / EGRESS LANE (I/E)
					DIRECTION OF TRAFFIC
					NEW STRUCTURE
					EXISTING STRUCTURE
					PROPOSED HOV LANE
					PROPOSED ARTERIAL LANE

ATTACHMENT C-4.3
ALTERNATIVE 14 – LANE DIAGRAMS

SHEET 1 OF 1

12-DRA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-5.1:
ALTERNATIVE 11 – LAYOUTS**

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ATTACHMENT C-5.1: ALTERNATIVE 11 - LAYOUTS



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-5.2:
ALTERNATIVE 11 – CROSS SECTIONS**

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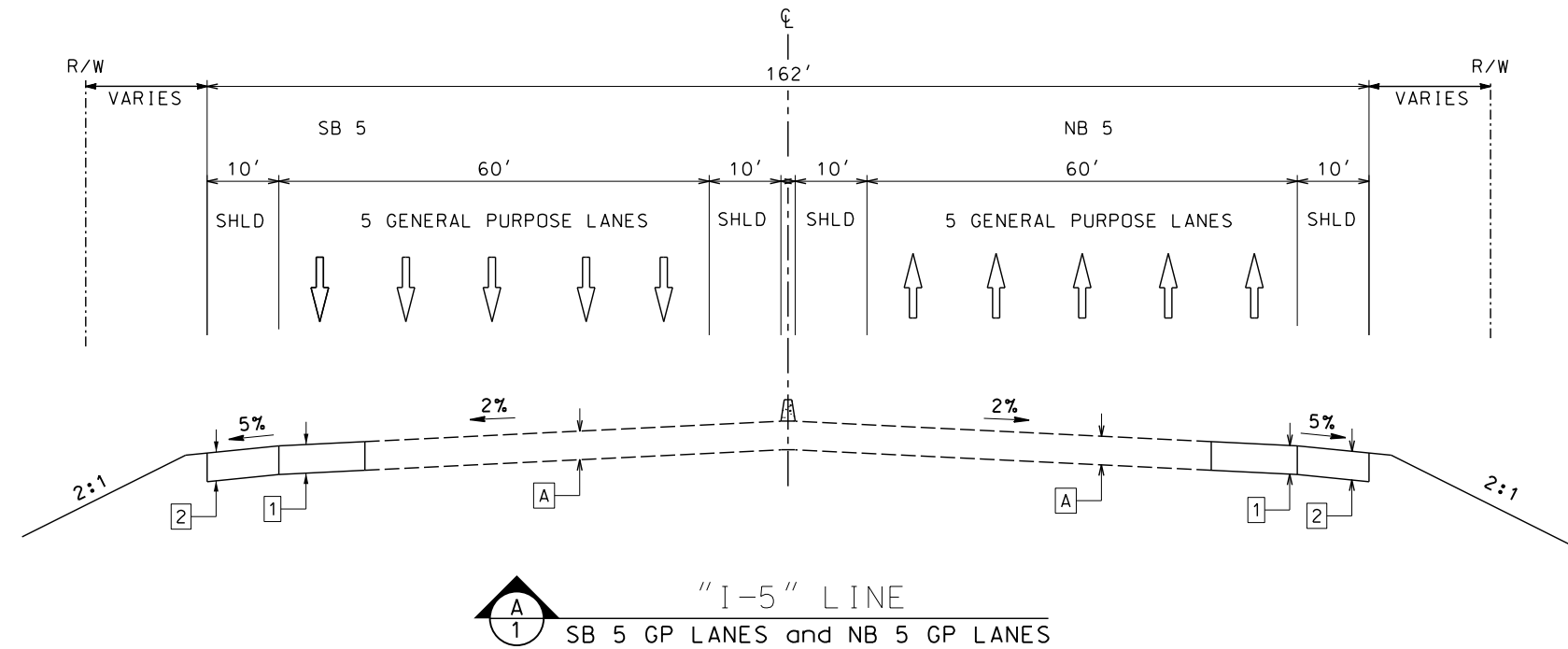
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	241	14.0/15.1		

REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS
OR AGENTS SHALL NOT BE RESPONSIBLE FOR
THE ACCURACY OR COMPLETENESS OF SCANNED
COPIES OF THIS PLAN SHEET.

TRANSPORTATION CORRIDOR AGENCIES
125 PACIFICA, SUITE 100
IRVINE, CA 92618

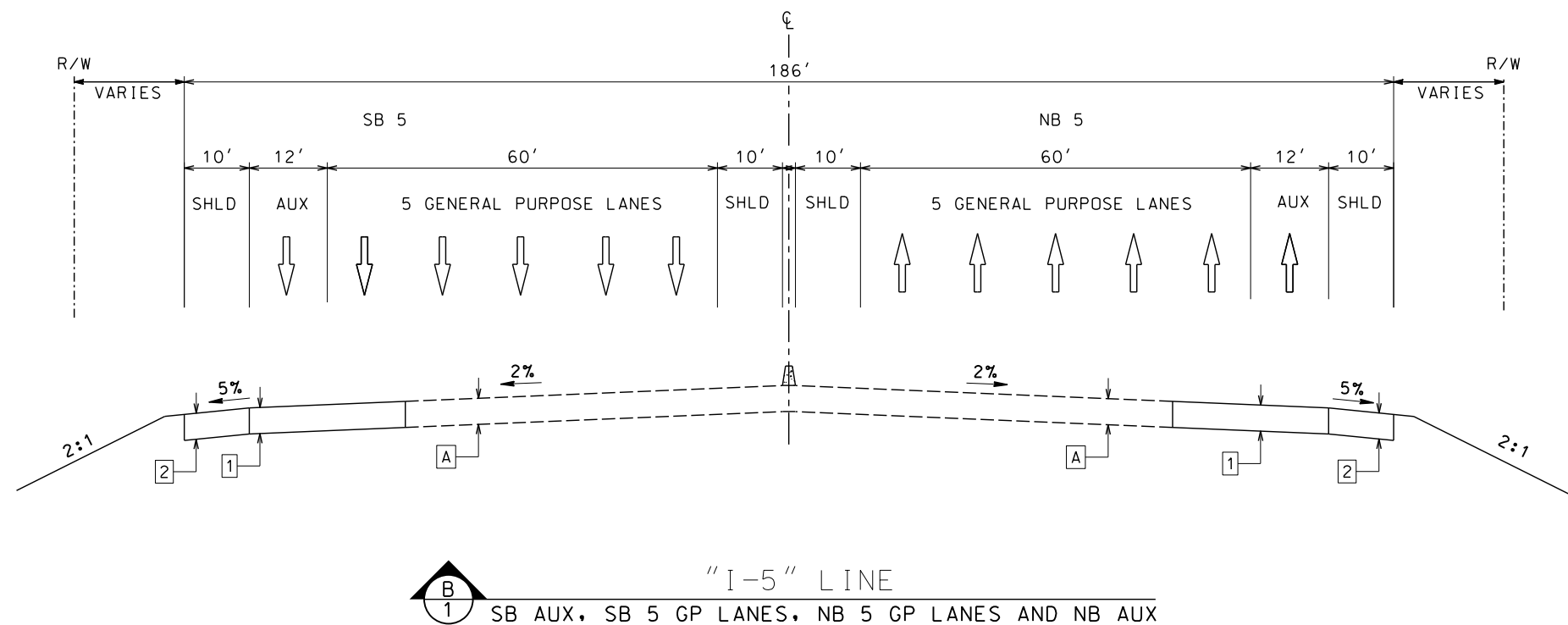


TYPICAL PAVEMENT STRUCTURE SECTIONS

- | | | | | | |
|---|---|-------|-------|---|----|
| 1 | [| 1.00' | JPCP | 3 | AS |
| | | 0.35' | LCB | | |
| | | 0.70' | CLASS | | |
| | | 0.65' | LSS | | |
| 2 | [| 1.00' | HMA-A | 2 | AB |
| | | 2.00' | CLASS | | |

EXISTING PAVEMENT STRUCTURE SECTIONS

- | | | |
|---|-------|-----|
| A | 0.67' | PCC |
| | 0.67' | AB |
| | 0.67' | AS |



ATTACHMENT C-5.2
ALTERNATIVE 11 - CROSS SECTIONS

NO SCALE

$$X-1$$

NOTE: SEE ATTACHMENT C-5.3 FOR SECTION LOCATIONS

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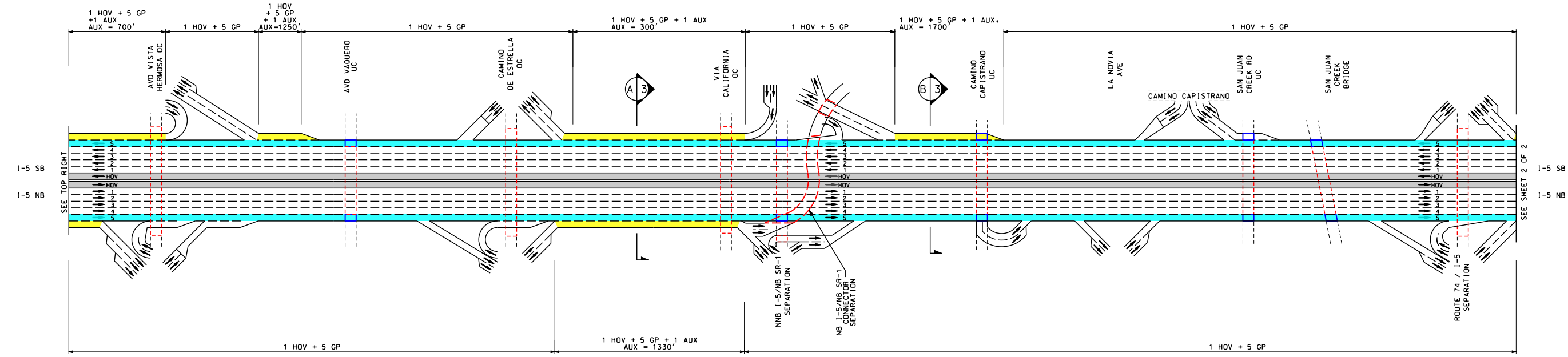
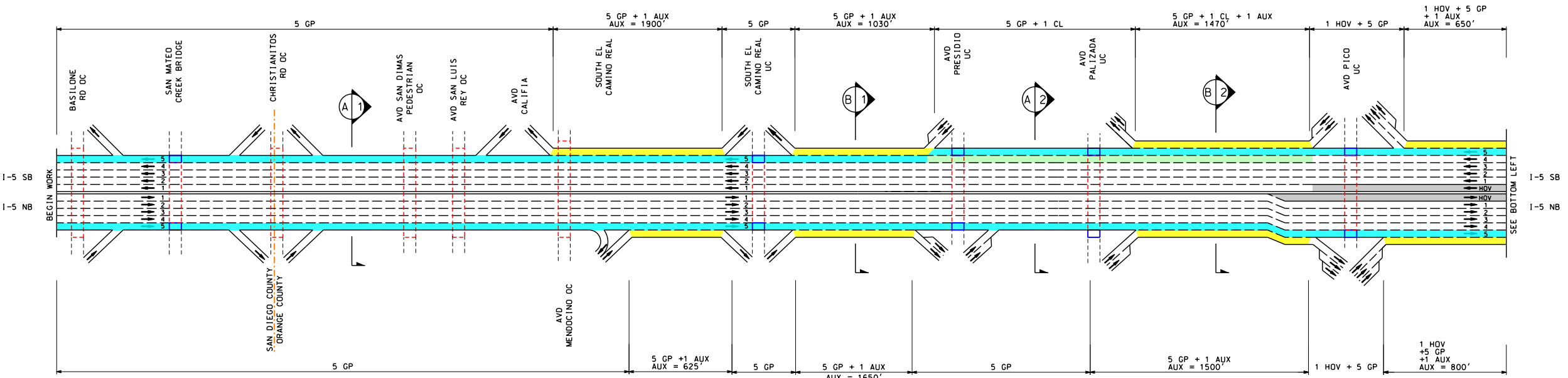
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-5.3:
ALTERNATIVE 11 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILLARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

ATTACHMENT C-5.3
ALTERNATIVE 11 – LANE DIAGRAMS

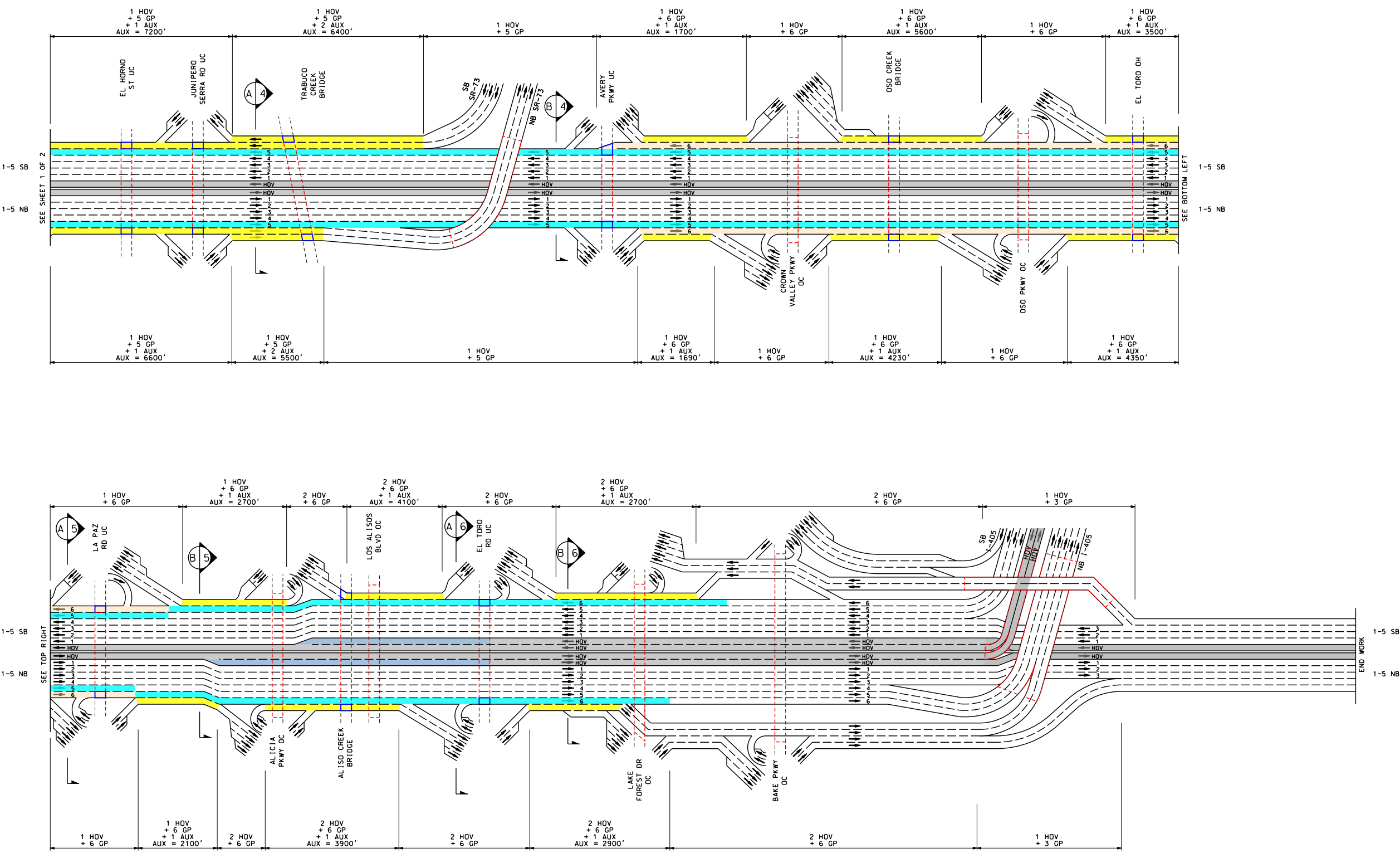
SHEET 1 OF 2

12-DRA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-5.3
ALTERNATIVE 11 – LANE DIAGRAMS

SHEET 2 OF 2

LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILLARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

12-DRA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

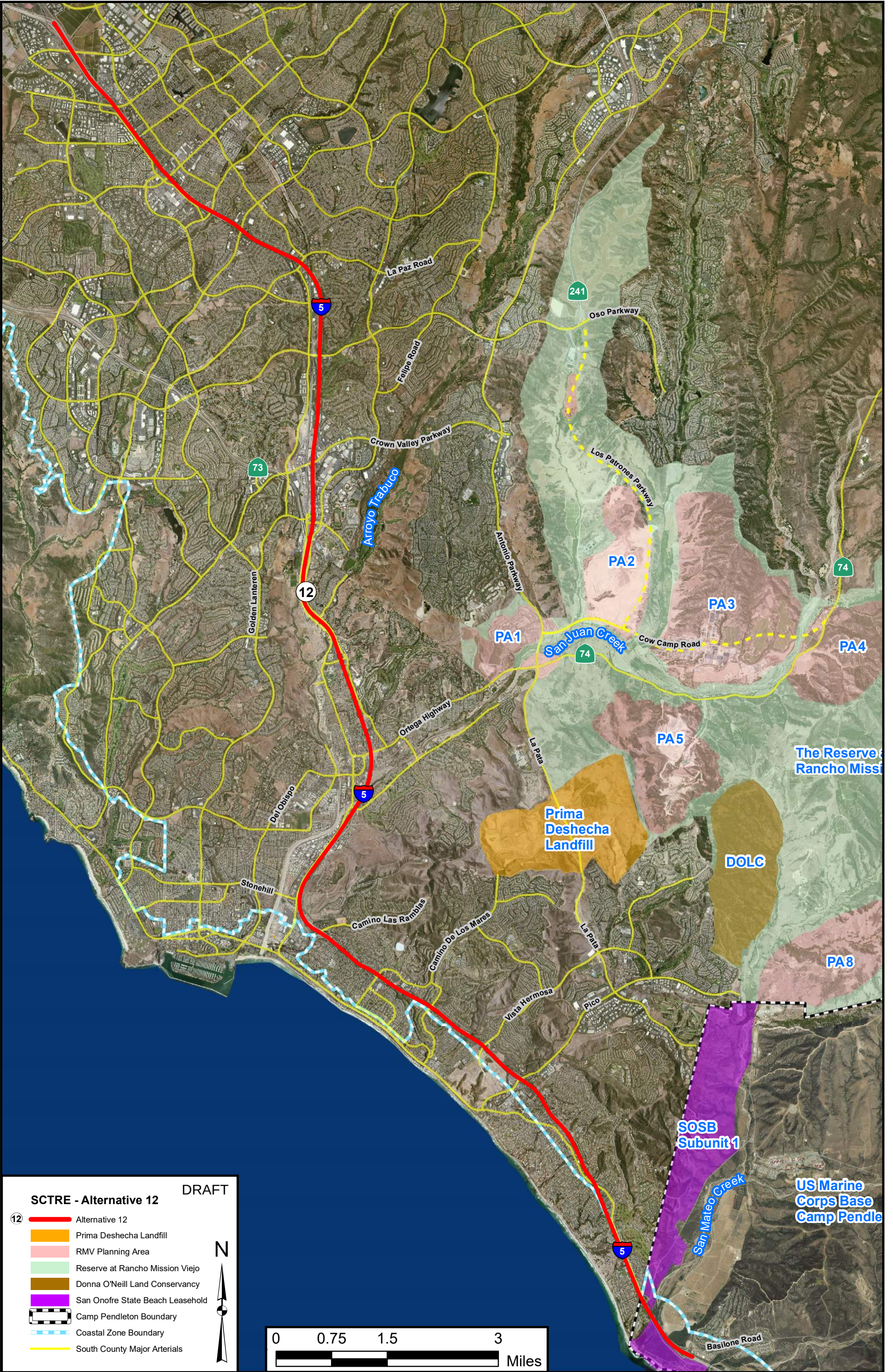
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-6.1:
ALTERNATIVE 12 – LAYOUTS**

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Attachment C-6.1: Alternative 12 - Layouts



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-6.2:
ALTERNATIVE 12 – CROSS SECTIONS**

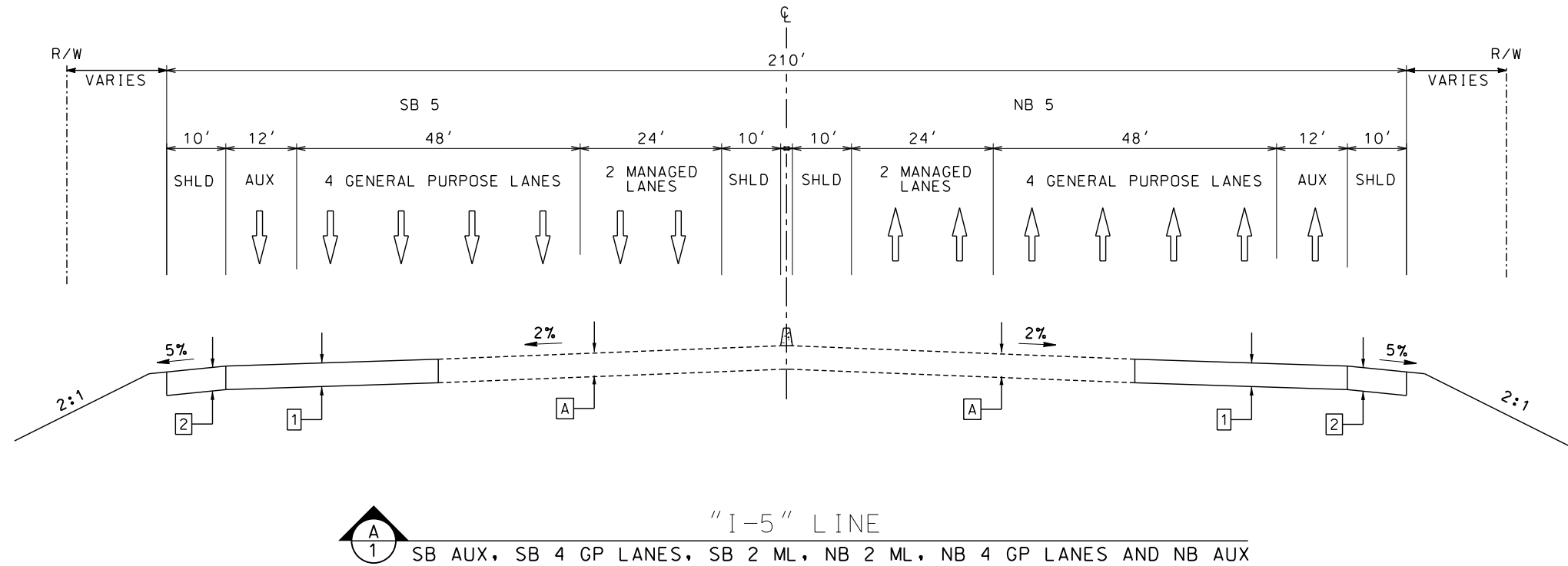
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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	ORA	241	14.0/15.1		

REGISTERED CIVIL ENGINEER DATE	
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS
OR AGENTS SHALL NOT BE RESPONSIBLE FOR
THE ACCURACY OR COMPLETENESS OF SCANNED
COPIES OF THIS PLAN SHEET.

TRANSPORTATION CORRIDOR AGENCIES
125 PACIFICA, SUITE 100
IRVINE, CA 92618

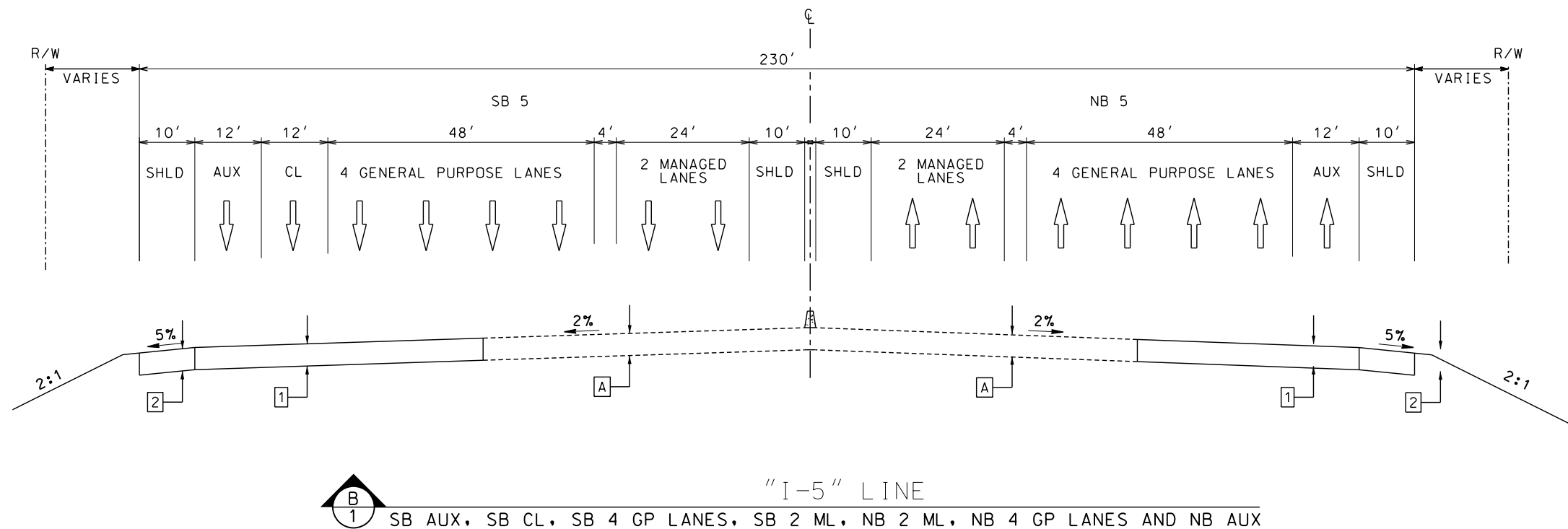


TYPICAL PAVEMENT STRUCTURE SECTIONS

- | | | | | |
|---|---|--------------|---|----|
| 1 | [| 1.00', JCP | 3 | AS |
| | | 0.35', LCB | | |
| | | 0.70', CLASS | | |
| | | 0.65', LSS | | |
| | | | | |
| 2 | [| 1.00', HMA-A | 2 | AB |
| | | 2.00', CLASS | | |

EXISTING PAVEMENT STRUCTURE SECTIONS

-



ATTACHMENT C-6.2
ALTERNATIVE 12 – CROSS SECTIONS

NO SCALE

$$X-1$$

NOTE: SEE ATTACHMENT C-6.3 FOR SECTION LOCATIONS

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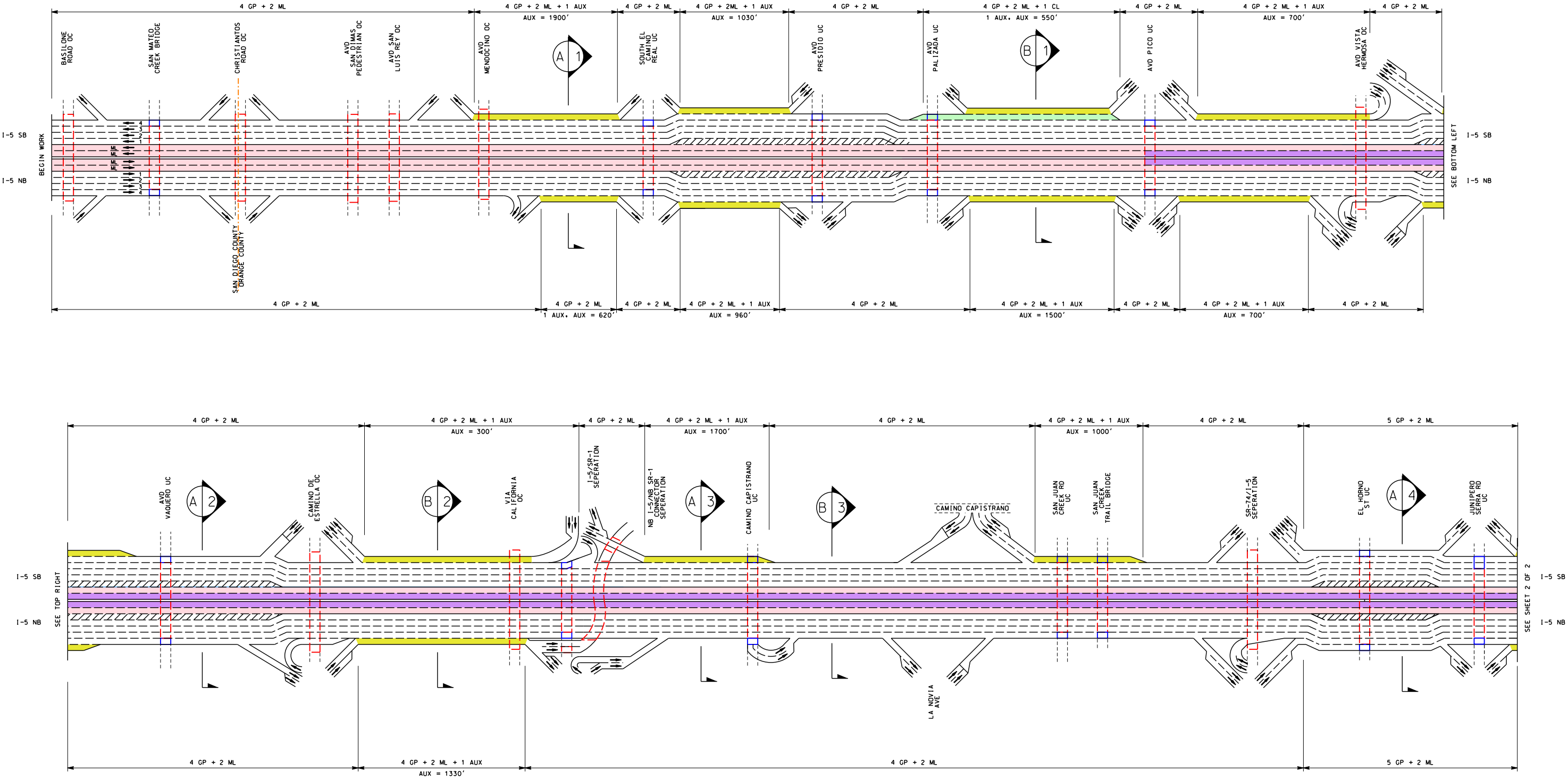
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-6.3:
ALTERNATIVE 12 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-6.3
ALTERNATIVE 12 - LANE DIAGRAMS

SHEET 1 OF 2

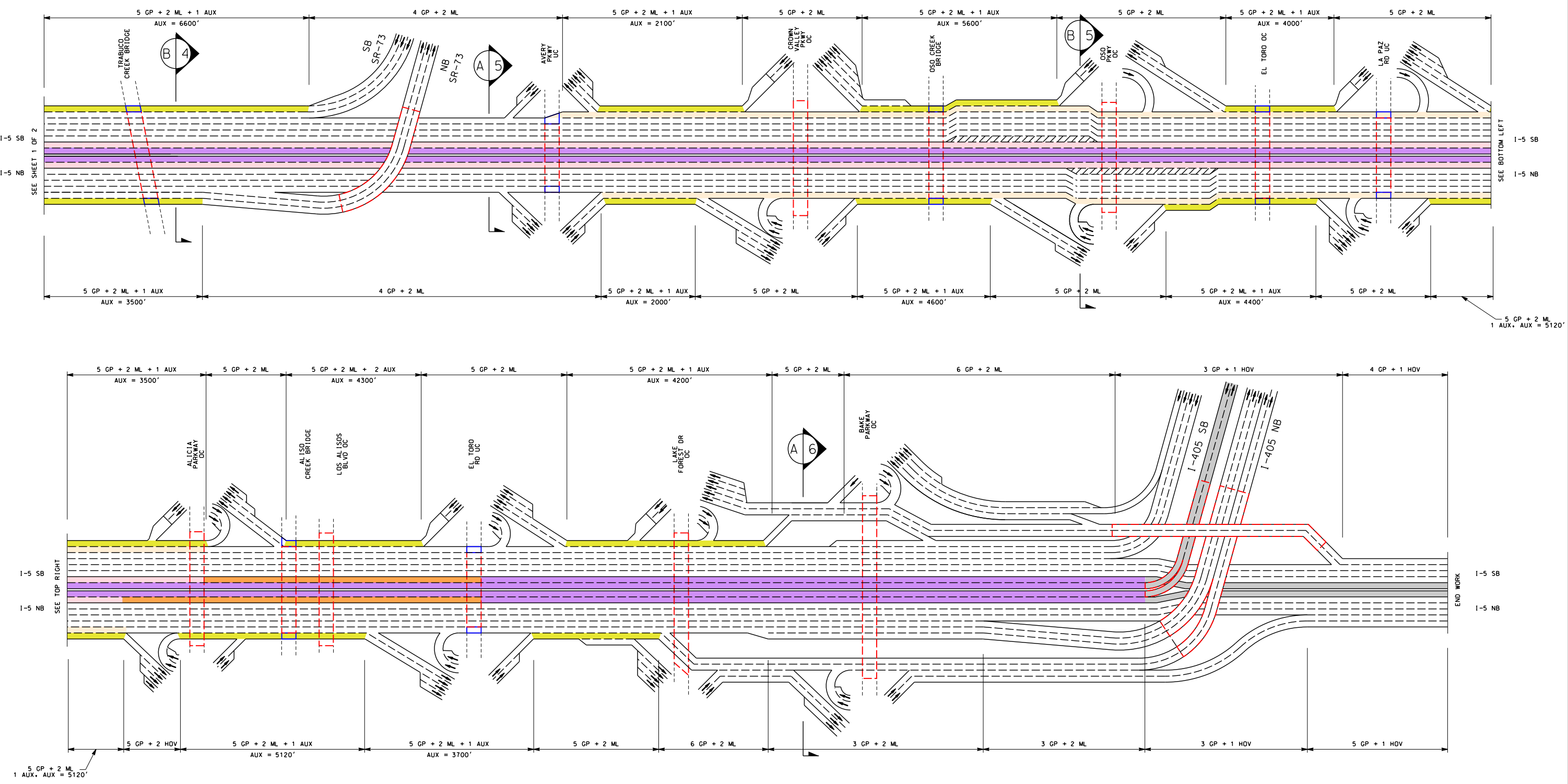
LEGEND:					
	GENERAL PURPOSE LANE ADDITION		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING AUXILLARY LANE (AUX)
	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)
					PROPOSED CLIMBING LANE (CL)
					PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD
					PROPOSED INGRESS / EGRESS LANE (I/E)
					DIRECTION OF TRAFFIC
					NEW STRUCTURE
					EXISTING STRUCTURE
					PROPOSED HOV LANE
					PROPOSED ARTERIAL LANE

12-ORA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:

GENERAL PURPOSE LANE ADDITION	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE	EXISTING AUXILIARY LANE (AUX)	PROPOSED CLIMBING LANE (CL)	DIRECTION OF TRAFFIC	PROPOSED HOV LANE
EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE	PROPOSED DIRECT ACCESS RAMP (DAR)	PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	NEW STRUCTURE	PROPOSED ARTERIAL LANE
MANAGED LANE (ML), TOLL LANE OR HOV LANE	PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD	EXISTING CLIMBING LANE (CL)	PROPOSED INGRESS / EGRESS LANE (I/E)	EXISTING STRUCTURE	

ATTACHMENT C-6.3
ALTERNATIVE 12 - LANE DIAGRAMS

SHEET 2 OF 2

12-DRA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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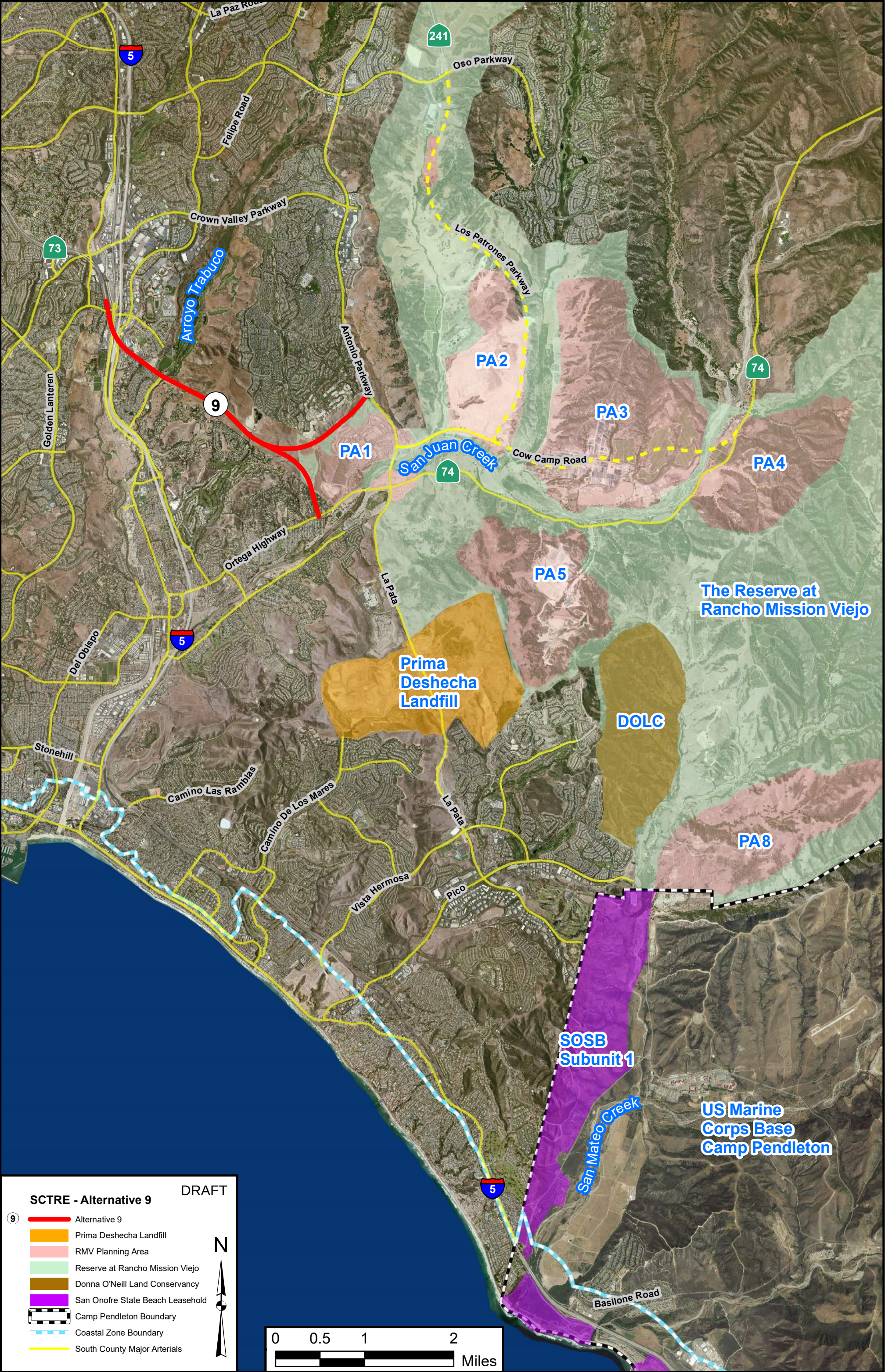
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-7.1:
ALTERNATIVE 9 – LAYOUTS**

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ATTACHMENT C-7.1: ALTERATIVE 9 - LAYOUTS



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-7.2:
ALTERNATIVE 9 – CROSS SECTIONS**

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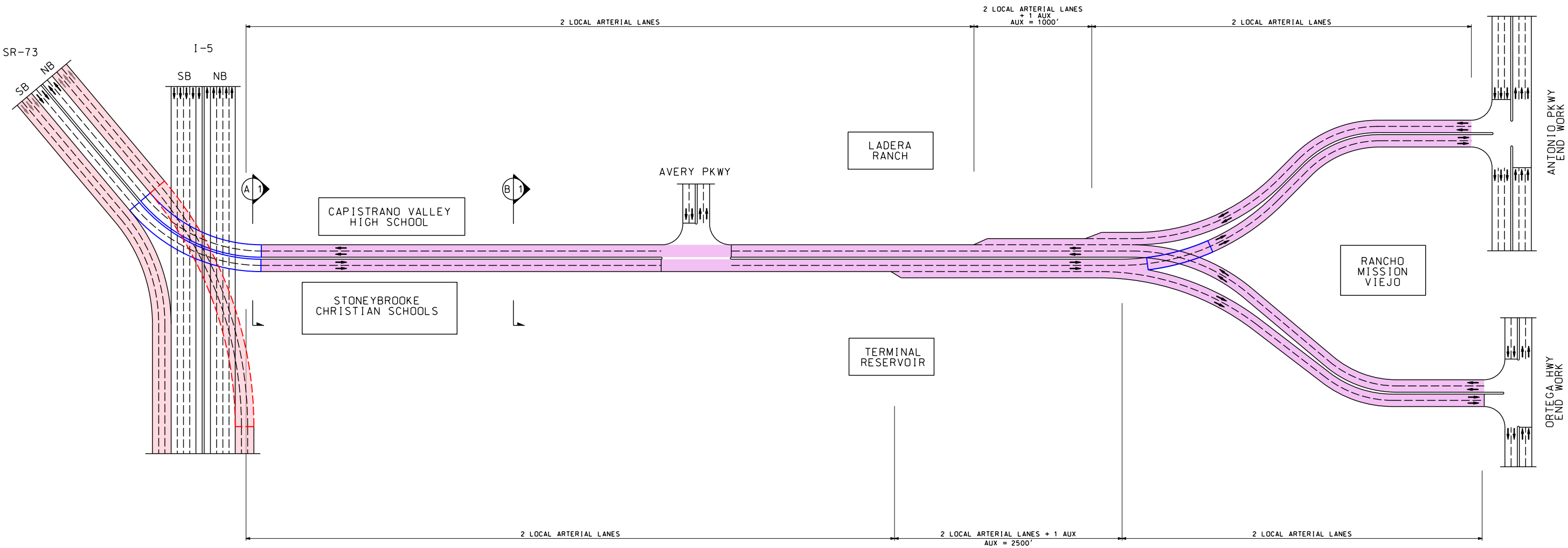
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-7.3:
ALTERNATIVE 9 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



LEGEND:

GENERAL PURPOSE LANE ADDITION

EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE

MANAGED LANE (ML), TOLL LANE OR HOV LANE

EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE

PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE

PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD

EXISTING AUXILLARY LANE (AUX)

PROPOSED DIRECT ACCESS RAMP (DAR)

EXISTING CLIMBING LANE (CL)

PROPOSED CLIMBING LANE (CL)

PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD

PROPOSED INGRESS / EGRESS LANE (I/E)

DIRECTION OF TRAFFIC

NEW STRUCTURE

EXISTING STRUCTURE

PROPOSED HOV LANE

PROPOSED ARTERIAL LANE

ATTACHMENT C-7.3
ALTERNATIVE 9 – LANE DIAGRAMS

SHEET 1 OF 1

12-ORA-5 PM 0-22.2
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-8.1:
ALTERNATIVE 18 – LAYOUTS**

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Attachment C-8.1: Alternative 18 - Layouts

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-8.2:
ALTERNATIVE 18 – CROSS SECTIONS**

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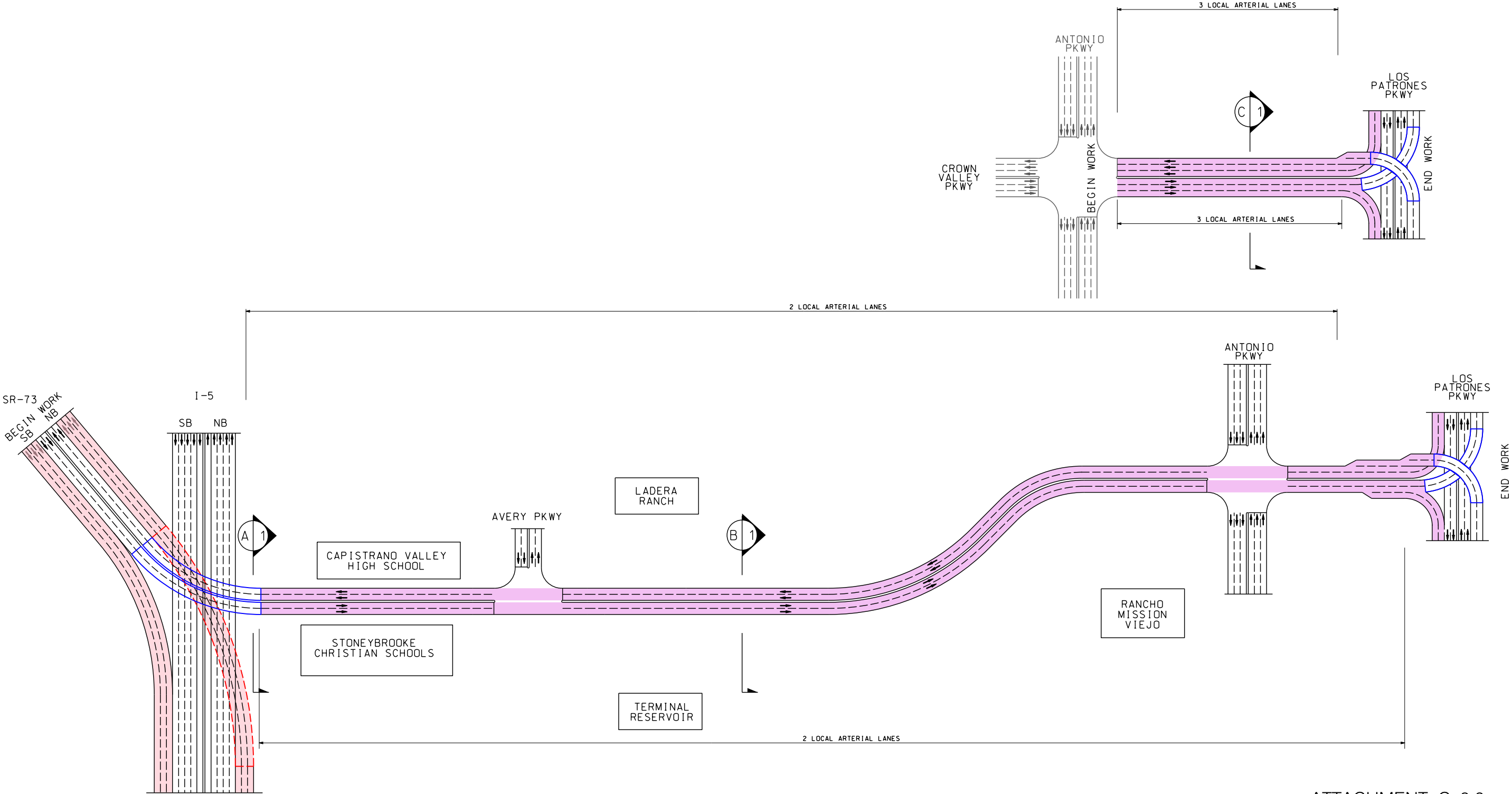
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-8.3:
ALTERNATIVE 18 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-8.3
ALTERNATIVE 18 – LANE DIAGRAMS

SHEET 1 OF 1

LEGEND:					
	GENERAL PURPOSE LANE ADDITION		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING AUXILLARY LANE (AUX)
	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)
			PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		PROPOSED INGRESS / EGRESS LANE (I/E)
	DIRECTION OF TRAFFIC		NEW STRUCTURE		PROPOSED ARTERIAL LANE
	EXISTING STRUCTURE				

12-ORA-73 PM 10.3-11.3

NO SCALE
SCHEMATICS

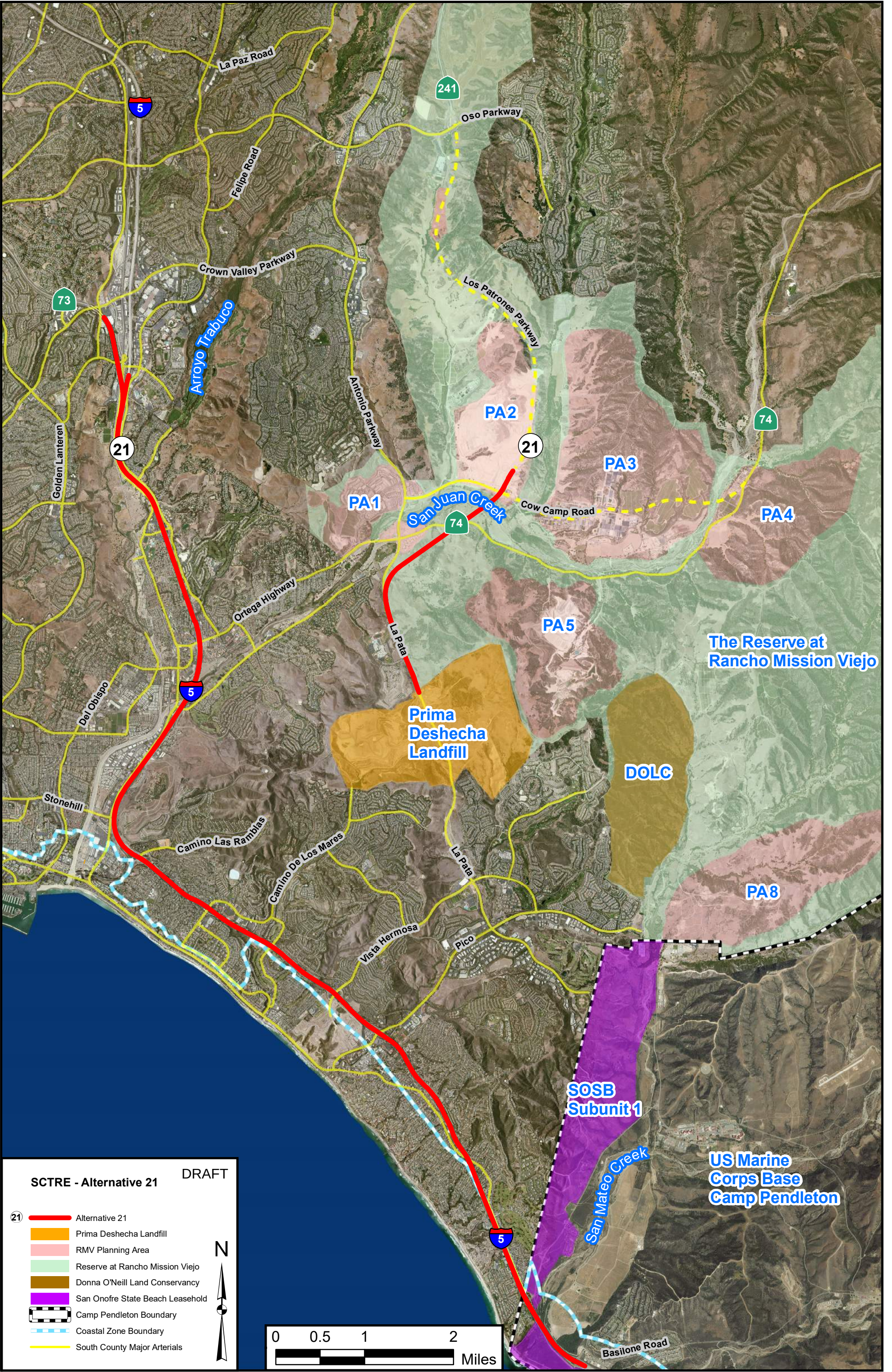
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-9.1:
ALTERNATIVE 21 – LAYOUTS**

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Attachment C-9.1: Alternative 21 - Layouts



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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-9.2:
ALTERNATIVE 21 – CROSS SECTIONS**

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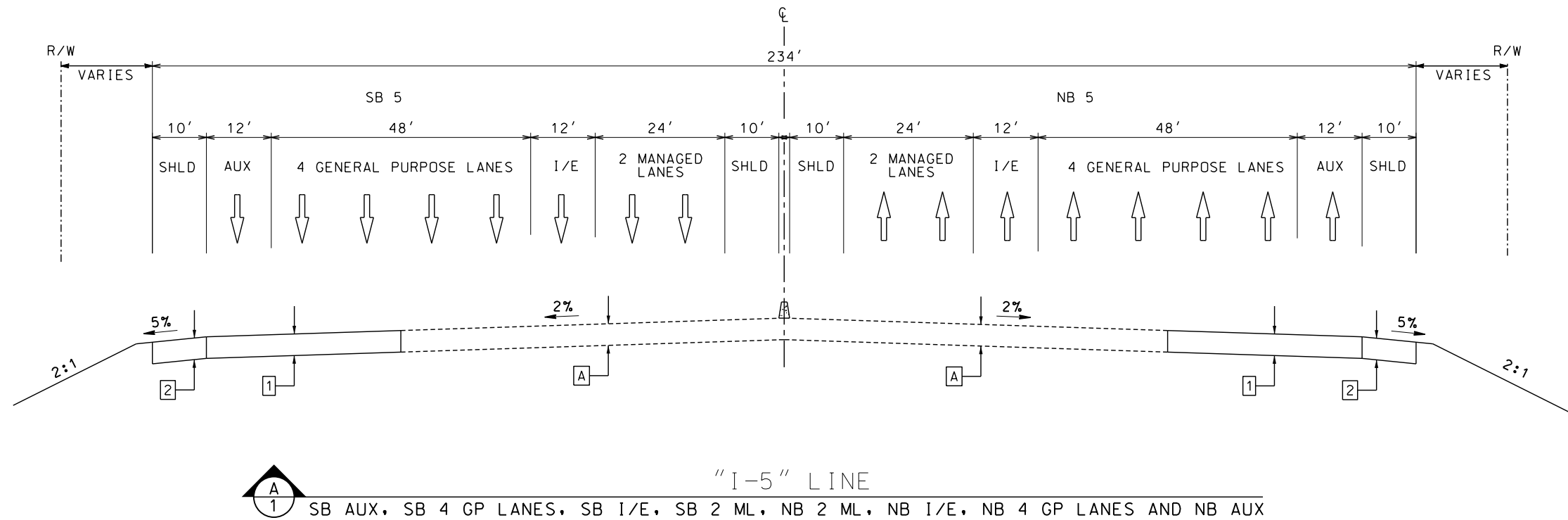
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	ORA	241	14.0/15.1		

REGISTERED CIVIL ENGINEER DATE _____
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS
OR AGENTS SHALL NOT BE RESPONSIBLE FOR
THE ACCURACY OR COMPLETENESS OF SCANNED
COPIES OF THIS PLAN SHEET.

TRANSPORTATION CORRIDOR AGENCIES
125 PACIFICA, SUITE 100
IRVINE, CA 92618

Professional Engineer Seal: REGISTERED PROFESSIONAL ENGINEER, No. _____, Exp. _____, CIVIL, STATE OF CALIFORNIA

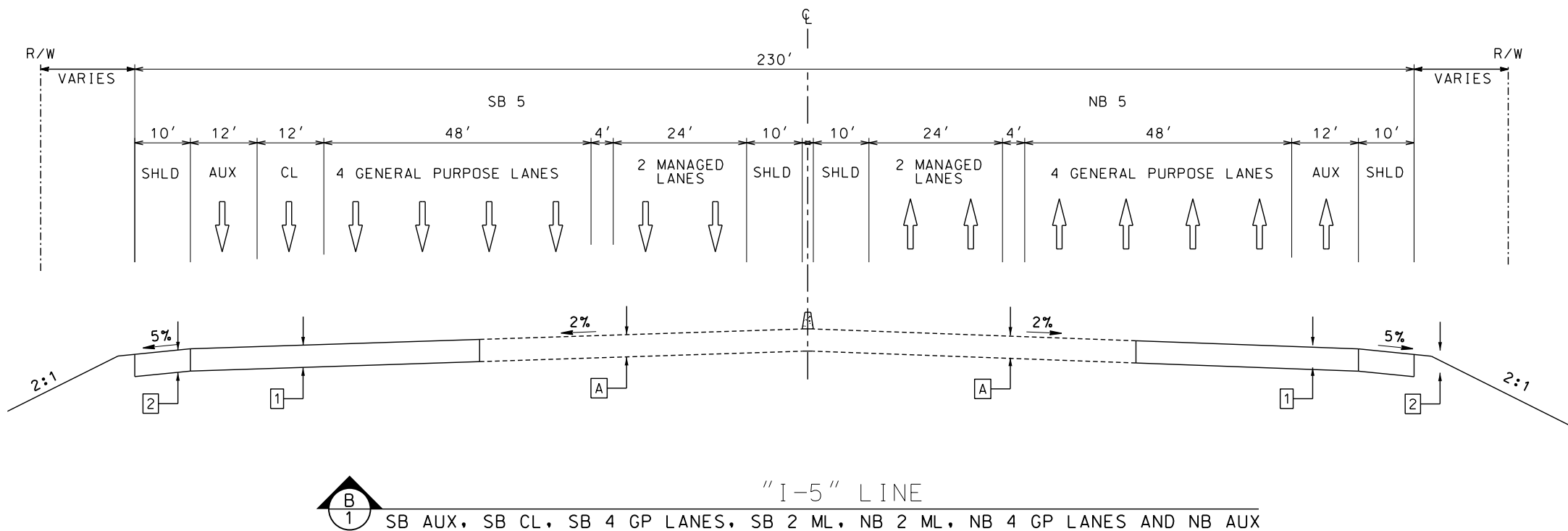


TYPICAL PAVEMENT STRUCTURE SECTIONS

- | | | | | | |
|---|---|-------|-------|---|----|
| 1 | [| 1.00' | JPCP | 3 | AS |
| | | 0.35' | LCB | | |
| | | 0.70' | CLASS | | |
| | | 0.65' | LSS | | |
| 2 | [| 1.00' | HMA-A | 2 | AB |
| | | 2.00' | CLASS | | |

EXISTING PAVEMENT STRUCTURE SECTIONS

- | | | |
|---|-------|-----|
| A | 0.67' | PCC |
| | 0.67' | AB |
| | 0.67' | AS |



ATTACHMENT C-9.2
ALTERNATIVE 21 – CROSS SECTIONS

NOTE: SEE ATTACHMENT C-9.3 FOR SECTION LOCATIONS

NO SCALE

 $x-1$

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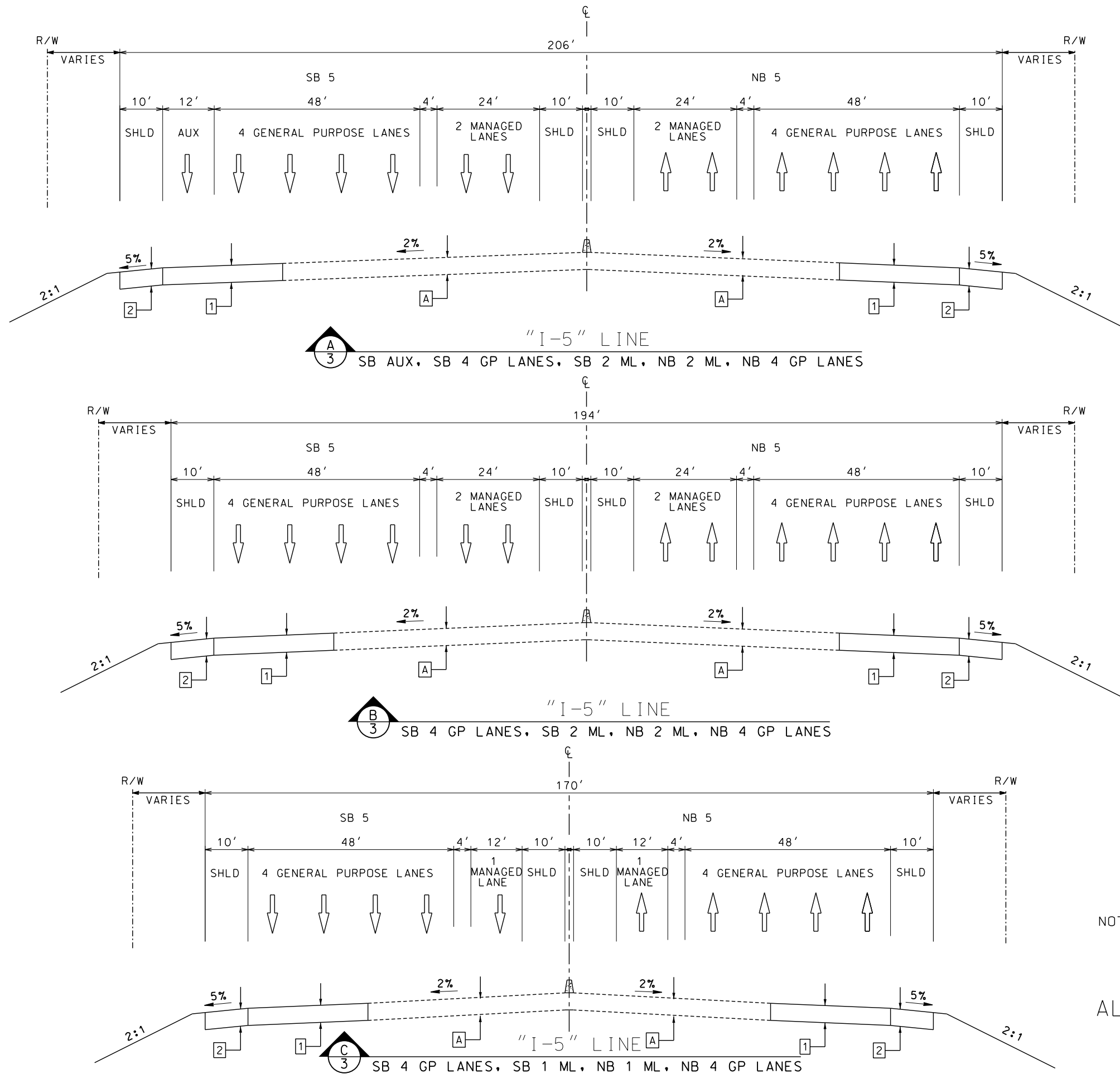
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	ORA	241	14.0/15.1		

REGISTERED CIVIL ENGINEER DATE _____
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS
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THE ACCURACY OR COMPLETENESS OF SCANNED
COPIES OF THIS PLAN SHEET.

TRANSPORTATION CORRIDOR AGENCIES
125 PACIFICA, SUITE 100
IRVINE, CA 92618

Professional Engineer Seal (State of California, Civil Engineering). The seal includes fields for 'No.' and 'Exp.'.



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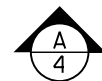
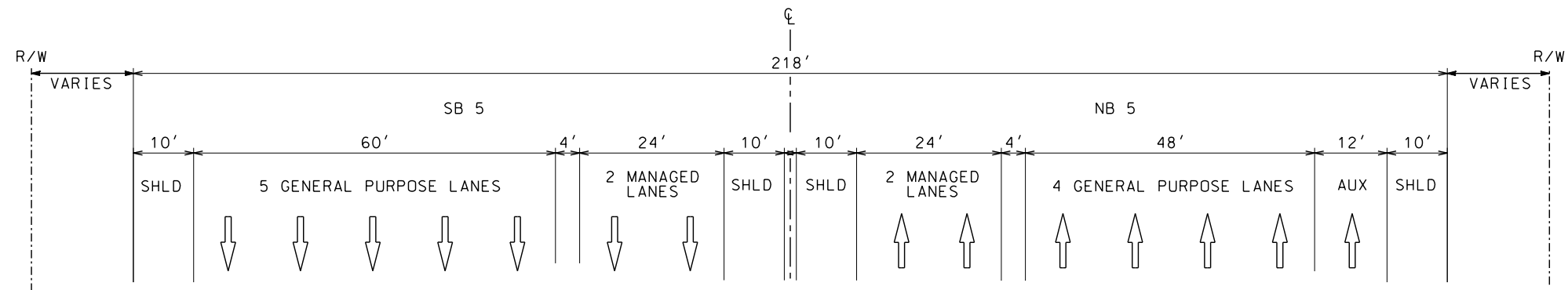
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
12	ORA	241	14.0/15.1		

REGISTERED CIVIL ENGINEER DATE _____
PLANS APPROVAL DATE _____

THE STATE OF CALIFORNIA OR ITS OFFICERS
OR AGENTS SHALL NOT BE RESPONSIBLE FOR
THE ACCURACY OR COMPLETENESS OF SCANNED
COPIES OF THIS PLAN SHEET.

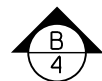
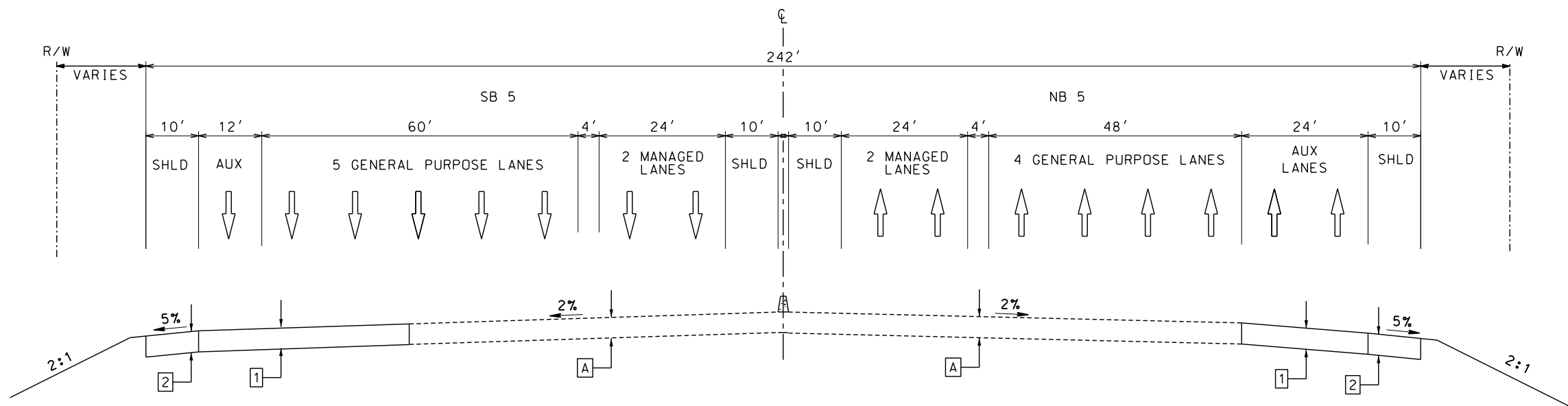
TRANSPORTATION CORRIDOR AGENCIES
125 PACIFICA, SUITE 100
IRVINE, CA 92618

Professional Engineer Seal: REGISTERED PROFESSIONAL ENGINEER, No. _____, Exp. _____, CIVIL, STATE OF CALIFORNIA



" I - 5 " L I N E

SB 5 GP LANES, SB 2 ML, NB 2 ML, NB 4 GP LANES AND NB AUX



"I-5" LINE

SB AUX, SB 5 GP LANES, SB 2 ML, NB 2ML, NB 4 GP LANES AND NB 2 AUX LANES

ATTACHMENT C-9.2
ALTERNATIVE 21 - CROSS SECTIONS

NO SCALE

X-4

NOTE: SEE ATTACHMENT C-9.3 FOR SECTION LOCATIONS

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DGN FILE =C $FILES$

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RELATIVE BORDER SCALE
IS IN INCHES

UNIT 0000

DRAFT

BORDER LAST REVISED 7/2/2010

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TIME PLOTTED =	C\$TIMES
LAST REVISION	
00-00-00	

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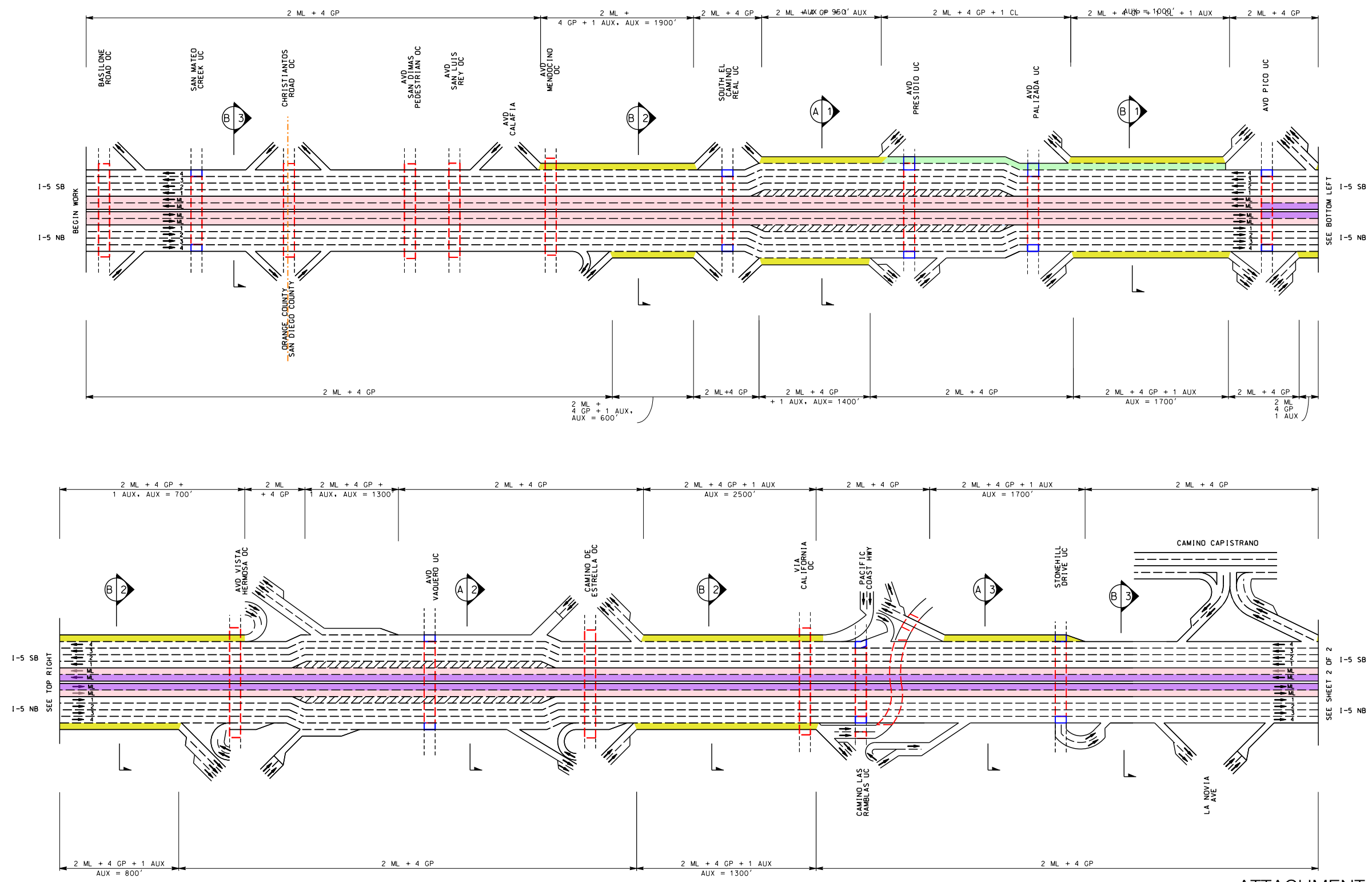
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT C-9.3:
ALTERNATIVE 21 – LANE DIAGRAMS**

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-9.3
ALTERNATIVE 21 – LANE DIAGRAMS

SHEET 1 OF 2

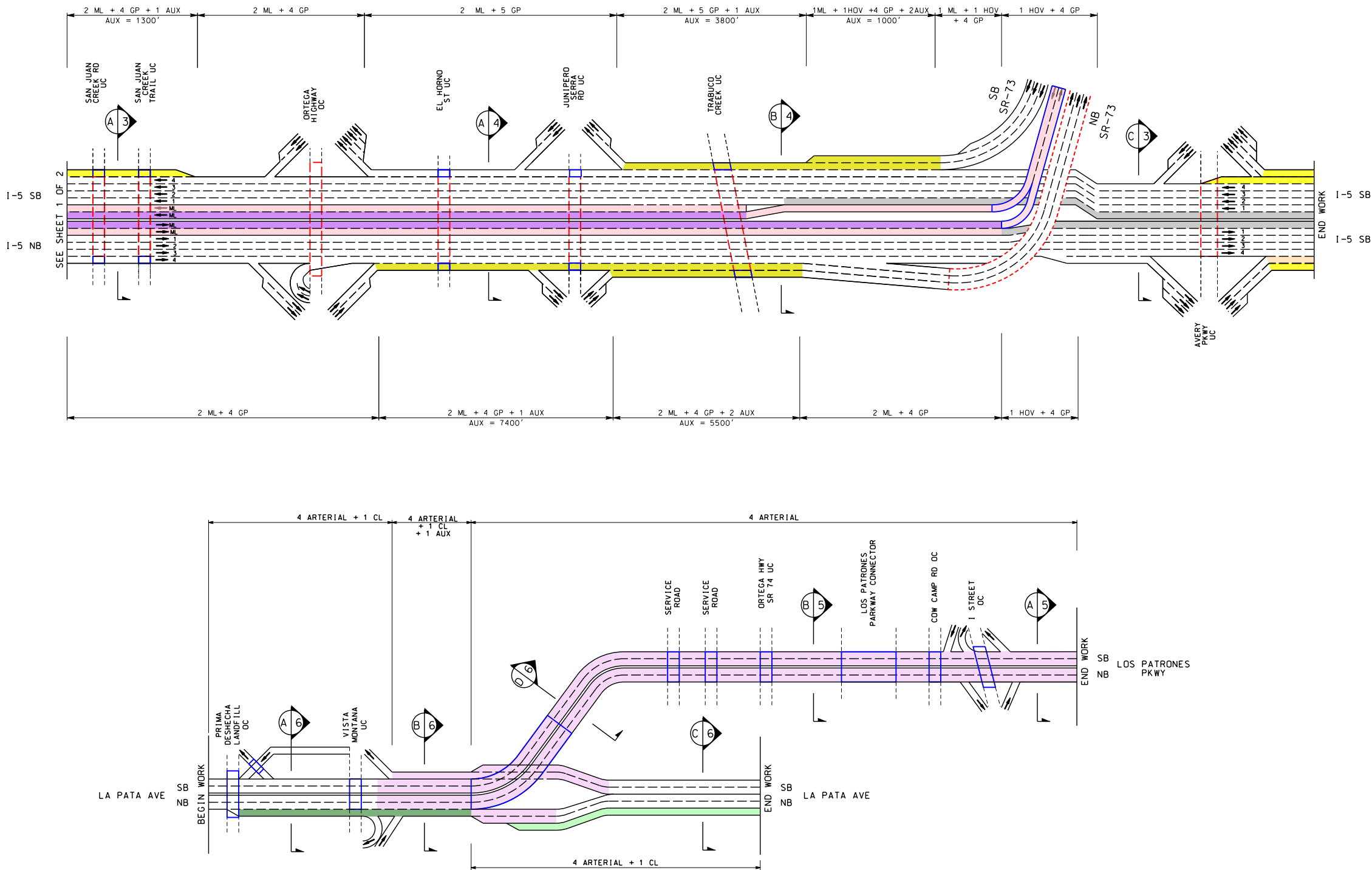
LEGEND:					
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	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)
					PROPOSED CLIMBING LANE (CL)
					PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD
					PROPOSED INGRESS / EGRESS LANE (I/E)
					DIRECTION OF TRAFFIC
					NEW STRUCTURE
					EXISTING STRUCTURE
					PROPOSED ARTERIAL LANE

12-ORA-5 PM 0-12.89
12-ORA-73 PM 10.3-11.3
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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SOUTH COUNTY TRAFFIC RELIEF EFFORT



ATTACHMENT C-9.3
ALTERNATIVE 21 – LANE DIAGRAMS

SHEET 2 OF 2

LEGEND:											
	GENERAL PURPOSE LANE ADDITION		EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE TO BE CONVERTED TO MANAGED LANE		EXISTING AUXILLARY LANE (AUX)		PROPOSED CLIMBING LANE (CL)		DIRECTION OF TRAFFIC		PROPOSED HOV LANE
	EXISTING HIGH OCCUPANCY VEHICLE (HOV) LANE		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD - TO BE CONVERTED TO MANAGED LANE		PROPOSED DIRECT ACCESS RAMP (DAR)		PROPOSED HOV LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		NEW STRUCTURE		PROPOSED ARTERIAL LANE
	MANAGED LANE (ML), TOLL LANE OR HOV LANE		PROPOSED GENERAL PURPOSE LANE FROM OCTA PROJECT J WIDENING SR-73 TO EL TORO RD		EXISTING CLIMBING LANE (CL)		PROPOSED INGRESS / EGRESS LANE (I/E)		EXISTING STRUCTURE		

12-ORA-5 PM 0-12.89
12-ORA-73 PM 10.3-11.3
11-SD-5 PM 71.3-72.4

NO SCALE
SCHEMATICS

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D:
COST ESTIMATES – CAPITAL OUTLAY PROJECT ESTIMATES

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-1:
ALTERNATIVE 13 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support

Capital Outlay Project Estimate – Alternative 13

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 13 - Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternate:

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the

existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>1,400M-1,600M</u>
TOTAL STRUCTURE ITEMS	\$ <u>450M-500M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>210M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,870M-2,310M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>267M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>2,137M-2,577M</u>

I. ROADWAY ITEMS

$$\begin{array}{rclcl} & \text{Average Cost per Lane Mile} & & \text{Number of Lane Miles} & \text{Total Cost} \\ \text{Total Cost} & \underline{\$18\text{M}} & \times & \underline{83.6} & = \underline{\$1,500\text{ M}} \end{array}$$

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS \$1,400M-\$1,600M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$2.4M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Presidio UC (R)
Total Cost for Structure	\$2.4M	\$0.7M	\$0.7M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (L)	Avenida Palizada UC (R)	Avenida Pico UC (L)
Total Cost for Structure	\$3.1M	\$3.1M	\$3.2M

	Structure (13)	Structure (14)	Structure (15)
Bridge Name	Avenida Pico UC (R)	Avenida Vista Hermosa OC (L)	Avenida Vista Hermosa OC (R)
Total Cost for Structure	\$0.4M	\$10.0M	\$10.0M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Avenida Vaquero UC (L)	Avenida Vaquero UC (R)	Camino De Estrella OC
Total Cost for Structure	\$1.3M	\$1.3M	\$6.7M
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	Via California OC	Camino Capistrano UC (L)	Camino Capistrano UC (R)
Total Cost for Structure	\$7.5M	\$3.5M	\$1.1M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	5/N5-N1 Connector Sep	5/S5-N1 Connector Sep	N5-N1 Connector UC (L)
Total Cost for Structure	\$1.8M	\$1.4M	\$0.7M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	N5-N1 Connector UC (R)	I-5/SR-1 Sep	SR241/I-5/Vista Marina Connector
Total Cost for Structure	\$1.2M	\$0.6M	\$80.9M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	La Pata Ave UC (L)	La Pata Ave UC (R)	Ortega Hwy (SR-74) UC (L)
Total Cost for Structure	\$3.1M	\$3.1M	\$1.5M
	Structure (31)	Structure (32)	Structure (33)
Bridge Name	Ortega Hwy (SR-74) UC (R)	Cow Camp Road OC	San Juan Creek Bridge (L)
Total Cost for Structure	\$1.5M	\$9.3M	\$18.0M
	Structure (34)	Structure (35)	Structure (36)
Bridge Name	San Juan Creek Bridge (R)	Camino Las Ramblas UC (L)	Camino Las Ramblas UC (R)
Total Cost for Structure	\$18.0M	\$3.1M	\$3.1M
	Structure (37)	Structure (38)	Structure (39)
Bridge Name	Prima Deshecha Landfill Rd 1 OC	Prima Deshecha Landfill Rd 2 OC	I Street
Total Cost for Structure	\$1.3M	\$1.3M	\$6.2M

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 450M-500M

III. ENVIRONMENTAL MITIGATION

<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation <u>1</u>	<u>LS</u> X	<u>\$210M</u> =	<u>\$210M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$210M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$260M</u>
B. Utility Relocation (State share)	<u>\$16M</u>

Anticipated Date of Right-of-Way Certification (Date to which values are escalated)	Year <u>2022</u>
--	------------------

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cospers, Overland, Pacific & Cutler (951) 683-2353, jcospers@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS	<u>\$276M</u>
--------------------------	---------------

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-2:
ALTERNATIVE 17 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support

Capital Outlay Project Estimate – Alternative 17

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 17 - Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternate:

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the

existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>750M-1,100M</u>
TOTAL STRUCTURE ITEMS	\$ <u>350M-400M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>194M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,290M-1,710M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>210M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>1,500M-1,900M</u>

I. ROADWAY ITEMS

$$\begin{array}{rclcl} & \text{Average Cost per Lane Mile} & & \text{Number of Lane Miles} & \\ \text{Total Cost} & \underline{\$11.6\text{M}} & \times & \underline{77.6} & = \underline{\$900\text{ M}} \end{array}$$

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS \$750M-\$1,100M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$2.4M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Presidio UC (R)
Total Cost for Structure	\$2.4M	\$6.6M	\$2.4M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (L)	Avenida Palizada UC (R)	Avenida Pico UC (L)
Total Cost for Structure	\$2.9M	\$0.4M	\$0.9M

	Structure (13)	Structure (14)	Structure (15)
Bridge Name	Avenida Pico UC (R)	Avenida Vista Hermosa OC (L)	Avenida Vista Hermosa OC (R)
Total Cost for Structure	\$0.9M	\$10.0M	\$10.0M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Avenida Vaquero UC (L)	Avenida Vaquero UC (R)	SR241/I-5/ Connector
Total Cost for Structure	\$1.3M	\$1.3M	\$43.5
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	Avenida Vaquero OC	Camino De Los Mares UC	La Pata Ave UC (L)
Total Cost for Structure	\$5.6M	\$3.7M	\$3.1M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	La Pata Ave UC (R)	Ortega Hwy (SR-74) UC (L)	Ortega Hwy (SR-74) UC (R)
Total Cost for Structure	\$3.1M	\$1.5M	\$1.5M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	Cow Camp Road OC	San Juan Creek Bridge (L)	San Juan Creek Bridge (R)
Total Cost for Structure	\$9.3M	\$18.0M	\$18.0M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	Camino Las Ramblas UC (L)	Camino Las Ramblas UC (R)	Prima Deshecha Landfill Rd 1 OC
Total Cost for Structure	\$3.1M	\$3.1M	\$1.3M
	Structure (31)	Structure (32)	
Bridge Name	Prima Deshecha Landfill Rd 2 OC	I Street	
Total Cost for Structure	\$1.3M	\$6.2M	

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS	\$ <u>350M-400M</u>
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III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation <u>1</u>	<u>LS</u>	X	<u>\$194M</u>	= <u>\$194M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS	<u>\$194M</u>
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IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$200M</u>
B. Utility Relocation (State share)	<u>\$10M</u>

Anticipated Date of Right-of-Way Certification (Date to which values are escalated)	Year <u>2022</u>
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*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition,

condemnation, and other services. Contact: Josh Coper, Overland, Pacific & Cutler (951) 683-2353, jcoper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS

\$210M

DRAFT

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-3:
ALTERNATIVE 14 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support

Capital Outlay Project Estimate – Alternative 14

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 14 - Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternate:

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south

of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>600M-950M</u>
TOTAL STRUCTURE ITEMS	\$ <u>400M-450M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>173M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,173M-1,573M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>125M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>1,298M-1,698M</u>

I. ROADWAY ITEMS

	<u>Average Cost per Lane Mile</u>		<u>Number of Lane Miles</u>		<u>Total Cost</u>
Total Cost	<u>\$11.1M</u>	X	<u>69.6</u>	=	<u>\$774 M</u>

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS

\$600M-\$950 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$1.1M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Palizada UC (L)
Total Cost for Structure	\$2.4M	\$6.6M	\$3.2M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (R)	SR241/I-5/ Connector	La Pata Ave OC (L)
Total Cost for Structure	\$0.4M	\$46.6M	\$6.2M

	Structure (13)	Structure (14)	Structure (15)
Bridge Name	La Pata Ave OC(R)	Ortega Hwy (SR-74) UC (L)	Ortega Hwy (SR-74) UC (R)
Total Cost for Structure	\$6.2M	\$3.8M	\$3.8 M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Cow Camp Road OC	San Juan Creek Bridge (L)	San Juan Creek Bridge (R)
Total Cost for Structure	\$9.3M	\$18.0M	\$18.0M
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	Camino Vera Cruz UC (L)	Camino Vera Cruz UC (R)	Avd Vista Hermosa OC (L)
Total Cost for Structure	\$6.2 M	\$6.2 M	\$11.0M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	Avd Vista Hermosa OC (R)	Camino Del Rio (L)	Camino Del Rio (R)
Total Cost for Structure	\$11.0M	\$6.2M	\$8.6M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	Calle Frontera OC	Calle Del Cerro OC	Calle Saluda OC
Total Cost for Structure	\$3.6M	\$5.4M	\$3.6M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	I Street OC	Landfill UC (L)	Landfill UC (R)
Total Cost for Structure	\$6.2M	\$3.6M	\$3.6M

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS

\$ 400M-450M

III. ENVIRONMENTAL MITIGATION

<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation <u>1</u>	<u>LS</u> X	<u>\$173M</u>	= <u>\$173M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$173M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$115M</u>
B. Utility Relocation (State share)	<u>\$10M</u>

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cosper, Overland, Pacific & Cutler (951) 683-2353, jcosper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS \$125M

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-4:
ALTERNATIVE 11 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support Capital Outlay Project Estimate – Alternative 11

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 11 - Add I-5 General Purpose Lane (From I-405 to San Diego County)

Alternate:

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>725M-975M</u>
TOTAL STRUCTURE ITEMS	\$ <u>575M-625M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>92M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,392M-1,692M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>686M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>2,078-2,378M</u>

I. ROADWAY ITEMS

	<u>Average Cost per Lane Mile</u>		<u>Number of Lane Miles</u>		<u>Total Cost</u>
Total Cost	<u>\$14.36 M</u>	X	<u>56.4</u>	=	<u>\$810 M</u>

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS

\$725M-\$975 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$2.4M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Palizada UC (L)
Total Cost for Structure	\$2.4M	\$7.2M	\$2.9M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (R)	Avenida Pico UC (L)	Avenida Vista Hermosa OC (R)
Total Cost for Structure	\$0.4M	\$1.7M	\$10.0M

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	Structure (13)	Structure (14)	Structure (15)
Bridge Name	Avenida Vista Hermosa OC (L)	Avenida Vaquero UC (NB)	Avenida Vaquero UC (SB)
Total Cost for Structure	\$10.0M	\$1.3M	\$1.3M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Camino De Estrella OC	Via California OC	5/N5-N1 Conn Separation (NB)
Total Cost for Structure	\$6.7M	\$7.5M	\$1.8M
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	5/N5-N1 Conn Separation (SB)	Route 5/1 Separation (NB)	Route 5/1 Separation (SB)
Total Cost for Structure	\$1.4M	\$0.7M	\$1.2M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	Camino Capistrano UC (NB)	Camino Capistrano UC (SB)	San Juan Creek Rd UC (NB)
Total Cost for Structure	\$2.6M	\$0.1M	\$1.0M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	San Juan Creek Rd UC (SB)	San Juan Creek Bridge (L)	San Juan Creek Bridge (R)
Total Cost for Structure	\$0.7M	\$4.0M	\$3.7M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	El Horno UC (NB)	El Horno UC(SB)	Junipero Serra UC (NB)
Total Cost for Structure	\$0.8M	\$0.8M	\$0.4M
	Structure (31)	Structure (32)	Structure (33)
Bridge Name	Junipero Serra UC (SB)	Trabuco Creek Bridge	Avery Pkwy Widen
Total Cost for Structure	\$1.2M	\$2.2M	\$1.8M
	Structure (34)	Structure (35)	Structure (36)
Bridge Name	Crown Valley Pkwy OC	Oso Creek Bridge	Oso Pkwy OC
Total Cost for Structure	\$9.5M	\$3.7M	\$9.4M
	Structure (37)	Structure (38)	Structure (39)
Bridge Name	El Toro Overhead (SB)	El Toro Overhead (NB)	El Toro Overhead Off-Ramp
Total Cost for Structure	\$0.6M	\$1.8M	\$3.5M

DRAFT

	Structure (37)	Structure (38)	Structure (39)
Bridge Name	La Paz Road UC (SB)	La Paz Road UC (NB)	La Paz Road NB Loop On-Ramp
Total Cost for Structure	\$0.9M	\$1.2M	\$2.5M
	Structure (40)	Structure (41)	Structure (42)
Bridge Name	Alicia Pkwy UC	Aliso Creek Bridge	Los Alisos Blvd OC
Total Cost for Structure	\$12.6M	\$1.5M	\$7.4M
	Structure (43)	Structure (44)	
Bridge Name	El Toro Rd UC	Lake Forest Dr OC	
Total Cost for Structure	\$1.9M	\$15.0M	

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.
Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 575M-625M

III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation	<u>1</u>	<u>LS</u>	<u>X</u>	<u>\$92M</u>
				<u>=</u>
				<u>\$92M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$92M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$643M</u>
B. Utility Relocation (State share)	<u>\$43M</u>

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cospers, Overland, Pacific & Cutler (951) 683-2353, jcospers@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS	<u>\$686M</u>
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT D-5:
ALTERNATIVE 12 – CAPITAL OUTLAY PROJECT ESTIMATE**

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Project Study Report – Project Development Support

Capital Outlay Project Estimate – Alternative 12

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 12 - Add I-5 HOT Lane (From I-405 to San Diego County)

Alternate:

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 12, those HOV lanes would be incorporated into the Alternative 12 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>700M-1,050M</u>
TOTAL STRUCTURE ITEMS	\$ <u>500M-550M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>115M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,315M-1,715M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>423M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>1,738M-2,138M</u>

I. ROADWAY ITEMS

	<u>Average Cost per Lane Mile</u>		<u>Number of Lane Miles</u>		<u>Total Cost</u>
Total Cost	<u>\$14.50 M</u>	X	<u>56.4</u>	=	<u>\$818 M</u>

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS

\$700M-\$1,050 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$2.4M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Palizada UC (L)
Total Cost for Structure	\$2.4M	\$7.2M	\$2.9M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (R)	Avenida Pico UC (L)	Avenida Vista Hermosa OC (R)
Total Cost for Structure	\$0.4M	\$1.7M	\$10.0M

	Structure (13)	Structure (14)	Structure (15)
Bridge Name	Avenida Vista Hermosa OC (L)	Avenida Vaquero UC (NB)	Avenida Vaquero UC (SB)
Total Cost for Structure	\$10.0M	\$1.3M	\$1.3M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Camino De Estrella OC	Via California OC	5/N5-N1 Conn Separation (NB)
Total Cost for Structure	\$6.7M	\$7.5M	\$1.8M
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	5/N5-N1 Conn Separation (SB)	Route 5/1 Separation (NB)	Route 5/1 Separation (SB)
Total Cost for Structure	\$1.4M	\$0.7M	\$1.2M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	Camino Capistrano UC (NB)	Camino Capistrano UC (SB)	San Juan Creek Rd UC (NB)
Total Cost for Structure	\$2.6M	\$0.1M	\$1.0M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	San Juan Creek Rd UC (SB)	San Juan Creek Bridge (L)	San Juan Creek Bridge (R)
Total Cost for Structure	\$0.7M	\$4.0M	\$3.7M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	El Horno UC (NB)	El Horno UC(SB)	Junipero Serra UC (NB)
Total Cost for Structure	\$0.8M	\$0.8M	\$0.4M
	Structure (31)	Structure (32)	Structure (33)
Bridge Name	Junipero Serra UC (SB)	Trabuco Creek Bridge	Avery Pkwy Widen
Total Cost for Structure	\$1.2M	\$2.2M	\$1.8M
	Structure (34)	Structure (35)	Structure (36)
Bridge Name	Crown Valley Pkwy OC	Oso Creek Bridge	Oso Pkwy OC
Total Cost for Structure	\$9.5M	\$3.7M	\$9.4M
	Structure (37)	Structure (38)	Structure (39)
Bridge Name	El Toro Overhead (SB)	El Toro Overhead (NB)	El Toro Overhead Off-Ramp
Total Cost for Structure	\$0.6M	\$1.8M	\$3.5M

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	Structure (37)	Structure (38)	Structure (39)
Bridge Name	La Paz Road UC (SB)	La Paz Road UC (NB)	La Paz Road NB Loop On-Ramp
Total Cost for Structure	\$0.9M	\$1.2M	\$2.5M

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 500M-550M

III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation	<u>1</u>	<u>LS</u> X	<u>\$115M</u>	= <u>\$115M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$115M

IV. RIGHT-OF-WAY ITEMS

Escalated
Value*

A. Acquisition, including excess lands,
damages to remainder(s) and Goodwill \$394M

B. Utility Relocation (State share) \$29M

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cospers, Overland, Pacific & Cutler (951) 683-2353, jcosper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS \$423M

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-6:
ALTERNATIVE 9 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support Capital Outlay Project Estimate – Alternative 9

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 9 - Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternate:

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>500M-650M</u>
TOTAL STRUCTURE ITEMS	\$ <u>100M-150M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>53M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>653-853M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>289M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>942M-1,142M</u>

I. ROADWAY ITEMS

$$\begin{array}{rclcl} & \text{Average Cost per Lane Mile} & & \text{Number of Lane Miles} & \text{Total Cost} \\ \text{Total Cost} & \underline{\$27.5\text{M}} & \times & \underline{19.7} & = \underline{\$543 \text{ M}} \end{array}$$

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS \$500M-\$650 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	
Bridge Name	SR 73 Connector	ID09 Separator	
Total Cost for Structure	\$75.4M	\$4.0M	

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 100M-150M

III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation	<u>1</u>	<u>LS</u> X	<u>\$53M</u>	= <u>\$53M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$53M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$286M</u>
B. Utility Relocation (State share)	<u>\$3M</u>

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cosper, Overland, Pacific & Cutler (951) 683-2353, jcosper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS \$289M

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT D-7:
ALTERNATIVE 18 – CAPITAL OUTLAY PROJECT ESTIMATE**

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Project Study Report – Project Development Support Capital Outlay Project Estimate – Alternative 18

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 18 - Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternate:

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>500M-650M</u>
TOTAL STRUCTURE ITEMS	\$ <u>100M-150M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>200M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>800-1,000M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>279M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>1,079M-1,279M</u>

I. ROADWAY ITEMS

$$\begin{array}{rclcl} & \text{Average Cost per Lane Mile} & & \text{Number of Lane Miles} & \text{Total Cost} \\ \text{Total Cost} & \underline{\$20.7\text{M}} & \times & \underline{27.5} & = \underline{\$569 \text{ M}} \end{array}$$

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS \$500M-\$650 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	
Bridge Name	SR 73 Connector	Los Patrones Pkwy OC	Crown Valley Pkwy OC
Total Cost for Structure	\$75.4M	\$3.6M	\$4.0M

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 100M-150M

III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation	<u>1</u>	<u>LS</u> X	<u>\$200M</u>	= <u>\$200M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$200M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$275M</u>
B. Utility Relocation (State share)	<u>\$4M</u>

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cosper, Overland, Pacific & Cutler (951) 683-2353, jcosper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS \$279M

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT D-8:
ALTERNATIVE 21 – CAPITAL OUTLAY PROJECT ESTIMATE

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Project Study Report – Project Development Support

Capital Outlay Project Estimate – Alternative 21

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4
EA 12-0Q680K – 1217000087 – PPNO 5473
August/2018

PROJECT DESCRIPTION:

Limits:

The Project improvement limits include State Route (SR) 241 from Oso Parkway to Interstate (I-) 5 in Orange County, SR 73 from Cabot Road to the SR 73/I-5 connector viaduct in Orange County, and I-5 from the I-405 connection in Irvine in Orange County to Basilone Road in San Diego County. This PSR-PDS includes eight Build Alternatives and one No-Build Alternative.

Proposed Improvement (Scope):

Alternative 21 - Los Patrones Parkway Extension and I-5 HOT Lanes

Alternate:

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part

of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ <u>600M-850M</u>
TOTAL STRUCTURE ITEMS	\$ <u>400M-450M</u>
TOTAL ENVIRONMENTAL MITIGATION ITEMS	\$ <u>154M</u>
SUBTOTAL CONSTRUCTION COSTS	\$ <u>1,154M-1,454M</u>
TOTAL RIGHT-OF-WAY ITEMS	\$ <u>98M</u>
 TOTAL PROJECT CAPITAL OUTLAY COSTS	 \$ <u>1,252M-1,552M</u>

I. ROADWAY ITEMS

	<u>Average Cost per Lane Mile</u>		<u>Number of Lane Miles</u>		<u>Total Cost</u>
Total Cost	<u>\$9.98M</u>	X	<u>71.4</u>	=	<u>\$712 M</u>

Explanation:

Major items for Roadway costs include roadway excavation, pavement removal, new asphalt concrete (AC) and jointed plain concrete pavement (JPCP) structural pavement, new and reconstructed sound walls, roadway drainage, better management practice (BMP) features, fencing, minor concrete, permanent and temporary traffic control, construction staging, communication, landscape, irrigation, minor and supplemental items, and roadway mobilization.

Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL ROADWAY ITEMS

\$600M-\$850 M

II. STRUCTURES ITEMS

	Structure (1)	Structure (2)	Structure (3)
Bridge Name	San Mateo Creek Br. Widen (L)	San Mateo Creek Br. Widen (R)	Avenida San Dimas PED OC
Total Cost for Structure	\$6.5M	\$6.5M	\$2.0M
	Structure (4)	Structure (5)	Structure (6)
Bridge Name	Avenida San Luis Rey OC	Avenida Mendocino OC	El Camino Real UC (L)
Total Cost for Structure	\$3.1M	\$3.6M	\$2.4M
	Structure (7)	Structure (8)	Structure (9)
Bridge Name	El Camino Real UC (R)	Avenida Presidio UC (L)	Avenida Palizada UC (L)
Total Cost for Structure	\$2.4M	\$7.2M	\$2.9M
	Structure (10)	Structure (11)	Structure (12)
Bridge Name	Avenida Palizada UC (R)	Avenida Pico UC (L)	Avenida Vista Hermosa OC (R)
Total Cost for Structure	\$0.4M	\$1.7M	\$10.0M

	Structure (13)	Structure (14)	Structure (15)
Bridge Name	Avenida Vista Hermosa OC (L)	Avenida Vaquero UC (NB)	Avenida Vaquero UC (SB)
Total Cost for Structure	\$10.0M	\$1.3M	\$1.3M
	Structure (16)	Structure (17)	Structure (18)
Bridge Name	Camino De Estrella OC	Via California OC	5/N5-N1 Conn Separation (NB)
Total Cost for Structure	\$6.7M	\$7.5M	\$1.8M
	Structure (19)	Structure (20)	Structure (21)
Bridge Name	5/N5-N1 Conn Separation (SB)	Route 5/1 Separation (NB)	Route 5/1 Separation (SB)
Total Cost for Structure	\$1.4M	\$0.7M	\$1.2M
	Structure (22)	Structure (23)	Structure (24)
Bridge Name	Camino Capistrano UC (NB)	Camino Capistrano UC (SB)	San Juan Creek Rd UC (NB)
Total Cost for Structure	\$2.6M	\$0.1M	\$1.0M
	Structure (25)	Structure (26)	Structure (27)
Bridge Name	San Juan Creek Rd UC (SB)	San Juan Creek Bridge (L)	San Juan Creek Bridge (R)
Total Cost for Structure	\$0.7M	\$4.0M	\$3.7M
	Structure (28)	Structure (29)	Structure (30)
Bridge Name	El Horno UC (NB)	El Horno UC(SB)	Junipero Serra UC (NB)
Total Cost for Structure	\$0.8M	\$0.8M	\$0.4M
	Structure (31)	Structure (32)	Structure (33)
Bridge Name	Junipero Serra UC (SB)	Trabuco Creek Bridge	NB La Pata On
Total Cost for Structure	\$1.2M	\$2.2M	\$0.8M
	Structure (34)	Structure (35)	Structure (36)
Bridge Name	Vista Montana UC	La Pata Connector	Service Road 1
Total Cost for Structure	\$1.2M	\$17.3M	\$0.4M
	Structure (37)	Structure (38)	Structure (39)
Bridge Name	Service Road 2	Ortega Hwy	San Juan Creek Bridge
Total Cost for Structure	\$0.4M	\$7.1M	\$16.8M

	Structure (37)	Structure (38)	Structure (39)
Bridge Name	Cow Camp Rd OC	I-Street	
Total Cost for Structure	\$9.3M	\$6.2M	

Explanation:

Major items for Structures costs include new Expressway/Freeway on new alignment, construct interchanges, modify interchanges, bridge replacement on new and existing alignment, bridge rehabilitation, new bridges, bridge seismic retrofit, bridge widening, curve correction, median barrier retrofit, construct passing lane, sound wall/retaining wall, widen highway, modify slopes, landslide/slip-outs, bridge deck rehabilitation, bridge joint seals.
Contact: David Speirs, HNTB (714) 460-1600, dspeirs@hntb.com

TOTAL STRUCTURE ITEMS \$ 400M-450M

III. ENVIRONMENTAL MITIGATION

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Item Cost</u>
Environmental Mitigation	<u>1</u>	<u>LS</u> X	<u>\$154M</u>	= <u>\$154M</u>

Explanation:

Environmental mitigation includes permit costs, habitat mitigation, archaeological monitoring, biological monitoring, paleontological monitoring, bird and bat exclusion device installation and monitoring, and new or reconstructed noise barriers. Contact: Lisa Williams, LSA (949) 553-0666, lisa.williams@lsa.net

TOTAL ENVIRONMENTAL MITIGATION ITEMS \$154M

IV. RIGHT-OF-WAY ITEMS

	Escalated Value*
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	<u>\$78M</u>

B. Utility Relocation (State share) \$20M

Anticipated Date of Right-of-Way Certification Year 2022
(Date to which values are escalated)

*Actual year estimate is provided.

Explanation:

Total Right-of-Way cost estimate includes acquisition costs for partial and full acquisition of various property categories, relocation, Goodwill, demolition, condemnation, and other services. Contact: Josh Cosper, Overland, Pacific & Cutler (951) 683-2353, jcosper@opcservices.com

TOTAL RIGHT-OF-WAY ITEMS \$98M

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT E:
PRELIMINARY ENVIRONMENTAL ANALYSIS REPORT (PEAR)**

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PRELIMINARY ENVIRONMENTAL ANALYSIS REPORT

1. Project Information

District 11 and 12	County San Diego and Orange	Route SR 241, I-5, SR 73	PM 12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4	EA 12-0Q680K
Project Title: South County Traffic Relief Effort				
Project Manager Farid Nowshiravan, Caltrans District 12			Phone # (657)-328-6303	
Project Engineer David Speirs, CMG			Phone # (714) 460-1600	
Environmental Office Chief/Manager Smita Deshpande, Caltrans District 12			Phone # (657) 328-6151	
PEAR Preparer Christina Hirt, LSA			Phone # (949) 553-0666	

2. Project Description

2.1 Purpose

The purpose and fundamental objectives of the Project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on Interstate 5 (I-5) during peak commuting hours and weekends.
- Provide additional north-south capacity in case of traffic incidents on I-5.
- Provide additional north-south capacity in case of emergencies.
- Enhance multi-modal mobility opportunities.

2.2 Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends.
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5.
- The lack of sufficient north-south capacity impairs evacuation and emergency response.

2.3 Description of Work

The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County. The Project includes Build Alternatives for the extension of the tolled SR 241 lanes to I-5, new general-purpose lanes or high-occupancy toll (HOT) lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and State Route 73 (SR 73).

Caltrans may be the lead agency for the Proposed Project under the California Environmental Quality Act (CEQA) and will be the lead agency under the National Environmental Policy Act (NEPA) as delegated by the Federal Highway Administration (FHWA).

2.4 Alternatives

The Study Area and Alternatives evaluated in the Project Initiation Document phase are shown on Figure 1, Project Location, and Figure 2, Project Alternatives (all figures attached), and described below. Alternative 1 is the No-Build Alternative. The Build Alternatives and Idea Numbers described below correspond to the ideas studied in the South County Traffic Relief Effort Initial Screening (Attachment I of the PSR-PDS) and Idea 21 as identified in Section 9 of the PSR-PDS. For the purpose of this report, the Alternatives will be referred to using the Alternative Number only.

Alternative 1 - No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for State Route 241 (SR 241) and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or high-occupancy toll (HOT) lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and the Preferred Plan in the Orange County Transportation Authority (OCTA) 2014 Long Range Transportation Plan (LRTP) in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved RTPs. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 2 above; it only provides a baseline for comparison with the Build Alternatives.

Alternative 13 - Build Idea 13 (ID13): Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western

boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 13 improvements along SR 241 include:

- Widening Los Patrones Parkway to meet Highway Design Manual (HDM) standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modifying the existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modifying a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at I Street, including northbound and southbound connections;
- Adding one new interchange on SR 241 at Camino Las Ramblas, including northbound and southbound connections;
- Adding a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Adding climbing lanes in both the northbound direction (between Avenida California and Camino Las Ramblas, north of Avenida La Pata to Ortega Highway, as well as from I Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as between San Juan Hills High School to Camino Del Rio).

Alternative 13 improvements on I-5 include:

- Modifying 10 existing interchanges along I-5 at Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the widening of I-5;
- Modifying existing northbound on-ramp to I-5 at Stonehill Drive to accommodate the widening of I-5;
- Converting one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from La Novia Avenue to Avenida Pico; and
- Adding two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Alternative 13 improvements on local roadways include:

- Extending the existing Camino Las Ramblas to the proposed SR 241/Camino Las Ramblas interchange; and
- Extending the existing La Novia Avenue to the proposed SR 241/ Camino Las Ramblas interchange.

Multi-modal and sustainability features included in Alternative 13 are:

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, Americans with Disabilities Act (ADA) ramps, and bikeway connections (as applicable) at local arterial intersections.

Alternative 17 - Build Idea 17 (ID17): Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 17 improvements along SR 241 include:

- Widening Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modifying existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;

- Modifying a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at I Street, including northbound and southbound connections;
- Adding one new interchange at Camino Las Ramblas, including northbound and southbound connections;
- Adding a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Adding climbing lanes in both the northbound direction (north of Camino De Los Mares to Camino Las Ramblas, north of Avenida La Pata to Ortega Highway, as well as from I Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Ortega Highway as well as from Prima Deshecha Landfill to Camino Las Ramblas).

Alternative 17 improvements along I-5 include:

- Modifying eight existing interchanges along I-5 at Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the widening of I-5;
- Converting one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from Avenida Vaquero to Avenida Pico; and
- Adding two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Alternative 17 improvements on local roadways include:

- Extending the existing Camino De Los Mares to the proposed SR 241/Camino De Los Mares interchange.

Multi-modal and sustainability features included in Alternative 17 are:

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Alternative 14 - Build Idea 14 (ID14): Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the

outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 14 improvements along SR 241 include:

- Widening Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modifying existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modifying a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at I Street, including northbound and southbound connections;
- Adding one new interchange at Calle Saluda, including northbound and southbound connections;
- Adding one new interchange at Calle Del Cerro, including northbound and southbound connections;
- Adding a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Adding climbing lanes in both the northbound direction (north of Calle Del Cerro to Prima Deshecha Landfill, north of Avenida La Pata to Ortega Highway, as well as from I Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as from the Prima Deshecha Landfill to Camino Del Rio).

Alternative 14 improvements along I-5 include:

- Modifying seven existing interchanges along I-5 at Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road to accommodate the widening of I-5; and
- Adding two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Alternative 14 improvements on local roadways include:

- Extending existing Calle Saluda to the proposed SR 241/Calle Saluda interchange, including a new roundabout; and
- Extending existing Calle Del Cerro to the proposed SR 241/Calle Del Cerro interchange, including a new roundabout.

Multi-modal and sustainability features included in Alternative 14 are:

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Alternative 11 - Build Idea 11 (ID11): Add I-5 General Purpose Lanes from I-405 to San Diego County

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 11 improvements on I-5 include:

- Modifying 23 existing I-5 interchanges at Lake Forest Drive, El Toro Road, Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-modal and sustainability features included in Alternative 11 are:

- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Alternative 12 - Build Idea 12 (ID12): Add I-5 High-Occupancy/Toll (HOT) Lane (From I-405 to San Diego County)

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 12, those HOV lanes would be incorporated into the Alternative 12 HOT lanes, and would allow for untolled HOV access subject to the prevailing

HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 12 improvements on I-5 include:

- Modifying 21 existing I-5 interchanges at Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-modal and sustainability features included in Alternative 12 are:

- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Alternative 9 - Build Idea 9 (ID9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

Alternative 9 improvements on local roadways include:

- Extending Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Adding one new intersection at the proposed arterial roadway and Antonio Parkway, including a signalized intersection; and
- Adding one new intersection at the proposed arterial roadway and Ortega Highway, including a signalized intersection.

Multi-modal and sustainability features included in Alternative 9 are:

- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73, bicycles would not be permitted.

Alternative 18 - Build Idea 18 (ID18): Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

Alternative 18 improvements on local roadways include:

- Extending Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Adding one new interchange at the proposed arterial roadway and Los Patrones Parkway, including northbound and southbound connections; and
- Extending Crown Valley Parkway and adding one new interchange at Los Patrones Parkway, including northbound and southbound connections.

Multi-modal and sustainability features included in Alternative 18 are:

- Complete Streets treatments at modified and new interchanges consistent with Caltrans' *Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73 or a connection to a high-speed ramp to Los Patrones Parkway, bicycles would not be permitted.

Alternative 21 - Build Idea 21 (ID21): Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from

Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 21 improvements along Los Patrones Parkway include:

- Constructing a new interchange at I Street and Los Patrones Parkway (the northern limit of this alternative is the limit of work required to construct the on- and off-ramps at the I Street interchange);
- Constructing a grade-separated interchange at the Vista Montana intersection to allow traffic on Avenida La Pata to proceed northbound and southbound without stopping and provide on- and off-ramps for northbound and southbound access to Vista Montana; and
- Reconfiguring the northbound access road from Prima Deshecha Landfill to provide grade-separated “braided ramps” between the new northbound off-ramp to Vista Montana and the existing northbound access road.
- Subject to further study, in the next phase of project development, this alternative may include the addition of tolling equipment along Los Patrones Parkway.

Alternative 21 improvements along I-5 include:

- Modifying 16 existing I-5 interchanges at SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-modal and sustainability features included in Alternative 21 are:

- Complete Streets treatments at new and modified and new interchanges consistent with *Caltrans’ Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

3. Anticipated Environmental Approval

CEQA		NEPA	
Environmental Determination			
Statutory Exemption	☐		
Categorical Exemption	☐	Categorical Exclusion	☐
Environmental Document			
Initial Study or Focused Initial Study with proposed Negative Declaration (ND) or Mitigated Negative Declaration (MND)	☐	Routine Environmental Assessment with proposed Finding of No Significant Impact	☐
		Complex Environmental Assessment with proposed Finding of No Significant Impact	☐
Environmental Impact Report	☒	Environmental Impact Statement	☒
CEQA Lead Agency (if determined):			
Estimated length of time (months) to obtain environmental approval:		42	
Estimated person hours to complete identified tasks:		60,000	

CEQA = California Environmental Quality Act

NEPA = National Environmental Policy Act

4. Special Environmental Considerations

Special considerations that may affect scope, cost, and schedule include the following:

- Section 4(f) of the Department of Transportation Act of 1966:** All Build Alternatives would be in the vicinity of properties that are potentially subject to the requirements for protection under Section 4(f) of the Department of Transportation Act (DOT Act) of 1966:
 - Alternative 13 would be in the vicinity of 17 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 17 would be in the vicinity of 15 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 14 would be in the vicinity of 16 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 11 would be in the vicinity of 23 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 12 would be in the vicinity of 20 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 9 would be in the vicinity of 1 resource potentially subject to the requirements for protection under Section 4(f).
 - Alternative 18 would be in the vicinity of 2 resources potentially subject to the requirements for protection under Section 4(f).
 - Alternative 21 would be in the vicinity of 22 resources potentially subject to the requirements for protection under Section 4(f).
- Biological Resources (Special Status Species and/or Habitats):** The Study Area potentially supports special-status species and/or habitats that may require focused surveys (e.g., rare plant surveys, focused surveys for listed bird species, jurisdictional delineation). The

completion of these surveys is not expected to affect the current Project schedule and/or Project Delivery.

The results of the focused surveys could identify a resource that may require avoidance or minimization through Project design changes. Any substantial Project design changes would result in potentially substantial costs and time delays if the potential resource issue could not be avoided, minimized, or permitted through the processes identified below with the resource agencies.

- **Biological Resources (Permitting and Regulatory Processes):** The potential presence of special-status species and/or regulated resources (e.g., California Department of Fish and Wildlife [CDFW] and United States Fish and Wildlife Service [USFWS] listed species, and United States Army Corps of Engineers [USACE] and Regional Water Quality Control Board [RWQCB] jurisdictional features) within the Study Area is expected to require several regulatory processes for the Build Alternatives.

External factors beyond the control of Caltrans include the ability of the agencies identified to provide adequate staffing resources to facilitate the permitting processes in a timely fashion. It is quite common for these agencies to be understaffed and not meet Project permit deadlines, thereby resulting in potential Project delays.

5. Anticipated Environmental Commitments

All Build Alternatives would potentially require environmental commitments to address temporary and/or permanent project-level and cumulative impacts related to parks and recreation, farmland, communities, visual/aesthetics, cultural resources, water quality, paleontological resources, hazardous waste, air quality, noise and vibration, energy and climate change, and biological resources as a result of the Project. Based on the setting and the anticipated scope of work for the Proposed Project, the environmental commitments listed below have been implemented for similar transportation improvement projects:

- **Parks and Recreation:** Implementation of avoidance and minimization measures related to Section 4(f) properties.
- **Farmlands:** Establishment of potential farmland conservation easements providing replacement farmland in perpetuity for any loss of designated farmland, or other mitigation developed among the County Agricultural Commissioner, Caltrans, and TCA.
- **Community Impacts:** Implementation of a Public Outreach Program, Transportation Management Plan, and Relocation Plan.
- **Visual Impacts:** Incorporation of aesthetic treatments, context sensitive solutions, and landscaping consistent with adopted plans and Caltrans policies and requirements.
- **Cultural Resources:** Monitoring during construction and proper handling of buried resources and/or human remains.
- **Floodplains:** Incorporation of floodplain design measures for positive drainage and pollution prevention and treatment best management practices (BMPs) to minimize floodplain impacts and preserve beneficial floodplain values.
- **Water Quality:** Incorporation of erosion control BMPs during construction and treatment BMPs during operation for storm water runoff control.

- **Paleontological Resources:** Preparation and implementation of a Paleontological Mitigation Plan that includes monitoring during construction and proper handling of paleontological resources.
- **Hazardous Waste:** Removal and disposal of hazardous waste consistent with State and federal regulations and Caltrans guidance and preparation of a Hazardous Waste Work Plan.
- **Air Quality:** Compliance with standard construction emissions requirements for control of fugitive dust, vehicle idling, and emissions reduction measures consistent with South Coast Air Quality Management District (SCAQMD), San Diego County Air Pollution Control District (APCD), and Caltrans requirements, as applicable. Section 14 of the Caltrans Standard Specifications requires compliance with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.
- **Noise and Vibration:** Compliance with standard construction noise and vibration reduction requirements as required by applicable local jurisdictions' noise ordinances and Caltrans Standard Specifications Section 14-8.02, reconstruction of existing sound barriers, and construction of new sound barriers,
- **Energy and Climate Change:** Compliance with standard construction emissions requirements as listed in Title 13 of the California Code of Regulations for greenhouse gas emissions from vehicle idling during construction and project-specific avoidance and minimization measures identified in the technical reports.
- **Biological Resources:** Implementation of avoidance, protective, and compensatory measures to offset potential adverse impacts on biological resources, including compensatory measures for habitat loss and special-status species impacts. Detailed measures will be developed in the Biological Resource Management Plan (BRMP), subject to USFWS and CDFW review and approval and consistent with any resource agency approval documentation/permits. These measures may include, but are not limited to, the following:
 - Providing habitat preservation and/or restoration
 - Designing and installing wildlife crossings
 - Providing specific compensation actions for special-status species (e.g., plant species relocation, den closing/relocation, pool/pond creation, and relocation of aquatic species).

6. **Permits and Approvals**

The Build Alternatives are expected to require the following regulatory permits/approvals:

- Project construction is subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) (Caltrans Statewide NPDES Permit Order No. 99-06-DWQ as amended by Order No. 2012-0011-DWQ, Order No. 20147-0006-EXEC, Order No. 2014-0077-DWQ, and Order No. 2015-0036-EXEC, NPDES No. CAS000003); Statewide General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ, NPDES No. CAS000002) and any subsequent amendments in effect at the time of Project construction.
- Operation of the Project is subject to the requirements of the Waste Discharge Requirements for The County of Orange, Orange County Flood Control District and The Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff

Orange County NPDES Permit Order No. R8-2009-0030, as amended by Order No. R8-2010-0062, NPDES No. CAS618030; Waster Discharge Requirements from the Municipal Separate Storm Sewer Systems (MS4s) Drainage the Watersheds within the San Diego Region Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266) (State Water Resources Board); or subsequent permit.

- Clean Water Act (CWA) Section 401 Water Quality Certification and WDRs from the San Diego RWQCB.
- CWA Section 404 Nationwide Permit from the USACE.
- CWA Section 10 Permit from the USACE
- California Fish and Game Code Section 1602 Lake or Streambed Alteration Agreement from the CDFW.
- Section 7 Consultation with the USFWS for listed species under the Federal Endangered Species Act (FESA).
- CDFW 2080.1 Consistency Determination for listed species under the California Endangered Species Act (CESA).
- The California Coastal Commission (CCC) oversees implementation of the California Coastal Act and the federal Coastal Zone Management Act. A Coastal Development Permit will be required for all Alternatives 13, 17, 14, 11, 12, and 21.

7. *Level of Effort: Risks and Assumptions*

Several factors could affect the cost, schedule, level of effort, and resources needed for the preparation and processing of the environmental document for the Project. Changes in the Project design could require technical studies to be re-opened. Results of the technical studies could identify costs substantial enough to warrant design refinements.

Based on the information available to date, it is anticipated that threatened and/or endangered species present in the Study Area will be impacted by Project implementation and that regulatory processing would be required with State and/or federal resource agencies. Alternatives 11 and 12 would widen I-5 right-of-way but would not develop new roadway alignments in previously undeveloped areas. In addition, wetlands and/or other jurisdictional waters in the Study Area will require permitting with State and/or federal resource agencies. Mitigation for regulated resources is expected to be required for all the Build Alternatives. These issues have been incorporated into the Project costs, schedule, and level of effort.

Given the amount of information collected in the Study Area and in the Project region over the past several decades for various projects in south Orange County, it is not anticipated that any new biological resource information will be identified. However, any substantive changes in the Build Alternative alignments could require additional biological surveys and the re-evaluation of the Project impacts based on new information along the changed alignments. In addition, rain may bring occurrences of rare plant species that were not anticipated or observed previously in the Study Area during dry years. Identification of new rare plant species after a rain event would require new studies, re-evaluation, and the potential of additional mitigation, which may result in additional costs and time delays.

External factors beyond Caltrans' control, such as resources agency staffing shortages, right-of-way acquisition delays, utility conflicts, survey windows, material availability, and design delays

may lengthen consultation time frames for all resource/regulatory permitting. This could also apply to the regulatory permits that would be required for impacts to jurisdictional waters.

8. PEAR Technical Summaries

The analyses in this section are applicable to all Build Alternatives unless otherwise noted. Due to similarities in the alignments for Alternatives 13, 17, and 14, the discussion of environmental topics is provided for the shared segments of the Study Area for those alternatives, where appropriate, to avoid repetition and better convey potential issues of concern. The shared segments for Alternatives 13, 17, and 14 are described below and are shown on Figure 1, Project Location (all figures attached). The boundaries of the Study Area considered in this Preliminary Environmental Analysis Report (PEAR) are shown on Figures 1 and 2.

- **Segment 1.** Segment 1 of the Study Area for Alternatives 13, 17, and 14 is between Oso Parkway in the city of Rancho Santa Margarita (existing SR 241 terminus) and southeast of the intersection of La Pata Avenue and SR 74 (Ortega Highway) in unincorporated Orange County. Alternatives 13, 17, and 14 share the same alignment in Segment 1.
- **Segment 2.** Segment 2 of the Study Area for Alternatives 13, 17, and 14 consists of three slightly different alignments between La Pata Avenue (southeast of the La Pata Avenue/SR 74 intersection) in unincorporated Orange County and the I-5 exit at East Avenida Pico in the San Clemente. Alternatives 13, 17, and 14 are analyzed individually in Segment 2.
- **Segment 3.** Segment 3 of the Study Area for Alternatives 13, 17, and 14 is on and along I-5 between East Avenida Pico in San Clemente and Basilone Road in San Diego County (the terminus for all three of those Build Alternatives). Alternatives 13, 17, and 14 share the same alignment along I-5 in Segment 3.

Since alternatives 11 and 12 are located solely along I-5 and only overlap with Alternatives 13, 17, and 14 where they each reach I-5, the Study Area segments are not used to describe Alternatives 11 and 12.

Similarly, Alternatives 9 and 18 do not overlap with Alternatives 13, 17, and 14; therefore, the Study Area segments do not apply for the analysis of Alternatives 9 and 18 in this PEAR.

Alternative 21 includes a portion of Alternative 12 along I-5 and a similar alignment to Segment 1 of Alternatives 13, 17, and 14; however, Alternative 21 does not fully share the same alignment as Segment 1 and is therefore referenced separately.

8.1 Land Use

Existing Land Use

A background review was conducted to prepare the land use discussion included in this PEAR. Documents obtained from a search of available literature include previously prepared planning documents, general plans, and zoning maps of the cities and counties in the Study Area. Table A identifies the jurisdictions in the Study Area by Build Alternative. Tables B through G identify the General Plan land use designations and zoning map designations for parcels in the Study Area. The information in Tables B through G is organized by alternative/segment and by city or county.

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Table A: Study Area Jurisdictions¹

Jurisdiction	Location
City of Rancho Santa Margarita	The City of Rancho Santa Margarita is in the north part of the Alternatives 13, 17, 14, 9, 18, and 21 Study Area and includes the current SR 241 terminus.
Unincorporated Orange County	Unincorporated Orange County is in the northeastern part of the Alternatives 13, 17, 14, 9, 18, and 21 Study Area.
City of Laguna Niguel	The City of Laguna Niguel is in the northwestern part of the Alternatives 11, 12, 9, 18 and 21 Study Area.
City of Irvine	The City of Irvine is in the north part of the Alternative 11 Study Area.
City of Laguna Hills	The City of Laguna Hills is in the northwestern part of the Alternatives 11, 12, and 21 Study Area.
City of Lake Forest	The City of Lake Forest is in the northeast part of Alternative 11 Study Area.
City of Laguna Woods	The City of Laguna Woods is in the northeast part of the Alternative 11 Study Area.
City of Mission Viejo	The City of Mission Viejo is in the northeastern part of the Alternatives 11 and 12 Study Area, the northwestern part of the Alternatives 9 and 18 Study Area, and is north of the Alternative 21 Study Area.
City of San Juan Capistrano	The City of San Juan Capistrano is in the western part of the Study Area for all Build Alternatives.
City of Dana Point	The City of Dana Point is in the southwestern part of the Alternatives 13, 11, 12, and 21 Study Area.
City of San Clemente	The City of San Clemente is in the central and southern part of the Alternatives 13, 17, 14, 11, 12 and 21 Study Area.
Unincorporated San Diego County	Unincorporated San Diego County is in the southern part of the Alternative 13, 17, 14, 11, 12 and 21 Study Area. The Study Area for these Build Alternatives in unincorporated San Diego County crosses parts of the Camp Pendleton Marine Corps Base and San Onofre State Beach.

Source: Google Maps (2017), Bing Maps.

¹ These jurisdictions are shown on Figure 2.

SR 241 = State Route 241

Table B: General Plan Land Use and Zoning Map Designations for the Alternatives 13, 17, and 14 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Segment 1			
Alternatives 13, 17, and 14	City of Rancho Santa Margarita	Open Space	Open Space
	County of Orange	Open Space Suburban Residential Urban Activity Center	Planned Community – Ranch Plan
Segment 2			
Alternative 13	County of Orange	Open Space	Planned Community – Ranch Plan
	City of San Juan Capistrano	General Open Space High Density Industrial Park Light Industrial Low Density Natural Open Space Planned Community Regional Park Very Low Density	Commercial Manufacturing District General Open Space Industrial Park District Mobile Home Park District Mobile Home Park District (existing interim use) - Commercial Manufacturing- future zoning Multiple-Family District Natural Open Space District Planned Community Districts: - CDP86-2 - CDP04-01 - CDP81-2 - CDP09-01 - CDP81-01 RSE-20,000 – Single-Family – 20,000 District Solid Waste Facility District Specific Plan Districts: - SP (02-01) - SP (87-01)
	City of Dana Point	Commercial/Residential Community Facility Recreation/Open Space Residential 3.5-7 dwelling units/acre Residential 7-17 dwelling units/acre Residential 22-30 dwelling units/acre	Commercial/Residential Mixed Use Community Commercial/Vehicle Community Facilities Open Space Professional/Administration Recreation Residential Single-Family 7 dwelling units/acre Residential Single-Family 12 dwelling units/acre Residential Duplex 14 dwelling units/acre

Table B: General Plan Land Use and Zoning Map Designations for the Alternatives 13, 17, and 14 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 13 (continued)	City of San Clemente	Community Commercial Light Industrial Institutional Open Space Public Open Space Private Public Regional Commercial Regional Medical Facilities Residential Low Density Residential Medium Low Density Residential Medium Density Residential High Density	Community Commercial 2 Community Commercial 2 – Medical Office Community Commercial 4 Open Space Private Open Space Private (Coastal Zone) Open Space Private – Inland Canyon Open Space Public Open Space Public (Coastal Zone) Public Public (Coastal Zone – Emergency Shelter) Public (Emergency Shelter) Regional Medical Facility Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density – Special Residential 1 Residential Low Density – Special Residential 11 Residential Low Density – Special Residential 12 Residential Low Density – Special Residential 13 Residential Medium Density – Special Residential 1 Residential Medium Low Density Residential Medium Low Density (Planned Residential Development) Specific Plans: - Forster Ranch - Marblehead Inland - Marblehead Coastal - West Pico Corridor
Alternative 17	County of Orange	Open Space	Planned Community- Ranch Plan
	City of San Juan Capistrano	General Open Space Medium Low Density Natural Open Space Neighborhood Park Planned Community Regional Park Very Low Density	General Open Space Natural Open Space District Planned Community Districts: - CDP86-2 - CDP04-01 - CDP81-2 RSE-10,000 - Single-Family-10,000 District Solid Waste Facility District
	City of San Clemente	Community Commercial Institutional Light Industrial Open Space Public Open Space Private Public	Community Commercial 2 Open Space Private Open Space Private – Inland Canyon Open Space Public Open Space Public (Coastal Zone) Public

Table B: General Plan Land Use and Zoning Map Designations for the Alternatives 13, 17, and 14 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 17 (continued)		Regional Commercial Residential High Density Residential Low Density Residential Medium Density Residential Medium Low Density Residential Very Low Density	Public (Emergency Shelter) Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density – Special Residential 1 Residential Low Density – Special Residential 18 Residential Low Density – Special Residential 11 Residential Low Density – Special Residential 12 Residential Low Density – Special Residential 13 Residential Low Density – Planned Residential Development Residential Medium Low Density Residential Medium Density – Special Residential 1 Specific Plans: • Marblehead Inland • Marblehead Coastal • Forester Ranch • West Pico Corridor
Alternative 14	County of Orange	Open Space Public Facilities	General Agriculture Planned Community – Ranch Plan
	City of San Juan Capistrano	General Open Space Planned Community Regional Park	General Open Space Planned Community Districts: • CDP86-2 • CDP04-01 Solid Waste Facility District
	City of San Clemente	Community Commercial Light Industrial Neighborhood Commercial Open Space Private Open Space Public Public Residential Low Density Residential Medium Density Residential Medium Low Density	Community Commercial 2 Open Space Public Public Residential Medium Low Density Specific Plans: • Talega • Forster Ranch • Marblehead Inland • Marblehead Coastal • Rancho San Clemente • West Pico Corridor

Table B: General Plan Land Use and Zoning Map Designations for the Alternatives 13, 17, and 14 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Segment 3			
Alternatives 13, 17 and 14	City of San Clemente	Civic Center Community Commercial Light Industrial Mixed Use Neighborhood Commercial Open Space Private Open Space Public Public Residential High Density Residential Low Density Residential Medium Density	Civic Center Community Commercial 2 (Coastal Zone) Community Commercial 3 (Coastal Zone) Golf Course Mixed Use Neighborhood Commercial Open Space Private Open Space Private (Coastal Zone) Open Space Public (Coastal Zone) Public (Emergency Shelter) Public (Coastal Zone – Emergency Shelter) Public Residential High Density Residential High Density (Coastal Zone) Residential Low Density Residential Low Density (Coastal Zone) Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density (Coastal Zone – Special Residential 3) Residential Low Density- Special Residential 1 Residential Low Density- Special Residential 2 Residential Medium Density Residential Medium Density (Coastal Zone) Residential Medium Low Density (Affordable Housing) Residential Very Low Density – Inland Canyon Specific Plan: West Pico Corridor
	County of San Diego	Public Agency Lands	Rural Residential

Sources:

City of San Clemente General Plan Land Use Map (March 15, 2016),
City of San Clemente Zoning Map (November 17, 2015),
County of Orange General Plan Land Use Map (August 23, 2015),
County of Orange Zoning Map (March 1, 2016),
City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
City of San Juan Capistrano Zoning Map (April 22, 2015),
County of San Diego General Plan Land Use Map (2015),

County of San Diego - PDS - Zoning & Property Information - Simplified (Last Modified: March 16, 2016),
City of Santa Margarita General Plan Land Use Map (July 2015),
City of Santa Margarita Zoning Map (June 2015),
City of Dana Point General Plan Land Use Map (November 23, 1993),
City of Dana Point Zoning Map (August 2012).

Table C: General Plan Land Use and Zoning Map Designations for the Alternative 11 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 11	City of Laguna Niguel	Community Commercial Residential Detached	Gateway Specific Plan – Community Service (Auto, Office, Retail) Open Space District
	City of Mission Viejo	Commercial Highway Community Facility	CH – Commercial Highway Community Facility
	City of Irvine	Orange County Great Park Research and Industrial Community Commercial	General Industrial Trails and Transit Oriented Development Preservation Community Commercial Vehicle-Related Commercial
	City of Laguna Hills	Mixed Use Freeway Commercial Village Commercial Open Space Neighborhood Mixed Use Low Density Residential	Mixed Use – Hospitality Overlay Freeway Commercial – Hospitality Overlay Freeway Commercial Village Commercial Medium-Low Density Residential Drainage Facilities Neighborhood Mixed Use Low Density Residential
	City of Laguna Woods	Residential Community	Residential Community
	City of Lake Forest	Professional Office Commercial Medium Density Residential Community Park/Open Space Low Density Residential Public Facility	Planned Community District: • Community Commercial • General Agriculture • Single Family Residential • Medium Density Residential • High Density Residential • Heavy Density Residential
	City of San Juan Capistrano	General Open Space Industrial Park Light Industrial Public and Institutional Low Density Medium High Density Medium Low Density Community Park Office/Research Park General Commercial Neighborhood Commercial Planned Community High Density Assisted Care Facility	General Open Space Open Space Recreation District Office Commercial District Industrial Park District Commercial Manufacturing District Mobile Home Park District (existing interim use): • Commercial Manufacturing- future zoning MRD-4,000 – Mission Residential District – 4,000 District Mobile Home Park District Planned Community Districts: • CDP90-2 • CDP86-4 • CDP06-01 • CDP78-1

Table C: General Plan Land Use and Zoning Map Designations for the Alternative 11 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 11 (continued)	City of San Juan Capistrano	Neighborhood Park Quasi Industrial Open Space Recreation Medium Density Existing Public Schools Special Study	• CDP81-01 Specific Plan Districts: • SP (02-01) • SP (87-01) RS-10,000 – Single-Family – 10,000 District RS-4,000 – Single-Family – 4,000 District RSE-40,000 – Single-Family – 40,000 District Community Park District Neighborhood Park District Multiple-Family District Public and Institutional District TC – Town Center District Neighborhood Commercial District General Commercial District Planned Residential Development District
	City of Dana Point	Community Facility Recreation/Open Space Residential 3.5-7 dwelling units/acre Residential 7-14 dwelling units/acre Residential 22-30 dwelling units/acre Commercial/Residential	Commercial/Residential Mixed Use Community Commercial/Vehicle Community Facilities Open Space Professional/Administration Recreation Residential Single-Family 7 dwelling units/acre Residential Single-Family 12 dwelling units/acre Residential Duplex 14 dwelling units/acre
	City of San Clemente	Civic Center Community Commercial Light Industrial Institutional Mixed Use Neighborhood Commercial Open Space Public Open Space Private Public Regional Commercial Regional Medical Facilities Residential Low Density Residential Medium Low Density Residential Medium Density Residential High Density	Civic Center Community Commercial 2 Community Commercial 2 (Coastal Zone) Community Commercial 2 (Medical Office) Community Commercial 3 (Coastal Zone) Community Commercial 4 Golf Course Mixed Use Neighborhood Commercial Open Space Private Open Space Private (Coastal Zone) Open Space Private – Inland Canyon Open Space Public Open Space Public (Coastal Zone) Public Public (Coastal Zone – Emergency Shelter) Public (Emergency Shelter)

Table C: General Plan Land Use and Zoning Map Designations for the Alternative 11 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 11 (continued)	City of San Clemente		Regional Medical Facility Residential High Density Residential High Density (Coastal Zone) Residential Low Density Residential Low Density (Coastal Zone) Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density (Coastal Zone – Special Residential 3) Residential Low Density – Special Residential 1 Residential Low Density – Special Residential 2 Residential Low Density – Special Residential 11 Residential Low Density – Special Residential 12 Residential Low Density – Special Residential 13 Residential Medium Density Residential Medium Density (Coastal Zone) Residential Medium Density – Special Residential 1 Residential Medium Low Density Residential Medium Low Density (Affordable Housing) Residential Medium Low Density (Planned Residential Development) Residential Very Low Density – Inland Canyon Specific Plans: • Forster Ranch • Marblehead Inland • Marblehead Coastal • West Pico Corridor
	County of San Diego	Public Agency Lands	Rural Residential

Sources:

City of Dana Point General Plan Land Use Map (November 23, 1993),
 City of Dana Point Zoning Map (August 2012),
 City of Laguna Niguel General Plan Land Use Map (February 2012),
 City of Laguna Niguel Zoning Map (February 2012),
 City of Mission Viejo Community View/GIS viewer
 (<http://maps.digitalmapcentral.com/production/VECommunityView/cities/Missionviejo/index.aspx>, accessed May 26, 2017),
 City of Irvine General Plan Land Use Map (July 2015),
 City of Irvine Zoning Map (March 2014),
 City of Laguna Hills General Plan Land Use Map (July 2009),
 City of Laguna Hills Zoning Map (October 2009),

City of Laguna Woods General Plan Land Use Map (August 2017),
 City of Laguna Woods Zoning Map (September 2017),
 City of Lake Forest General Plan Land Use Map (July 2016),
 City of Lake Forest Zoning Map (1991),
 City of Lake Forest Planned Community District (January 1982),
 City of San Clemente General Plan Land Use Map (March 15, 2016),
 City of San Clemente Zoning Map (November 17, 2015),
 City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
 City of San Juan Capistrano Zoning Map (April 22, 2015),
 County of San Diego General Plan Land Use Map (2015),
 County of San Diego - PDS - Zoning & Property Information - Simplified (Last Modified: March 16, 2016).

Table D: General Plan Land Use and Zoning Map Designations for the Alternative 12 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 12	City of Laguna Niguel	Community Commercial Residential Detached	Gateway Specific Plan – Community Service (Auto, Office, Retail) Open Space District
	City of Laguna Hills	Neighborhood Mixed Use Low Density Residential Freeway Commercial	Neighborhood Mixed Use Low Density Residential Freeway Commercial
	City of Mission Viejo	Commercial Highway Community Facility	CH – Commercial Highway Community Facility
	City of San Juan Capistrano	General Open Space Industrial Park Light Industrial Public and Institutional Low Density Medium High Density Medium Low Density Community Park Office/Research Park General Commercial Neighborhood Commercial Planned Community High Density Assisted Care Facility Neighborhood Park Quasi Industrial Open Space Recreation Medium Density Existing Public Schools Special Study	General Open Space Open Space Recreation District Office Commercial District Industrial Park District Commercial Manufacturing District Mobile Home Park District (existing interim use): - Commercial Manufacturing- future zoning MRD-4,000 – Mission Residential District – 4,000 District Mobile Home Park District Planned Community Districts: - CDP90-2 - CDP86-4 - CDP06-01 - CDP78-1 - CDP81-01 Specific Plan Districts: - SP (02-01) - SP (87-01) RS-10,000 – Single-Family – 10,000 District RS-4,000 – Single-Family – 4,000 District RSE-40,000 – Single-Family – 40,000 District Community Park District Neighborhood Park District Multiple-Family District Public and Institutional District TC – Town Center District Neighborhood Commercial District General Commercial District Planned Residential Development District

Table D: General Plan Land Use and Zoning Map Designations for the Alternative 12 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 12 (continued)	City of Dana Point	Community Facility Recreation/Open Space Residential 3.5-7 dwelling units/acre Residential 7-14 dwelling units/acre Residential 22-30 dwelling units/acre Commercial/Residential	Commercial/Residential Mixed Use Community Commercial/Vehicle Community Facilities Open Space Professional/Administration Recreation Residential Single-Family 7 dwelling units/acre Residential Single-Family 12 dwelling units/acre Residential Duplex 14 dwelling units/acre
	City of San Clemente	Civic Center Community Commercial Light Industrial Institutional Mixed Use Neighborhood Commercial Open Space Public Open Space Private Public Regional Commercial Regional Medical Facilities Residential Low Density Residential Medium Low Density Residential Medium Density Residential High Density	Civic Center Community Commercial 2 Community Commercial 2 (Coastal Zone) Community Commercial 2 (Medical Office) Community Commercial 3 (Coastal Zone) Community Commercial 4 Golf Course Mixed Use Neighborhood Commercial Open Space Private Open Space Private (Coastal Zone) Open Space Private – Inland Canyon Open Space Public Open Space Public (Coastal Zone) Public Public (Coastal Zone – Emergency Shelter) Public (Emergency Shelter) Regional Medical Facility Residential High Density Residential High Density (Coastal Zone) Residential Low Density Residential Low Density (Coastal Zone) Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density (Coastal Zone – Special Residential 3) Residential Low Density – Special Residential 1 Residential Low Density – Special Residential 2 Residential Low Density – Special Residential 11 Residential Low Density – Special Residential 12 Residential Low Density – Special Residential 13 Residential Medium Density Residential Medium Density (Coastal Zone)

Table D: General Plan Land Use and Zoning Map Designations for the Alternative 12 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 12 (continued)	City of San Clemente		Residential Medium Density – Special Residential 1 Residential Medium Low Density Residential Medium Low Density (Affordable Housing) Residential Medium Low Density (Planned Residential Development) Residential Very Low Density- Inland Canyon Specific Plans: • Forster Ranch • Marblehead Inland • Marblehead Coastal • West Pico Corridor
	County of San Diego	Public Agency Lands	Rural Residential

Sources:

City of Dana Point General Plan Land Use Map (November 23, 1993),
 City of Dana Point Zoning Map (August 2012),
 City of Laguna Hills Land Use Map (July 14, 2009)
 City of Laguna Hills Zoning District Map (October 13, 2009)
 City of San Clemente General Plan Land Use Map (March 15, 2016),
 City of San Clemente Zoning Map (November 17, 2015),
 City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
 City of San Juan Capistrano Zoning Map (April 22, 2015),
 County of San Diego General Plan Land Use Map (2015),
 County of San Diego - PDS - Zoning & Property Information - Simplified (Last Modified: March 16, 2016),
 City of Laguna Niguel General Plan Land Use Map (February 2012),
 City of Laguna Niguel Zoning Map (February 2012),
 City of Mission Viejo Community View/GIS viewer (<http://maps.digitalmapcentral.com/production/VECommunityView/cities/Missionviejo/index.aspx>, accessed May 26, 2017).

Table E: General Plan Land Use and Zoning Map Designations for the Alternative 9 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 9	County of Orange	Open Space Open Space Reserve Public Facilities Suburban Residential Urban Activity Center	Planned Communities: • Ladera Ranch • Ranch Plan General Agriculture
	City of Mission Viejo	Commercial Highway Community Facility Recreation/Open Space Residential 6.5 (3.5-6.5 dwelling units/acre)	CH – Commercial Highway Community Facility Recreation RPD 6.5 – Residential Planned Development
	City of San Juan Capistrano	General Open Space Low Density Medium High Density Public and Institutional Planned Community Very Low Density	General Open Space HR – Hillside Residential District P&I – Public and Institutional District Planned Community Districts: • CDP90-2 • Policy Directive 05-02 RA-Residential/Agriculture District RS-10,000 – Single-Family – 10,000 District RSE-20,000 – Single-Family – 20,000 District RSE-40,000 – Single-Family – 40,000 District
	City of Laguna Niguel	Community Commercial Open Space Residential Detached	Gateway Specific Plan - Community Service (Auto, Office, Retail) Open Space District RS-3 – Single-Family District 3

Sources:

County of Orange General Plan Land Use Map (August 23, 2015),
County of Orange Zoning Map (March 1, 2016),
City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
City of San Juan Capistrano Zoning Map (April 22, 2015),
City of Laguna Niguel General Plan Land Use Map (February 2012),
City of Laguna Niguel Zoning Map (February 2012),
City of Mission Viejo Community View/GIS viewer (<http://maps.digitalmapcentral.com/production/VECommunityView/cities/Missionviejo/index.aspx>, accessed May 26, 2017).

Table F: General Plan Land Use and Zoning Map Designations for the Alternative 18 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 18	County of Orange	Open Space Open Space Reserve Public Facilities Suburban Residential Urban Activity Center	Planned Communities: - Ladera Ranch - Ranch Plan General Agriculture
	City of Mission Viejo	Commercial Highway Community Facility Recreation/Open Space Residential 6.5 (3.5-6.5 dwelling units/acre)	CH – Commercial Highway Community Facility Recreation RPD 6.5 – Residential Planned Development
	City of San Juan Capistrano	General Open Space Low Density Medium High Density Public and Institutional Planned Community Very Low Density	General Open Space HR – Hillside Residential District P&I – Public and Institutional District Planned Community Districts: - CDP90-2 - Policy Directive 05-02 RA-Residential/Agriculture District RS-10,000 – Single-Family – 10,000 District RSE-20,000 – Single-Family – 20,000 District RSE-40,000 – Single-Family – 40,000 District
	City of Laguna Niguel	Community Commercial Open Space Residential Detached	Gateway Specific Plan – Community Service (Auto, Office, Retail) Open Space District RS-3 – Single-Family District 3

Sources:

County of Orange General Plan Land Use Map (August 23, 2015),
County of Orange Zoning Map (March 1, 2016),
City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
City of San Juan Capistrano Zoning Map (April 22, 2015),
City of Laguna Niguel General Plan Land Use Map (February 2012),
City of Laguna Niguel Zoning Map (February 2012),
City of Mission Viejo Community View/GIS viewer (<http://maps.digitalmapcentral.com/production/VECommunityView/cities/Missionviejo/index.aspx>, accessed May 26, 2017).

Table G: General Plan Land Use and Zoning Map Designations for the Alternative 21 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 21	County of Orange	Open Space Suburban Residential Urban Activity Center	Planned Community- Ranch Plan
	City of Laguna Niguel	Community Commercial Residential Detached	Gateway Specific Plan - Community Service (Auto, Office, Retail) Open Space District
	City of Mission Viejo	Commercial Highway Community Facility	CH – Commercial Highway Community Facility
	City of San Juan Capistrano	General Open Space Industrial Park Light Industrial Public and Institutional Low Density Medium High Density Medium Low Density Community Park Office/Research Park General Commercial Neighborhood Commercial Planned Community High Density Assisted Care Facility Neighborhood Park Quasi Industrial Open Space Recreation Medium Density Existing Public Schools Special Study	General Open Space Open Space Recreation District Office Commercial District Industrial Park District Commercial Manufacturing District Mobile Home Park District (existing interim use): - Commercial Manufacturing- future zoning MRD-4,000 - Mission Residential District-4,000 District Mobile Home Park District Planned Community Districts: - CDP90-2 - CDP86-4 - CDP06-01 - CDP78-1 - CDP81-01 Specific Plan Districts: - SP (02-01) - SP (87-01) RS-10,000 – Single-Family – 10,000 District RS-4,000 – Single-Family – 4,000 District RSE-40,000 – Single-Family – 40,000 District Community Park District Neighborhood Park District Multiple-Family District Public and Institutional District TC – Town Center District

Table G: General Plan Land Use and Zoning Map Designations for the Alternative 21 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 21	City of San Juan Capistrano		Neighborhood Commercial District General Commercial District Planned Residential Development District
	City of Dana Point	Community Facility Recreation/Open Space Residential 3.5-7 dwelling units/acre Residential 7-14 dwelling units/acre Residential 22-30 dwelling units/acre Commercial/Residential	Commercial/Residential Mixed Use Community Commercial/Vehicle Community Facilities Open Space Professional/Administration Recreation Residential Single-Family 7 dwelling units/acre Residential Single-Family 12 dwelling units/acre Residential Duplex 14 dwelling units/acre
	City of San Clemente	Civic Center Community Commercial Light Industrial Institutional Mixed Use Neighborhood Commercial Open Space Public Open Space Private Public Regional Commercial Regional Medical Facilities Residential Low Density Residential Medium Low Density Residential Medium Density Residential High Density	Civic Center Community Commercial 2 Community Commercial 2 (Coastal Zone) Community Commercial 2- Medical Office Community Commercial 3 (Coastal Zone) Community Commercial 4 Golf Course Mixed Use Neighborhood Commercial Open Space Private Open Space Private (Coastal Zone) Open Space Private- Inland Canyon Open Space Public Open Space Public (Coastal Zone) Public Public (Coastal Zone- Emergency Shelter) Public (Emergency Shelter) Regional Medical Facility Residential High Density Residential High Density (Coastal Zone) Residential Low Density Residential Low Density (Coastal Zone) Residential Low Density (Coastal Zone – Special Residential 1) Residential Low Density (Coastal Zone – Special Residential 3) Residential Low Density- Special Residential 1 Residential Low Density- Special Residential 2 Residential Low Density- Special Residential 11 Residential Low Density- Special Residential 12

Table G: General Plan Land Use and Zoning Map Designations for the Alternative 21 Study Area

Alternative	Jurisdiction	General Plan Land Use Designations	Zoning Map Designations
Alternative 21	City of San Clemente		Residential Low Density – Special Residential 13 Residential Medium Density Residential Medium Density (Coastal Zone) Residential Medium Density – Special Residential 1 Residential Medium Low Density Residential Medium Low Density (Affordable Housing) Residential Medium Low Density (Planned Residential Development) Residential Very Low Density- Inland Canyon Specific Plans: • Forster Ranch • Marblehead Inland • Marblehead Coastal • West Pico Corridor
	County of San Diego	Public Agency Lands	Rural Residential

Sources:

City of San Clemente General Plan Land Use Map (March 15, 2016),
City of San Clemente Zoning Map (November 17, 2015),
City of San Juan Capistrano General Plan Land Use Map (January 27, 2015),
City of San Juan Capistrano Zoning Map (April 22, 2015),
County of Orange General Plan Land Use Map (August 23, 2015),
County of Orange Zoning Map (March 1, 2016),
County of San Diego General Plan Land Use Map (2015),
County of San Diego - PDS - Zoning & Property Information - Simplified (Last Modified: March 16, 2016),
City of Laguna Niguel General Plan Land Use Map (February 2012),
City of Laguna Niguel Zoning Map (February 2012),
City of Mission Viejo Community View/GIS viewer (<http://maps.digitalmapcentral.com/production/VECommunityView/cities/Missionviejo/index.aspx>, accessed May 26, 2017).

Alternatives 13, 17, and 14. As shown in Table B, land use designations in Segment 1 consist of primarily open space and some residential uses. While the Build Alternative alignments differ in Segment 2 of the Study Area, the land uses in this segment generally include residential, commercial, open space, and institutional uses. The Study Area along I-5 in Segment 3 includes residential, commercial, open space and institutional uses. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table B.

Alternative 11. As shown in Table C, General Plan land use designations in the Study Area consist primarily of commercial, mixed use, and residential uses. The Study Area generally includes commercial, mixed use, residential, open space, and some preservation along the I-5 corridor in the cities of Irvine, Laguna Hills, Lake Forest, Laguna Woods, Mission Viejo, Laguna Niguel, San Juan Capistrano, Dana Point, San Clemente, and unincorporated San Diego County. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table C.

Alternative 12. As shown in Table D, General Plan land use designations in the Study Area consist of open space, commercial manufacturing, industrial, residential, commercial, public, and recreational uses. The Study Area includes commercial, residential, and public facilities along the I-5 corridor in the cities of Laguna Hills, Mission Viejo, Laguna Niguel, San Juan Capistrano, Dana Point, San Clemente, and unincorporated San Diego County. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table D.

Alternative 9. As shown in Table E, General Plan land use designations in the Study Area consist of open space, residential, commercial, public, and recreational uses. The Study Area includes commercial and public facilities where Alternative 9 would connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73 in the vicinity of I-5 in unincorporated Orange County and the cities of Mission Viejo, San Juan Capistrano, and Laguna Niguel. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table E.

Alternative 18. As shown in Table F, General Plan land use designations in the Study Area consist of open space, residential, commercial, public, and recreational uses. The Study Area includes commercial and public facilities where Alternative 18 would connect from Los Patrones Parkway to SR 73 in the vicinity of I-5 in unincorporated Orange County and the cities of Mission Viejo, San Juan Capistrano, and Laguna Niguel. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table F.

Alternative 21. As shown in Table G, General Plan land use designations in the Study Area consist of open space and residential uses where Los Patrones Parkway would extend from Oso Parkway to La Pata Avenue. The Study Area includes commercial, residential, and public facilities along the I-5 corridor in the cities of Mission Viejo, Laguna Niguel, San Juan Capistrano, Dana Point, San Clemente, and unincorporated San Diego County. The zoning designations in the Study Area are consistent with the General Plan land use designations, as indicated in Table G.

Consistency with State, Regional and Local Plans

There are several goals and policies included in State, regional, and local planning documents that would be applicable to the Build Alternatives. These plans include, but are not limited to, the County of Orange and San Diego General Plans; the General Plans for the Cities of Irvine, Laguna Hills, Laguna Woods, Lake Forest, Rancho Santa Margarita, Laguna Niguel, Mission Viejo, Dana Point, San Clemente, and San Juan Capistrano; the Prima Deshecha General Development Plan, and the Orange County Master Plan of Arterial Highways. The Study Area also includes Specific Plan areas that include applicable goals and policies related to land use and development in these Specific Plan areas. In addition, relevant goals and policies in the SCAG RTP/SCS and the San Diego Association of Governments (SANDAG) RTP/SCS would also be analyzed for consistency with the Build Alternatives. Alternatives 13, 17, 14, 11, 12, and 21 include improvements in the Coastal Zone.

The Build Alternatives would require right-of-way acquisition, which could result in permanent changes in land use for those specific parcels.

Recommended Technical Analysis

A *Community Impact Assessment* will be prepared for the Build Alternatives and will include an analysis of land use impacts and consistency with applicable plans, policies, and regulations. The results of the land use impacts and consistency analysis will be provided in the environmental document.

8.2 Parks and Recreation

As indicated in Tables B through G above, the Study Area traverses and abuts areas designated for open space and parks in various jurisdictions, unless certain determinations can be made. Section 4(f) of the DOT Act prohibits the use of land from a historic site of national, state, or local significance; park and recreational areas that are both publicly owned and open to the public, and publicly owned wildlife; and waterfowl refuges by a federally funded transportation project.

Tables H through M list the existing environmental constraints for parks and recreation resources in the Study Area, including properties subject to Section 4(f). Table H includes the proposed regional park and off-street hiking and riding trails in Prima Deshecha Landfill, which are in the Study Area for Alternatives 13, 17, and 14. In addition, there are schools in the Study Area with school play areas that are potentially open for public use, which could trigger Section 4(f).

Recommended Technical Analysis

A Section 4(f) Evaluation will be prepared for the Build Alternatives and appended to the environmental document. The analysis provided in the Section 4 (f) Evaluation will also be summarized in the environmental document.

**Table H: Environmental Constraints for Parks and Recreation –
Alternative 13, 17, and 14 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Segment 1			
Alternatives 13, 17, and 14	Capistrano Unified School District	Recreation areas at Tesoro High School (if available for public use)	Section 4(f)
	County of Orange	Proposed off-road paved bikeway along San Juan Creek (if publicly owned)	Section 4(f)
Segment 2			
Alternative 13	City of San Juan Capistrano	Proposed off-road paved bikeway providing a connection from La Novia Avenue to Camino Las Ramblas (if publically owned)	Section 4(f)
	City of Dana Point	Sunset Park	Section 4(f) California Park Preservation Act
		Calle Paloma Parkette	Section 4(f) California Park Preservation Act
Alternative 17	City of San Juan Capistrano	ACU Canyon Park	Section 4(f) California Park Preservation Act
Alternatives 13 and 17	City of San Clemente	San Gorgonio Park	Section 4(f) California Park Preservation Act
		Jim Johnson Memorial Sports Park	Section 4(f) California Park Preservation Act
Alternatives 13, 17, and 14	Capistrano Unified School District	Recreation areas at San Juan Hills High School (if available for public use)	Section 4(f)
	County of Orange	Proposed Regional Park on Prima Deshecha Landfill, including proposed biking and riding trails	Section 4(f)
	Various Jurisdictions	Existing recreational hiking trails (if publicly owned)	Section 4(f)
	Various Jurisdictions	Conversion of Open Space (Private and Public) to right-of-way (transportation use)	Land use consistency analysis in the EIR/EIS
Alternative 14	City of San Clemente	Forester Ridgeline Trail	Section 4(f)
		Prima Deshecha North Trail	Section 4(f)
		Class I (off-street) bike path along La Pata Avenue	Section 4(f)
		Vista Hermosa Sports Park	Section 4(f) California Park Preservation Act
Segment 3			
Alternatives 13, 17, and 14	City of San Clemente	Verde Park	Section 4(f) California Park Preservation Act
		San Clemente Municipal Golf Course	Section 4(f)
		San Luis Rey Park	Section 4(f) California Park Preservation Act
	Capistrano Unified School District	San Clemente High School (if available for public use)	Section 4(f)
		Concordia Elementary School (if available for public use)	Section 4(f)
	California State Parks	San Clemente State Beach	Section 4(f) California Park Preservation Act
	California State Parks	San Onofre State Beach	Section 4(f) California Park Preservation Act

Source: Google Maps (2017), Bing Maps.

EIR/EIS = Environmental Impact Report/Environmental Impact Statement

**Table I: Environmental Constraints for Parks and Recreation –
Alternative 11 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Alternative 11	City of Irvine	Orange County Great Park	Section 4(f) California Park Preservation Act
	City of Lake Forest	Cavanaugh Mini Park	Section 4(f)
	City of Mission Viejo	Sycamore Park	Section 4(f)
		Aegean Hills Park	Section 4(f)
	Capistrano Unified School District	Recreation areas at Capistrano Valley High School (if available for public use)	Section 4(f)
		Recreation areas at San Clemente High School (if available for public use)	Section 4(f)
		Recreation areas at Concordia Elementary School (if available for public use)	Section 4(f)
		Recreation areas at San Juan Elementary School (if available for public use)	Section 4(f)
	Capistrano Unified School District/Laguna Beach Unified School District	Recreation areas at Capistrano-Laguna Beach Regional Occupational Program (ROP)/San Juan Little League Baseball Fields	Section 4(f)
	City of San Juan Capistrano	Trabuco Creek Trail	Section 4(f)
		Oso-Rancho Capistrano Trail	Section 4(f)
		San Juan Creek Trail	Section 4(f)
		Dr. Joe Cortese Dog Park	Section 4(f)
		Junipero Serra Park	Section 4(f)
	City of Dana Point	Sunset Park	Section 4(f) California Park Preservation Act
		Calle Paloma Parkette	Section 4(f) California Park Preservation Act
	City of San Clemente	Verde Park	Section 4(f) California Park Preservation Act
		San Gorgonio Park	Section 4(f) California Park Preservation Act
		San Clemente Municipal Golf Course	Section 4(f)
		San Luis Rey Park	Section 4(f) California Park Preservation Act
		Jim Johnson Memorial Sports Park	Section 4(f) California Park Preservation Act
	California State Parks	San Clemente State Beach	Section 4(f) California Park Preservation Act
		San Onofre State Beach	Section 4(f) California Park Preservation Act

Source: Google Maps (2017), Bing Maps.

**Table J: Environmental Constraints for Parks and Recreation –
Alternative 12 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Alternative 12	City of Laguna Hills Capistrano Unified School District	Aegean Hills Park	Section 4(f)
		Recreation areas at Capistrano Valley High School (if available for public use)	Section 4(f)
		Recreation areas at San Clemente High School (if available for public use)	Section 4(f)
		Recreation areas at Concordia Elementary School (if available for public use)	Section 4(f)
		Recreation areas at San Juan Elementary School (if available for public use)	Section 4(f)
	Capistrano Unified School District/Laguna Beach Unified School District	Recreation areas at Capistrano-Laguna Beach Regional Occupational Program (ROP)/San Juan Little League Baseball Fields	Section 4(f)
	City of San Juan Capistrano	Trabuco Creek Trail	Section 4(f)
		Oso-Rancho Capistrano Trail	Section 4(f)
		San Juan Creek Trail	Section 4(f)
		Dr. Joe Cortese Dog Park	Section 4(f)
		Junipero Serra Park	Section 4(f)
	City of Dana Point	Sunset Park	Section 4(f) California Park Preservation Act
		Calle Paloma Parkette	Section 4(f) California Park Preservation Act
	City of San Clemente	Verde Park	Section 4(f) California Park Preservation Act
		San Gorgonio Park	Section 4(f) California Park Preservation Act
		San Clemente Municipal Golf Course	Section 4(f)
		San Luis Rey Park	Section 4(f) California Park Preservation Act
		Jim Johnson Memorial Sports Park	Section 4(f) California Park Preservation Act
	California State Parks	San Clemente State Beach	Section 4(f) California Park Preservation Act
		San Onofre State Beach	Section 4(f) California Park Preservation Act

Source: Google Maps (2017), Bing Maps.

**Table K: Environmental Constraints for Parks and Recreation –
Alternative 9 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Alternative 9	Capistrano Unified School District	Recreation areas at Capistrano Valley High School (if available for public use)	Section 4(f)
	Various Jurisdictions	Conversion of Open Space Reserve (Private and Public) to right-of-way (transportation use)	Land Use consistency analysis in the EIR/EIS

Source: Google Maps (2017), Bing Maps.

EIR/EIS = Environmental Impact Report/Environmental Impact Statement

**Table L: Environmental Constraints for Parks and Recreation –
Alternative 18 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Alternative 18	Capistrano Unified School District	Recreation areas at Capistrano Valley High School (if available for public use)	Section 4(f)
		Recreation areas at Tesoro High School (if available for public use)	Section 4(f)
	Various Jurisdictions	Conversion of Open Space Reserve (Private and Public) to right-of-way (transportation use)	Land use consistency analysis in the EIR/EIS

Source: Google Maps (2017), Bing Maps.

EIR/EIS = Environmental Impact Report/Environmental Impact Statement

**Table M: Environmental Constraints for Parks and Recreation –
Alternative 21 Study Area**

Alternative	Jurisdiction	Park or Recreation Resource	Environmental Compliance Requirements
Alternative 21	Capistrano Unified School District	Recreation areas at Tesoro High School (if available for public use)	Section 4(f)
	County of Orange	Proposed off road paved bikeway along San Juan Creek (if publicly owned)	Section 4(f)
	City of Laguna Hills	Aegean Hills Park	Section 4(f)
	Capistrano Unified School District	Recreation areas at Capistrano Valley High School (if available for public use)	Section 4(f)
		Recreation areas at San Clemente High School (if available for public use)	Section 4(f)
		Recreation areas at Concordia Elementary School (if available for public use)	Section 4(f)
		Recreation areas at San Juan Elementary School (if available for public use)	Section 4(f)
	Capistrano Unified School District/ Laguna Beach Unified School District	Recreation areas at Capistrano-Laguna Beach Regional Occupational Program (ROP)/San Juan Little League Baseball Fields	Section 4(f)
	City of San Juan Capistrano	Trabuco Creek Trail	Section 4(f)
		Oso-Rancho Capistrano Trail	Section 4(f)
		San Juan Creek Trail	Section 4(f)
		Dr. Joe Cortese Dog Park	Section 4(f)
		Junipero Serra Park	Section 4(f)
	City of Dana Point	Sunset Park	Section 4(f) California Park Preservation Act
		Calle Paloma Parkette	Section 4(f) California Park Preservation Act
	City of San Clemente	Verde Park	Section 4(f) California Park Preservation Act
		San Geronio Park	Section 4(f) California Park Preservation Act
		San Clemente Municipal Golf Course	Section 4(f)
		San Luis Rey Park	Section 4(f) California Park Preservation Act
		Jim Johnson Memorial Sports Park	Section 4(f) California Park Preservation Act
	California State Parks	San Clemente State Beach	Section 4(f) California Park Preservation Act
		San Onofre State Beach	Section 4(f) California Park Preservation Act

Source: Google Maps (2017), Bing Maps.

8.3 Growth

Planned growth in the Study Area is primarily concentrated in the foothills and the planned community of Rancho Mission Viejo in unincorporated Orange County. Rancho Mission Viejo is approved to develop a maximum of 14,000 residential units, with the potential to result in 32,823 new residents and 16,508 jobs in that plan area.¹

Regional growth projections for the counties of Orange, Riverside, and San Diego are outlined in the local land use plans and the SCAG and SANDAG RTP/SCS planning documents.

All Build Alternatives

The Study Area is largely developed and has limited potential for additional development. Growth potential in the Study Area is restricted in the south by the Camp Pendleton Marine Corps Base, in the central area by Prima Deshecha Landfill, and in the east by the Chiquita Canyon Conservation Area. Growth potential is generally restricted west of the Study Area because the land on both the east and west sides of I-5 is largely developed and built out.

Recommended Technical Analysis

The Build Alternatives' regional and local growth impacts will be addressed in a *Growth Impact Analysis* and the findings of that report will be summarized in the environmental document.

8.4 Farmlands/Timberlands

According to the California Department of Conservation Farmland Mapping and Monitoring Program,² there are designated farmlands in the Study Area for all eight Build Alternatives.

No timberlands were identified in the Study Area. Timberlands, as defined by California Public Resources Code Section 4526, refers to land (other than land owned by the federal government and land designated by the board as experimental forest land), which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees. The presence or absence of timberlands will be confirmed in the environmental document. The Study Area also includes grazing land.

Alternatives 13, 17, and 14

Segment 1. According to the California Department of Conservation Farmland Mapping and Monitoring Program, the Study Area would not intersect with designated farmland.³

Segment 2. According to the California Department of Conservation Farmland Mapping and Monitoring Program, Alternative 13 is in the vicinity of designated Farmlands of Statewide Importance and Unique Farmlands near the proposed connection to I-5 at La Novia Avenue.⁴ Alternatives 17 and 14 consist of Urban and Built-Up Land and Other Land in Segment 2.

¹ Ranch Plan EIR. 2004.

² Orange County Important Farmland 2014 and San Diego County Important Farmland 2014

³ Orange County Important Farmland 2014

⁴ Orange County Important Farmland 2014

Segment 3. According to the California Department of Conservation Farmland Mapping and Monitoring Program, Segment 3 consists of Urban and Built-Up Land.¹ Alternatives 13, 17, and 14 are in the vicinity of designated Farmlands of Local Importance in San Diego County near Basilone Road.

Alternative 11

According to the California Department of Conservation Farmland Mapping and Monitoring Program (Orange County Important Farmland 2014), Alternative 11 is in the vicinity of designated Prime Farmland and Unique Farmland east of I-5 between Alton Parkway and Lake Forest Drive. Alternative 11 is also in the vicinity of Prime Farmland west of I-5 between Avery Parkway and Junipero Serra Road. Alternative 11 generally consists of Urban and Built-Up Land.² Alternative 11 is in the vicinity of designated Farmlands of Local Importance in San Diego County near Basilone Road.³

Alternative 12

According to the California Department of Conservation Farmland Mapping and Monitoring Program (Orange County Important Farmland 2014), Alternative 12 is in the vicinity of designated Prime Farmland west of I-5 between Avery Parkway and Junipero Serra Road. Alternative 12 generally consists of Urban and Built-Up Land.⁴ Alternative 12 is in the vicinity of designated Farmlands of Local Importance in San Diego County near Basilone Road.⁵

Alternative 9

According to the California Department of Conservation Farmland Mapping and Monitoring Program (Orange County Important Farmland 2014), the segment of Alternative 9 in Orange County is in the vicinity of designated Prime Farmland, Farmlands of Statewide Importance, and Unique Farmlands.

Alternative 18

According to the California Department of Conservation Farmland Mapping and Monitoring Program (Orange County Important Farmland 2014), the segment of Alternative 18 in Orange County is in the vicinity of designated Prime Farmland, Farmlands of Statewide Importance, and Unique Farmlands.

Alternative 21

According to the California Department of Conservation Farmland Mapping and Monitoring Program (Orange County Important Farmland 2014), Alternative 21 is in the vicinity of designated Prime Farmland west of I-5 between Avery Parkway and Junipero Serra Road. Alternative 21 generally consists of Urban and Built-Up Land along I-5, and the portion of Alternative 21 in unincorporated Orange County from Oso Parkway to La Pata Avenue is not

¹ Orange County Important Farmland 2014 and San Diego County Important Farmland 2014

² Orange County Important Farmland 2014 and San Diego County Important Farmland 2014

³ San Diego County Important Farmland 2014

⁴ Orange County Important Farmland 2014 and San Diego County Important Farmland 2014

⁵ San Diego County Important Farmland 2014

located near any designated Farmland.¹ Alternative 21 is also in the vicinity of designated Farmlands of Local Importance in San Diego County near Basilone Road.²

Recommended Technical Analysis

A discussion of potential effects/impacts to farmlands/timberlands will be included in the environmental document. A *Farmland Impact Analysis Report* will be required if it is determined that the Build Alternatives will result in impacts to farmlands.

8.5 Community Impacts

Potential short-term temporary community impacts during construction would include noise, dust, construction equipment emissions, temporary construction easements (TCEs), temporary road closures, and traffic detours. All eight Build Alternatives would require partial and full property acquisitions for construction of the transportation facilities. Preliminary data related to partial and full acquisitions required by each of the Build Alternatives is provided in Table N below. At this phase, it is impossible to provide a full analysis of how each conceptual design will impact properties and whether partial or full right-of-way acquisitions would be required. Right-of-way acquisitions were determined by overlaying preliminary design alignments on top of parcel boundaries. It should be noted that the preliminary acquisition ranges provided below are conservative, and will be further refined during design with the primary goal of reducing the number of acquisitions.

Table N: Estimated Range of Right-of-Way Acquisitions for the Build Alternatives

Alternative No.	Residential	Non-Residential	Undeveloped Land
13	0-50	0-50	50-100
17	50-100	0-50	50-100
14	0-50	0-50	0-50
11	100-150	100-150	0-50
12	50-100	50-100	0-50
9	50-100	0-50	0-50
18	50-100	0-50	0-50
21	0-50	0-50	0-50

TCEs would be required to stage construction equipment and materials during construction of the Proposed Project. The Community Impact Assessment (CIA) will analyze short-term construction effects on the cities and communities within the Study Area. A *Relocation Impact Report* would be required for all Build Alternatives because these would result in the acquisition of property and the displacement of businesses, residences, and/or other structures.

Populations subjected to environmental justice determinations are defined as those populations with high concentrations of minority and low-income individuals. Tables O through T list the census tracts in the Study Area along with census information for key indicators of environmental justice populations.

¹ Orange County Important Farmland 2014 and San Diego County Important Farmland 2014

² San Diego County Important Farmland 2014

Table O: Environmental Justice Data for Census Tracts and Census Designated Places for Alternatives 13, 17, and 14 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below Level of Poverty (%)
187 (Camp Pendleton)	6,738 16.6%	9,171 22.6%	2,096 9.0%
320.23 (San Juan Capistrano, San Clemente, Unincorporated Orange County)	1,772 12.4%	1,461 10.2%	538 3.8%
320.44 (Rancho Santa Margarita, unincorporated Orange County)	850 14.5%	606 10.3%	201 3.4%
320.56 (Rancho Santa Margarita, unincorporated Orange County)	1,406 18.1%	1,427 18.4%	388 5.0%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
421.03 (San Clemente)	563 7.2%	1,380 17.6%	431 5.5%
421.06 (Dana Point, San Clemente)	50 3.8%	70 5.3%	139 10.8%
421.07 (San Clemente)	193 4.4%	2,275 51.8%	1,108 25.2%
421.08 (San Clemente)	257 5.22%	1,412 28.7%	616 12.5%
421.09 (San Clemente)	667 13.1%	862 17.0%	399 7.9%
421.11 (San Juan Capistrano, San Clemente)	371 6.1%	601 9.9%	359 5.9%
421.12 (San Clemente)	875 13.6%	831 12.9%	160 2.5%
421.13 (San Clemente)	107 2.6%	609 14.8%	358 8.7%
421.14 (San Clemente)	237 5.6%	783 18.4%	184 4.3%
422.01 (Dana Point, San Juan Capistrano, San Clemente)	240 4.5%	1,315 24.7%	375 7.1%
422.03 (San Juan Capistrano, San Clemente)	544 7.4%	849 11.6%	647 8.9%
422.05 (Dana Point, San Juan Capistrano, San Clemente)	598 8.3%	1,583 22.1%	250 3.5%
422.06 (Dana Point, San Clemente)	167 5.3%	617 19.5%	130 4.2%
423.12 (San Juan Capistrano)	681 7.0%	6,708 69.0%	2,489 25.6%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	1,395 23.6%	254 4.3%
City of Rancho Santa Margarita	7,979 16.3%	9,296 19.0%	2,196 4.5%
City of San Juan Capistrano	1,942 5.4%	13,367 37.1%	5,113 14.2%
City of San Clemente	5,540 8.5%	12,123 18.6%	4,589 7.1%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of Dana Point	2,113 6.2%	6,007 17.7%	2,673 7.9%
Camp Pendleton North (CDP)	1,330 16.9%	2,201 27.9%	361 6.7%

Table O: Environmental Justice Data for Census Tracts and Census Designated Places for Alternatives 13, 17, and 14 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below Level of Poverty (%)
Camp Pendleton South (CDP)	2,804 22.5%	2,759 22.1%	1,160 10.6%
Coto de Caza (CDP)	1,892 12.8%	1,470 9.9%	528 3.6%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%
San Diego County	657,333 20.2%	1,076,319 33.1%	444,024 14.0%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau’s defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Table P: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 11 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below Level of Poverty (%)
187 (Camp Pendleton)	6,738 16.6%	9,171 22.6%	2,096 9.0%
320.14 (Lake Forest)	851 15.1%	2,799 49.8%	1,282 23.0%
320.15 (Mission Viejo)	1,296 18.9%	1,283 18.7%	536 8.0%
320.12 (Mission Viejo)	431 10.4%	939 22.7%	254 6.2%
320.13 (Mission Viejo)	1,027 19.7%	305 5.9%	200 3.9%
320.22 (Mission Viejo)	549 8.0%	3,227 47.3%	675 9.9%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
421.03 (San Clemente)	563 7.2%	1,380 17.6%	431 5.5%
421.06 (Dana Point, San Clemente)	50 3.8%	70 5.3%	139 10.8%
421.07 (San Clemente)	193 4.4%	2,275 51.8%	1,108 25.2%
421.08 (San Clemente)	257 5.22%	1,412 28.7%	616 12.5%
421.11 (San Juan Capistrano, San Clemente)	371 6.1%	601 9.9%	359 5.9%
421.12 (San Clemente)	875 13.6%	831 12.9%	160 2.5%
421.13 (San Clemente)	107 2.6%	609 14.8%	358 8.7%
421.14 (San Clemente)	237 5.6%	783 18.4%	184 4.3%
422.01 (Dana Point, San Juan Capistrano, San Clemente)	240 4.5%	1,315 24.7%	375 7.1%
422.03 (San Juan Capistrano, San Clemente)	544 7.4%	849 11.6%	647 8.9%
422.05 (Dana Point, San Juan Capistrano, San Clemente)	598 8.3%	1,583 22.1%	250 3.5%
422.06 (Dana Point, San Clemente)	167 5.3%	617 19.5%	130 4.2%
423.07 (Laguna Hills)	1,500 21.8%	1,492 21.7%	744 10.9%
423.12 (San Juan Capistrano)	681 7.0%	6,708 69.0%	2,489 25.6%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	1,395 23.6%	254 4.3%
423.27 (Laguna Hills)	777 16.6%	662 14.1%	169 3.6%
423.28 (Laguna Hills)	227 9.6%	235 9.9%	93 3.9%
423.33 (Laguna Hills)	941 24.5%	144 3.7%	113 2.9%
524.10 (Irvine, Lake Forest)	1,186 21.8%	1,247 22.9%	535 9.9%

Table P: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 11 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below Level of Poverty (%)
524.11(Lake Forest)	1,069 20.1%	1,998 37.5%	374 7.1%
626.21 (Irvine)	2,084 27.4%	<i>1,090</i> <i>14.3%</i>	688 9.1%
626.22 (Laguna Woods)	728 18.5%	237 6.0%	514 13.0%
626.47 (Laguna Hills)	1,221 27.6%	844 19.1%	319 7.5%
City of Irvine	118,303 47.9%	23,927 9.7%	30,447 12.7%
City of Lake Forest	16,974 21.0%	18,682 23.2%	6,131 7.6%
City of Laguna Hills	6,329 20.33%	6,566 21.1%	2,467 8.0%
City of Laguna Woods	2,891 17.7%	755 4.6%	1,771 10.8%
City of Mission Viejo	15,145 15.8%	16,241 16.9%	4,545 4.7%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of San Juan Capistrano	1,942 5.4%	<i>13,367</i> <i>37.1%</i>	<i>5,113</i> <i>14.2%</i>
City of San Clemente	5,540 8.5%	12,123 18.6%	4,589 7.1%
City of Dana Point	2,113 6.2%	6,007 17.7%	2,673 7.9%
Camp Pendleton North (CDP)	1,330 16.9%	2,201 27.9%	361 6.7%
Camp Pendleton South (CDP)	2,804 22.5%	2,759 22.1%	1,160 10.6%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%
San Diego County	657,333 20.2%	1,076,319 33.1%	444,024 14.0%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau’s defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Table Q: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 12 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
187 (Camp Pendleton)	6,738 16.6%	9,171 22.6%	2,096 9.0%
320.12 (Mission Viejo)	431 10.4%	939 22.7%	254 6.2%
320.13 (Mission Viejo)	1,027 19.7%	305 5.9%	200 3.9%
320.15 (Mission Viejo)	1,296 18.9%	1,283 18.7%	536 8.0%
320.22 (Mission Viejo)	549 8.0%	3,227 47.3%	675 9.9%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
421.03 (San Clemente)	563 7.2%	1,380 17.6%	431 5.5%
421.06 (Dana Point, San Clemente)	50 3.8%	70 5.3%	139 10.8%
421.07 (San Clemente)	193 4.4%	2,275 51.8%	1,108 25.2%
421.08 (San Clemente)	257 5.22%	1,412 28.7%	616 12.5%
421.11 (San Juan Capistrano, San Clemente)	371 6.1%	601 9.9%	359 5.9%
421.12 (San Clemente)	875 13.6%	831 12.9%	160 2.5%
421.13 (San Clemente)	107 2.6%	609 14.8%	358 8.7%
421.14 (San Clemente)	237 5.6%	783 18.4%	184 4.3%
422.01 (Dana Point, San Juan Capistrano, San Clemente)	240 4.5%	1,315 24.7%	375 7.1%
422.03 (San Juan Capistrano, San Clemente)	544 7.4%	849 11.6%	647 8.9%
422.05 (Dana Point, San Juan Capistrano, San Clemente)	598 8.3%	1,583 22.1%	250 3.5%
422.06 (Dana Point, San Clemente)	167 5.3%	617 19.5%	130 4.2%
423.07 (Laguna Hills)	1,500 21.8%	1,492 21.7%	744 10.9%
423.12 (San Juan Capistrano)	681 7.0%	6,708 69.0%	2,489 25.6%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	1,395 23.6%	254 4.3%
423.27 (Laguna Hills)	777 16.6%	662 14.1%	169 3.6%
423.28 (Laguna Hills)	227 9.6%	235 9.9%	93 3.9%
423.33 (Laguna Hills)	941 24.5%	144 3.7%	113 2.9%
626.47 (Laguna Hills)	1,221 27.6%	844 19.1%	319 7.5%
City of Laguna Hills	6,329 20.33%	6,566 21.1%	2,467 8.0%

Table Q: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 12 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
City of Mission Viejo	15,145 15.8%	16,241 16.9%	4,545 4.7%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of San Juan Capistrano	1,942 5.4%	13,367 37.1%	5,113 14.2%
City of San Clemente	5,540 8.5%	12,123 18.6%	4,589 7.1%
City of Dana Point	2,113 6.2%	6,007 17.7%	2,673 7.9%
Camp Pendleton North (CDP)	1,330 16.9%	2,201 27.9%	361 6.7%
Camp Pendleton South (CDP)	2,804 22.5%	2,759 22.1%	1,160 10.6%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%
San Diego County	657,333 20.2%	1,076,319 33.1%	444,024 14.0%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau's defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Table R: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 9 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
320.22 (Mission Viejo)	549 8.0%	3,227 47.3%	675 9.9%
320.44 (Rancho Santa Margarita, unincorporated Orange County)	850 14.5%	606 10.3%	201 3.4%
320.56 (Rancho Santa Margarita, unincorporated Orange County)	1,406 18.1%	1,427 18.4%	388 5.0%
320.58 (Mission Viejo, Ladera Ranch Unincorporated Orange County)	1,348 17.5%	1,192 15.5%	87 1.1%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	1,395 23.6%	254 4.3%
City of Rancho Santa Margarita	7,979 16.3%	9,296 19.0%	2,196 4.5%
City of Mission Viejo	15,145 15.8%	16,241 16.9%	4,545 4.7%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of San Juan Capistrano	1,942 5.4%	13,367 37.1%	5,113 14.2%
Ladera Ranch (CDP)	4,686 17.3%	4,680 17.3%	709 2.6%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau’s defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Table S: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 18 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
320.22 (Mission Viejo)	549 8.0%	3,227 47.3%	675 9.9%
320.44 (Rancho Santa Margarita, unincorporated Orange County)	850 14.5%	606 10.3%	201 3.4%
320.56 (Rancho Santa Margarita, unincorporated Orange County)	<i>1,406</i> <i>18.1%</i>	1,427 18.4%	388 5.0%
320.57 (Ladera Ranch, Unincorporated Orange County)	1,456 17.8%	1,163 14.2%	260 3.2%
320.58 (Mission Viejo, Ladera Ranch, Unincorporated Orange County)	<i>1,348</i> <i>17.5%</i>	1,192 15.5%	87 1.1%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	<i>1,395</i> <i>23.6%</i>	254 4.3%
City of Rancho Santa Margarita	7,979 16.3%	9,296 19.0%	2,196 4.5%
City of Mission Viejo	15,145 15.8%	16,241 16.9%	4,545 4.7%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of San Juan Capistrano	1,942 5.4%	<i>13,367</i> <i>37.1%</i>	<i>5,113</i> <i>14.2%</i>
Coto de Caza (CDP)	1,892 12.8%	1,470 9.9%	528 3.6%
Ladera Ranch (CDP)	4,686 17.3%	4,680 17.3%	709 2.6%
Las Flores (CDP)	1,020 18.0%	924 16.3%	210 3.7%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau's defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Table T: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 21 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
187 (Camp Pendleton)	6,738 16.6%	9,171 22.6%	2,096 9.0%
320.12 (Mission Viejo)	431 10.4%	939 22.7%	254 6.2%
320.13 (Mission Viejo)	1,027 19.7%	305 5.9%	200 3.9%
320.15 (Mission Viejo)	1,296 18.9%	1,283 18.7%	536 8.0%
320.22 (Mission Viejo)	549 8.0%	3,227 47.3%	675 9.9%
320.23 (San Juan Capistrano, San Clemente, Unincorporated Orange County)	1,772 12.4%	1,461 10.2%	538 3.8%
320.56 (Rancho Santa Margarita, unincorporated Orange County)	1,406 18.1%	1,427 18.4%	388 5.0%
320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County)	310 7.3%	310 7.3%	86 2.0%
421.03 (San Clemente)	563 7.2%	1,380 17.6%	431 5.5%
421.06 (Dana Point, San Clemente)	50 3.8%	70 5.3%	139 10.8%
421.07 (San Clemente)	193 4.4%	2,275 51.8%	1,108 25.2%
421.08 (San Clemente)	257 5.22%	1,412 28.7%	616 12.5%
421.11 (San Juan Capistrano, San Clemente)	371 6.1%	601 9.9%	359 5.9%
421.12 (San Clemente)	875 13.6%	831 12.9%	160 2.5%
421.13 (San Clemente)	107 2.6%	609 14.8%	358 8.7%
421.14 (San Clemente)	237 5.6%	783 18.4%	184 4.3%
422.01 (Dana Point, San Juan Capistrano, San Clemente)	240 4.5%	1,315 24.7%	375 7.1%
422.03 (San Juan Capistrano, San Clemente)	544 7.4%	849 11.6%	647 8.9%
422.05 (Dana Point, San Juan Capistrano, San Clemente)	598 8.3%	1,583 22.1%	250 3.5%
422.06 (Dana Point, San Clemente)	167 5.3%	617 19.5%	130 4.2%
423.07 (Laguna Hills)	1,500 21.8%	1,492 21.7%	744 10.9%
423.12 (San Juan Capistrano)	681 7.0%	6,708 69.0%	2,489 25.6%
423.15 (Laguna Niguel, San Juan Capistrano)	336 5.7%	1,395 23.6%	254 4.3%
423.27 (Laguna Hills)	777 16.6%	662 14.1%	169 3.6%
423.28 (Laguna Hills)	227 9.6%	235 9.9%	93 3.9%
423.33 (Laguna Hills)	941 24.5%	144 3.7%	113 2.9%

Table T: Environmental Justice Data for Census Tracts and Census Designated Places for Alternative 21 Study Area

Census Tract/ Jurisdiction	Racial Minority Population (Non-White) ¹ (%)	Hispanic/ Latino Population ² (%)	Below level of Poverty (%)
626.47 (Laguna Hills)	1,221 27.6%	844 19.1%	319 7.5%
City of Laguna Hills	6,329 20.33%	6,566 21.1%	2,467 8.0%
City of Mission Viejo	15,145 15.8%	16,241 16.9%	4,545 4.7%
City of Laguna Niguel	10,071 15.5%	10,926 16.8%	4,332 6.7%
City of San Juan Capistrano	1,942 5.4%	13,367 37.1%	5,113 14.2%
City of San Clemente	5,540 8.5%	12,123 18.6%	4,589 7.1%
City of Dana Point	2,113 6.2%	6,007 17.7%	2,673 7.9%
Camp Pendleton North (CDP)	1,330 16.9%	2,201 27.9%	361 6.7%
Camp Pendleton South (CDP)	2,804 22.5%	2,759 22.1%	1,160 10.6%
Orange County	746,986 23.9%	1,070,553 34.2%	385,556 12.5%
San Diego County	657,333 20.2%	1,076,319 33.1%	444,024 14.0%

Source: United States Census Bureau, 2012–2016 American Community Survey (ACS), Table B03002 and B17001.

Notes: *Italics* indicate that minority, Hispanic, and/or low-income populations are slightly higher in a census tract when compared to either the city and/or county statistics.

Bold indicates that minority, Hispanic, and/or low-income populations are substantially higher in a census tract or Census Designated Place when compared to the city and/or county statistics. Census tracts are considered to have substantial racial minority and Hispanic/Latino populations if their percentage of minority residents is more than 10 percentage points higher than the County as a whole and substantial low-income populations if their percentage of residents who are living below the Census Bureau's defined poverty threshold is more than 5 percentage points higher than the County as a whole.

¹ Includes individuals who identify themselves as Black/African American, Asian, Native Hawaiian/Pacific Islander, Native American/Native Alaskan, Some Other Race, or two or more races.

² Persons of Hispanic/Latino Origin may be of any race.

Alternatives 13, 17, and 14

- The city of San Juan Capistrano and Census Tracts 421.07 and 421.08 (San Clemente) have substantially higher percentages of Hispanic/Latino population and populations living below the level of poverty than the County of Orange for those census categories.
- Census Tracts 422.03 and 422.05 all have higher percentages of Racial Minority population than the city of San Juan Capistrano.
- Census Tracts 320.61 (Mission Viejo, San Juan Capistrano, unincorporated Orange County) and 421.11 (San Juan Capistrano, San Clemente) have a higher percentage of Racial Minority population than the city of San Juan Capistrano.
- Census Tract 423.12 (San Juan Capistrano) has a higher percentage of Racial Minority population and a substantially higher Hispanic/Latino population as well as population living below the level of poverty than the city of San Juan Capistrano.

- Census Tract 320.23 (San Juan Capistrano, San Clemente, and unincorporated Orange County) has a higher percentage of Racial Minority population than the city of San Juan Capistrano.
- Census Tracts 421.09 and 421.12 (San Clemente) have higher percentages of Racial Minority population than the city of San Clemente, and Census Tracts 421.09 and 421.13 (San Clemente) have higher percentages of population living below the level of poverty than the city of San Clemente.
- Census Tracts 422.01, 422.05, and 422.06 have higher percentages of Hispanic/Latino population than the city of San Clemente.

Census Tract 423.15 (Laguna Niguel, San Juan Capistrano) has a higher Racial Minority population than the city of San Juan Capistrano and a higher Hispanic/Latino population than the city of Laguna Niguel. Census Tract 320.56 (Rancho Santa Margarita, unincorporated Orange County) has higher percentages of Racial Minority population and population living below the level of poverty than the city of Rancho Santa Margarita.

Alternative 11

- The city of San Juan Capistrano and Census Tracts 421.07 and 421.08 (San Clemente) have higher percentages of Hispanic/Latino population and population living below the level of poverty than the County of Orange for those census categories.
- Census Tract 423.12 (San Juan Capistrano) has a higher percentage of Racial Minority population, and substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of San Juan Capistrano and the County of Orange for those census categories.
- Census Tract 423.15 has a higher Racial Minority population than the city of San Juan Capistrano and a higher Hispanic/Latino population than the city of Laguna Niguel.
- Census Tracts 421.11, 422.03, and 422.05 all have higher percentages of Racial Minority population than the city of San Juan Capistrano.
- Census Tracts 422.01, 422.05, and 422.06 have higher percentages of Hispanic/Latino population than the city of San Clemente.
- Census Tract 421.13 (San Clemente) has a higher population living below the level of poverty than the city of San Clemente.
- Census Tract 320.22 (Mission Viejo) has substantially higher percentages of Racial Minority population, Hispanic/Latino population, and population living below the level of poverty than the city of Mission Viejo for those census categories.
- Census Tracts 320.15 and 320.12 (Mission Viejo) have higher Hispanic/Latino populations than the city of Mission Viejo.
- Census Tracts 320.13, 230.15, and 320.61 have higher percentages of Racial Minority population than the city of Mission Viejo.
- Census Tract 421.06 has a higher percentage of population living below the level of poverty than the city of Dana Point.
- Census Tract 423.07 (Laguna Hills) has higher percentages of Racial Minority population, Hispanic/Latino population, and population living below the level of poverty than the city of Laguna Hills.
- Census Tract 423.33 (Laguna Hills) has a higher Racial Minority population than the city of Laguna Hills.

- Census Tract 320.14 (Lake Forest) has a substantially higher Hispanic/Latino population and population living below the level of poverty than the city of Lake Forest.
- Census Tract 524.10 (Irvine, Lake Forest) has a higher percentage of Hispanic/Latino population than the city of Irvine and a higher percentage of population living below the level of poverty than the city of Lake Forest.
- Census Tract 524.11 (Lake Forest) has a substantially higher percentage of Hispanic/Latino population than the city of Lake Forest.
- Census Tract 626.21 (Irvine) has a higher percentage of Hispanic/Latino population than the city of Irvine.
- Census Tract 626.22 (Laguna Woods) has higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of Laguna Woods.

Alternative 12

- The city of San Juan Capistrano and Census Tracts 421.07 and 421.08 (San Clemente) have substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the County of Orange for those census categories.
- Census Tract 423.12 (San Juan Capistrano) has a higher percentage of Racial Minority population and substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of San Juan Capistrano and the County of Orange for those census categories.
- Census Tract 423.15 has a higher Racial Minority population than the city of San Juan Capistrano and a higher Hispanic/Latino population than the city of Laguna Niguel.
- Census Tracts 421.11, 422.03, and 422.05 all have higher percentages of Racial Minority population than the city of San Juan Capistrano.
- Census Tracts 422.01, 422.05, and 422.06 have higher percentages of Hispanic/Latino population than the city of San Clemente.
- Census Tract 320.22 (Mission Viejo) has substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of Mission Viejo for those census categories.
- Census Tracts 320.13, 230.15, and 320.61 have higher percentages of Racial Minority population than the city of Mission Viejo.
- Census Tracts 423.33 and 626.47 have higher percentages of Racial Minority population than the city of Laguna Hills.
- Census Tract 421.06 has a higher percentage of population living below the level of poverty than the City of Dana Point.

Alternative 9

- The City of San Juan Capistrano has a higher percentage of Hispanic/Latino population and population living below the level of poverty than the County of Orange.
- Census Tract 320.61 has a higher percentage of Racial Minority population than the city of San Juan Capistrano.
- Census Tract 320.22 (Mission Viejo) has substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of Mission Viejo for those census categories.

- Census Tract 320.56 (Rancho Santa Margarita, unincorporated Orange County) has higher percentages of Racial Minority population and population living below the poverty level than the city of Rancho Santa Margarita for those census categories.
- Census Tract 320.58 has a higher percentage of Racial Minority population than the city of Mission Viejo.
- Census Tract 423.15 (Laguna Niguel, San Juan Capistrano) has a higher Racial Minority population than the city of San Juan Capistrano and a higher Hispanic/Latino population than the city of Laguna Niguel.

Alternative 18

- The city of San Juan Capistrano has higher percentages of Hispanic/Latino population and population living below the level of poverty than the County of Orange.
- Census Tract 320.56 (Rancho Santa Margarita, unincorporated Orange County) has higher percentages of Racial Minority population and population living below the level of poverty than the city of Rancho Santa Margarita for those census categories.
- Census Tract 423.15 (Laguna Niguel, San Juan Capistrano) has a higher percentage of Racial Minority population than the city of San Juan Capistrano and a higher percentage of Hispanic/Latino population than the city of Laguna Niguel.
- Census Tract 320.22 (Mission Viejo) has substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of Mission Viejo for those census categories.
- Census Tracts 320.58 (Mission Viejo, Ladera Ranch, Unincorporated Orange County) and 320.61 (Mission Viejo, San Juan Capistrano, Unincorporated Orange County) have higher percentages of Racial Minority population than the city of Mission Viejo and the city of San Juan Capistrano.

Alternative 21

- The city of San Juan Capistrano and Census Tracts 421.07 and 421.08 (San Clemente) have substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the County of Orange for those census categories.
- Census Tract 423.12 (San Juan Capistrano) has higher percentages of Racial Minority population and substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of San Juan Capistrano and the County of Orange for those census categories.
- Census Tract 320.22 (Mission Viejo) has substantially higher percentages of Hispanic/Latino population and population living below the level of poverty than the city of Mission Viejo for those census categories.
- Census Tract 320.23 (San Juan Capistrano, San Clemente, and Unincorporated Orange County) has a higher percentage of Racial Minority population than the city of San Juan Capistrano.
- Census Tract 320.56 (Rancho Santa Margarita, unincorporated Orange County) has higher percentages of Racial Minority population and population living below the level of poverty than the city of Rancho Santa Margarita.
- Census Tracts 320.13, 230.15, and 320.61 have higher percentages of Racial Minority population than the city of Mission Viejo.

- Census Tracts 423.33 and 626.47 have higher percentages of Racial Minority population than the city of Laguna Hills.
- Census Tract 421.06 has a higher percentage of population living below the level of poverty than the city of Dana Point.
- Census Tracts 421.11, 422.03, and 422.05 all have higher percentages of Racial Minority population than the city of San Juan Capistrano.
- Census Tracts 422.01, 422.05, and 422.06 have higher percentages of Hispanic/Latino population than the city of San Clemente.
- Census Tract 423.15 has a higher Racial Minority population than the city of San Juan Capistrano and a higher Hispanic/Latino population than the city of Laguna Niguel.

These populations and the other characteristics listed in Tables O through T will be analyzed further in the CIA for the Proposed Project. The CIA will describe the relationship between the Build Alternatives for the Proposed Project and the cities and communities in the Study Area. The CIA will analyze the potential effects of the Build Alternatives related to land use and planning, growth, community character and cohesion, real property acquisition and relocations, economics, community facilities and services, and environmental justice to assess how those Build Alternatives may affect the people, institutions, neighborhoods, communities, and larger social and economic systems in the Study Area.

Recommended Technical Analysis

A Community Impact Assessment, a Draft Relocation Impact Report, and a Final Relocation Impact Report will be prepared and summarized in the environmental document.

8.6 Visual/Aesthetics

The Study Area is primarily suburban with undeveloped hillsides in the northern and eastern parts of the Study Area. Existing and planned development in the Study Area includes freeways (I-405, I-5, State Route 1 (SR 1), SR 73, State Route 74 (SR 74), and SR 241), local arterials and roads, residential, commercial/industrial, open space, and recreational uses.

Scenic Highways

The State Scenic Highway System consists of highways that are either eligible for designation or have been officially designated as Scenic Highways. There are three eligible State Scenic Highways in the Study Area (i.e., SR 74, SR 1, and I-5) for Alternatives 13, 17, 14, 11, 12, 9, and 21. There are no eligible or designated Scenic Highways in the Study Area for Alternative 18.

To be designated as a State Scenic Highway, the local governing body applies to Caltrans for Scenic Highway approval, adopts a Corridor Protection Program, and receives notification that the highway has been officially designated a Scenic Highway. The Study Area does not include any of the officially designated State Scenic Highways.¹ As shown in Table U, Scenic Highways in the Study Area, the three eligible highways in the Study Area (i.e., SR 74, SR 1, and I-5) are not officially designated. However, as described below, the Build Alternatives are likely to affect

¹ Caltrans Officially Designated State Scenic Highways. Website: http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm, accessed December 11, 2017.

Table U: Scenic Highways in the Study Area

Segment/ Alternative	Route	County	State Scenic Highway Location (from/to)	Scenic Highway Designation Status
Segment 1				
Alternatives 13, 17, and 14	SR 74	Orange/Riverside	I-5 near San Juan Capistrano to SR 111 in Palm Desert	Eligible State Scenic Highway not officially designated
Segment 2				
Alternative 13	SR 1	Orange/Los Angeles	I-5 south of San Juan Capistrano to SR 19 near Long Beach	Eligible State Scenic Highway not officially designated
Alternatives 13, 17, and 14	I-5	San Diego/Orange	Opposite Coronado to SR 74 near San Juan Capistrano	Eligible State Scenic Highway not officially designated
Segment 3				
Alternatives 13, 17, and 14	I-5	San Diego/Orange	Opposite Coronado to SR 74 near San Juan Capistrano	Eligible State Scenic Highway not officially designated
Alternative 11				
Alternative 11	SR 1	Orange/Los Angeles	I-5 south of San Juan Capistrano to SR 19 near Long Beach	Eligible State Scenic Highway not officially designated
	I-5	San Diego/Orange	Opposite Coronado to SR 74 near San Juan Capistrano	Eligible State Scenic Highway not officially designated
Alternative 12				
Alternative 12	SR 1	Orange/Los Angeles	I-5 south of San Juan Capistrano to SR 19 near Long Beach	Eligible State Scenic Highway not officially designated
	I-5	San Diego/Orange	Opposite Coronado to SR 74 near San Juan Capistrano	Eligible State Scenic Highway not officially designated
Alternative 9				
Alternative 9	SR 74	Orange/Riverside	I-5 near San Juan Capistrano to SR 111 in Palm Desert	Eligible State Scenic Highway not officially designated
Alternative 18				
Alternative 18	None	N/A	N/A	N/A
Alternative 21				
Alternative 21	SR 74	Orange/Riverside	I-5 near San Juan Capistrano to SR 111 in Palm Desert	Eligible State Scenic Highway not officially designated
	SR 1	Orange/Los Angeles	I-5 south of San Juan Capistrano to SR 19 near Long Beach	Eligible State Scenic Highway not officially designated
	I-5	San Diego/Orange	Opposite Coronado to SR 74 near San Juan Capistrano	Eligible State Scenic Highway not officially designated

Source: Caltrans. Scenic Highways. Website: <http://www.dot.ca.gov/design/lap/livability/scenic-highways/index.html> (accessed December 11, 2017).

I-5 = Interstate 5

N/A = Not Applicable

SR 1 = State Route 1

SR 111 = State Route 111

SR 19 = State Route 19

SR 74 = State Route 74

the visual character and quality of the Study Area, including potentially affecting these three eligible State Scenic Highways.

Visual Character

Alternatives 13, 17, and 14.

Segment 1. Segment 1 is characterized by suburban development and undeveloped hillsides. The northern terminus of the Study Area is largely characterized by undeveloped rolling hills with distant suburban development and the Thomas F. Riley Wilderness Park. Farther south, this segment of the Study Area traverses land between Planning Areas (PAs) 2 and 3 in Rancho Mission Viejo (unincorporated Orange County), which is under construction with suburban residential and commercial uses. Where the Study Area crosses SR 74, the land near Antonio Parkway is currently developed for residential and commercial uses (PA 1). Where the Study Area approaches the junction of Segments 1 and 2 (east of La Pata Avenue), the land is undeveloped but is planned for residential and commercial uses as part of the Rancho Mission Viejo Ranch Plan (PA 5).

Segment 2. Segment 2 is characterized by suburban development, undeveloped hillsides, and Prima Deshecha Landfill. At the northern part of this segment, Alternatives 13 and 17 share the same alignment from La Pata Avenue to north of the terminus of Camino Las Ramblas in San Juan Capistrano, where the alternatives diverge. Alternatives 13 and 17 would be on an elevated structure in undeveloped areas with existing suburban residential uses to the north and south. Alternative 13 would follow the undeveloped area to the northwest and connect with I-5 at La Novia Avenue, where the road would transition into the center lanes of the widened I-5 right-of-way. Alternative 17 would transition to the southwest at the terminus of Camino Las Ramblas and traverse the undeveloped areas between existing suburban residential uses. Alternative 17 would cross the existing Shorecliffs Golf Club in San Clemente on an elevated structure and would connect to I-5 at Avenida Vaquero, where the road would transition into the center lanes of the widened I-5 right-of-way.

At the northern part of this segment, Alternative 14 would take a southern route generally along the existing and planned alignment of La Pata Avenue through the Prima Deshecha Landfill property. Alternative 14 splits from the general alignment of La Pata Avenue at Avenida Vista Hermosa and extends southwest across undeveloped land. Existing suburban residential uses and the Vista Hermosa Sports Park would be in the vicinity of the elevated facility.

Segment 3. Segment 3 is largely characterized by I-5 and existing commercial and residential uses. Alternative 14 would be the only alternative in this segment with an elevated structure in this segment, where Segment 2 transitions into Segment 3 at Avenida Pico. The remainder of Segment 3, from Avenida Pico to Basilone Road, would consist of a widened I-5 right-of-way at the same grade as the existing facility.

Alternative 11. The Study Area for Alternative 11 consists of the I-5 corridor from the I-405/I-5 interchange to the San Diego County line. Alternative 11 is largely characterized by I-5 and existing commercial and residential uses. Alternative 11 would widen I-5 right-of-way at the same grade as the existing facility.

Alternative 12. The Study Area for Alternative 12 consists of the I-5 corridor from Alicia Parkway to the San Diego County line. Alternative 12 is largely characterized by I-5 and existing commercial and residential uses, and would consist of managed lanes in the center median of the I-5 right-of-way. Alternative 12 would consist of a widened I-5 right-of-way at the same grade as the existing facility.

Alternative 9. The Study Area for Alternative 9 generally consists of the areas north of SR 74 and south of SR 241.

The northern part of the Study Area is characterized by suburban development and undeveloped hillsides. Beyond the connection to Antonio Parkway, Alternative 9 is characterized by suburban development and open space reserves in unincorporated Orange County. Alternative 9 would then travel northwest adjacent to existing suburban residential, commercial, and school uses as it connects to Via Escolar in Mission Viejo and thereafter to SR 73 in Laguna Niguel.

Alternative 18. The Study Area generally consists of the areas north of SR 74 and south of SR 241.

The northern part of the Study Area is characterized by suburban development and undeveloped hillsides. Alternative 18 would follow the Los Patrones Parkway alignment to the proposed extension of Crown Valley Parkway, which is largely characterized by undeveloped land with nearby suburban uses and the Thomas F. Riley Wilderness Park. Beyond the proposed connection to Crown Valley Parkway, the alternative traverses undeveloped and open space reserve areas in unincorporated Orange County. Alternative 18 then travels northwest adjacent to existing suburban residential, commercial, and school uses. Alternative 18 would connect to Via Escolar in Mission Viejo and thereafter connect to SR 73 in Laguna Niguel.

Alternative 21. The Study Area consists of an extension of Los Patrones Parkway from Oso Parkway to La Pata Avenue and the I-5 corridor from Alicia Parkway to the San Diego County line. Alternative 21 at the Los Patrones Parkway extension is largely characterized by suburban development and undeveloped hillsides. Where the Study Area crosses SR 74, the land near Antonio Parkway is developed for residential and commercial uses as part of the Rancho Mission Viejo Ranch Plan (PA 1). Where the Study Area extends from SR 74 to the Prima Deshecha Landfill, the land to the east is undeveloped but is planned for residential and commercial uses as part of the Rancho Mission Viejo Ranch Plan (PA 5). Alternative 21 along I-5 is largely characterized by existing commercial and residential uses and would consist of managed lanes in the center median of the I-5 right-of-way. This alternative would consist of a widened I-5 right-of-way at the same grade as the existing facility.

In general, development of the Build Alternatives in undeveloped areas and with elevated structures would result in greater visual impacts.

Recommended Technical Analysis

A Caltrans Questionnaire to Determine Visual Impact Assessment Level was completed for the Proposed Project. Per the resulting score of 30, noticeable visual changes to the environment are proposed. A fully developed *Visual Impact Assessment* (VIA) will be prepared to address potential visual/aesthetics impacts associated with the Build Alternatives and will be summarized

in the environmental document. The VIA will include before and after view simulations at appropriate locations sufficient to address all the Build Alternatives.

8.7 Cultural Resources

A cultural resource record search conducted for the Study Area indicates that previous cultural resource studies (including survey, testing, monitoring, and overviews) cover nearly the entirety of the Study Area; however, the majority of the studies are more than 10 years old. Historic resources must be a minimum of 50 years old for eligibility for the National Register of Historic Places (National Register) or California Register of Historic Resources (California Register). Therefore, historic resources may have been added to either the National Register or California Register since publication of these studies. A total of 147 prehistoric and historic resources have been recorded within the Study Area for all the Build Alternatives combined. These include 103 sites and 44 isolated finds. The 103 sites in the Study Area consist of historic (58), prehistoric (40), and combination prehistoric/historic (5) resources. The 44 isolated finds consist of prehistoric (42) and historic (2) isolates.

Historic resource sites include buildings (37, including 1 adobe building and 1 adobe location), structure/foundations with trash (6), road alignments (6), reservoir/water conveyance systems (4), historic districts (2), trash scatters (2), and a railroad (1). Prehistoric resource sites include lithic scatters (22), habitations (11), villages (2), artifact scatters (2), milling stations (2), and a National Register-eligible district (1), which is also a named village site. Combination prehistoric/historic sites include the historic Mission San Juan Capistrano (containing prehistoric material), another site with a human burial/lithics/historic trash (1), prehistoric habitation sites with historic trash (2), and a prehistoric lithic/historic trash site (1). Prehistoric isolated finds are primarily lithics (36), but also include milling artifacts (4); a ceramic shard (1); and an undescribed isolate (1). Historic isolated finds include a wagon (1) and an undescribed isolate (1).

In addition to the above-listed resources, the Office of Historic Preservation (OHP) Historic Properties Directory lists another 72 properties located within or near the Study Area. Of these 72 OHP-listed properties, 62 are located in and near Alternatives 17, 12, and 21 in the San Clemente area (32), and in and near Alternatives 12 and 21 in the San Juan Capistrano area (30). Nine OHP-listed properties are located in and near Alternatives 13, 12, and 21 in the Dana Point area. Although the majority of the OHP-listed properties are ineligible for listing in the National Register, most have not been evaluated for the California Register or local listing. Several of the properties are listed in the California and National Registers, or are contributors to California and National Register-listed districts. Based on surveys, several properties appear eligible to the National Register either as individual properties or as contributors to districts. A few of the listed properties have not been evaluated.

Two historic districts exist within several portions of the Study Area for Alternatives 17, 14, 12, and 21 in San Clemente. District P-30-150035 is the Spanish Colonial Revival Thematic Historic District recorded in 2007 (OHP Property No. 167502). District P-30-150036 is the Ole Hanson/Spanish Village-by-the-Sea Thematic Historic District, also recorded in 2007 (OHP Property No. 167745). Both districts appear to cover the same area from Camino De Estrella south to the Orange/San Diego County line. The Ole Hanson/Spanish Village-by-the-Sea Thematic Historic District was recommended as eligible for National Register listing under

Criteria a, b, and c. The Spanish Colonial Revival Thematic Historic District was recommended as eligible for local listing.

Two Findings of Effect (FOEs) exist for the Study Area. These were for habitation site CA-ORA-1107, which is located along I-5 in the Dana Point area of Alternatives 12 and 21, and for native village site CA-ORA-22, which is the principal site of the San Mateo Archaeological District (SMAD). Site CA-ORA-1107 was previously determined ineligible for listing in the National Register, but was not evaluated for the California Register. Site CA-ORA-22 (*Panhe*) was determined eligible for the California Register based on archaeological survey and excavation, but was determined ineligible for the National Register. Nevertheless, this site is a contributor to the National Register-eligible San Mateo Archaeological District.

In addition to CA-ORA-22, the SMAD also includes sites CA-SDI-11703 and CA-SDI-13071. The SMAD is situated in both Orange and San Diego Counties. Several other large and potentially important archaeological sites exist near SMAD. The reason for the presence of so many large and important sites is San Mateo Creek, where water could be obtained near the ocean. It is also an area where a diversity of plants and animals could be hunted and gathered for food and other uses.

All the Build Alternatives that follow I-5 to Basilone Road encounter both historic thematic districts, the National Register-eligible SMAD, as well as several prehistoric habitation/village sites situated in the San Mateo Creek drainage.

A description of the resources by each Build Alternative is provided below. Some of the Build Alternatives overlap. As such, the separate Build Alternatives include many of the same sites. For this reason, the total number of sites for all Build Alternatives combined does not equal the total number of resources. Table V provides a summary of previously recorded resources present in the Study Area for each Build Alternative.

Table V. Summary of Resources with the Build Alternatives

Alternative	Previously Recorded Resources Present in Study Area	Districts	Sites	Isolated Finds
13	55	3	44	8
17	28	3	20	5
14	44	3	26	15
11	77	3	59	15
12	73	3	58	12
9	18	0	15	3
18	14	0	8	6
21	81	3	61	17

Alternative 13

Alternative 13 measures 19.9 miles in length and encompasses 3,512.3 acres. Approximately 11.0 miles of this alignment is through undeveloped area, while the remaining approximately 9.0 miles follows I-5 from Avenida Aeropuerto south to Basilone Road.

A total of 44 previously recorded resource sites and 8 isolated finds exist in Alternative 13. In addition, Alternative 13 traverses the 2 historic thematic districts in San Clemente as well as the archaeological district (SMAD) near the south end of the alignment. Of the 44 previously recorded sites, 26 are historic, 14 are prehistoric, 2 are combination prehistoric/historic, and 2 are of unknown type.

Alternative 17

Alternative 17 measures 17.4 miles in length and encompasses 3,172.5 acres. Alternative 17 proceeds from the current end of SR 241 at Oso Parkway to approximately 11 miles south through undeveloped land to the I-5 at Avenida Vaquero (west of the Prima Deshecha Landfill). From the Prima Deshecha Landfill, Alternative 17 then follows the I-5 south for another 6.4 miles to Basilone Road.

A total of 20 previously recorded resource sites and 5 isolated finds exist in Alternative 17. Alternative 17 also traverses the 2 historic thematic districts and 1 archaeological district (SMAD) in San Clemente. Of the 20 recorded sites, 8 are prehistoric, 7 historic, 2 are a combination of prehistoric/historic, and 3 are of unknown type.

Alternative 14

Alternative 14 measures a total length of 16 miles and encompasses 3,256.1 acres. Alternative 14 is similar to Alternative 17 except at its northern end where the alignment runs through 11.7 miles of undeveloped terrain east of Alternative 17. At its north end, Alternative 14 begins at SR 241 at Oso Parkway and proceeds south to the I-5 at Avenida Pico, where it follows I-5 south to Basilone Road.

A total of 26 previously recorded resource sites and 15 isolated finds exist in Alternative 14. Alternative 14 also traverses the 2 historic thematic districts and 1 archaeological district (SMAD) in San Clemente. Of the 26 recorded sites, 17 are prehistoric, 7 historic, 1 is a combination of prehistoric/historic, and 1 is of unknown type.

Alternative 11

Alternative 11 follows the existing I-5 from I-405 at the “El Toro Y” south 22.4 miles to Basilone Road, encompassing a total of 2,763.85 acres. There is relatively little undeveloped land along this alignment, and what few undeveloped areas do exist are isolated and occur as small parcels.

A total of 59 previously recorded resource sites and 15 isolated finds exist in Alternative 11. In addition, Alternative 11 traverses the 2 historic thematic districts and 1 archaeological district (SMAD) in San Clemente. Of the 59 recorded sites, 41 are historic, 12 are prehistoric, 1 is a combination prehistoric/historic site, and 5 are of unknown type.

Alternative 12

Alternative 12 follows I-5 from approximately Alicia Parkway south 21.6 miles to Basilone Road. Alternative 12 is similar to Alternative 11 in that both follow I-5. Alternative 12 encompasses 2,317.6 acres that, like Alternative 11, are primarily developed. The few undeveloped areas that do exist in Alternative 12 are isolated and in small parcels.

A total of 58 previously recorded resource sites and 12 isolated finds exist in Alternative 12. In addition, Alternative 12 traverses the 2 historic thematic districts and 1 archaeological district (SMAD) in San Clemente. Of the 58 recorded sites, 41 are historic, 11 are prehistoric, 1 is a combination prehistoric/historic site, and 5 are of unknown type.

Alternative 9

Alternative 9 joins SR 73/I-5 near Avery Parkway and proceeds southeast where it diverges, one portion leading south to Ortega Highway and another portion leading northeast to Antonio Parkway. Alternative 9 totals 5.6 miles in length and encompasses 1,715.2 acres. A total of 4.3 miles of Alternative 9 traverses undeveloped areas while approximately 1.3 miles run through developed land.

A total of 15 previously recorded resource sites and 3 isolated finds exist in Alternative 9. Of the 15 recorded sites, 12 are historic, 2 are prehistoric, and 1 is a combination prehistoric/historic site. Few previously recorded resources exist in Alternative 9 because it is one of the shorter Build Alternatives.

Alternative 18

Alternative 18 traverses the same area as Alternative 9 from SR 73/I-5 southeast but does not include the portion leading southeast to Ortega Highway. Alternative 18 does include the northeast portion to Antonio Parkway, which then proceeds an additional 2 miles farther. Another separate 0.9-mile-long portion of Alternative 18 leads east-northeast from Crown Valley Parkway at San Antonio Parkway, through undeveloped area. Alternative 18 totals 7.2 miles in length and encompasses an area of 2,465.5 acres. There are 1.3 miles of Alternative 18 that go through developed areas and 5.9 miles that go through undeveloped areas.

A total of 8 previously recorded resource sites and 6 isolated finds exist in Alternative 18. Of the 8 recorded sites, 6 are prehistoric and 2 are historic. Few previously recorded resources exist along this Alternative because, like Alternative 9, Alternative 18 is one of the shortest Build Alternatives and encompasses much less acreage than the longer Alternatives.

Alternative 21

Alternative 21 consists of 2 separate segments totaling 17.8 miles in length and 3,114 acres. Alternative 21 runs along I-5 and through 13.8 miles of developed areas. A second, separate segment of Alternative 21 runs for 4 miles through a primarily undeveloped area (i.e., 2.6 miles south of Ortega Highway and 1.4 miles north of Ortega Highway). The southernmost 1.4-mile portion of this segment follows a somewhat developed area along Avenida La Pata.

A total of 61 previously recorded resource sites and 17 isolated finds exist in Alternative 21. As well, Alternative 21 traverses the 2 historic thematic districts and 1 archaeological district (SMAD) in San Clemente. Of the 61 recorded sites, 38 are historic, 15 are prehistoric, 2 are combination prehistoric/historic sites, and 6 are of unknown type.

Recommended Technical Analysis

An *Archaeological Survey Report* (ASR), a *Historical Resources Evaluation Report* (HRER), and a *Historic Property Survey Report* (HPSR) will need to be prepared for the Build

Alternatives and will include archival research, Native American consultation, outreach to historical societies and similar groups, intensive-level field surveys, and an evaluation of resources. In addition, a *Finding of Effect* (FOE) will be prepared to analyze the potential effects of the proposed undertaking on National Register-eligible and -listed properties in the Project Area of Potential Effects (APE). A Memorandum of Agreement will be prepared if it is determined there would be adverse effects to historical resources. The findings of these reports will be summarized in the environmental document.

8.8 Hydrology and Floodplain

A drainage assessment was prepared to identify Caltrans, Orange County Flood Control District (OCFCD), and various city drainage systems as well as Federal Emergency Management Agency (FEMA) floodplains and to discuss the potential impacts of on these facilities and floodplains. Floodplains are defined in terms of Flood Hazard Zones as follows:

- **Zone A:** Areas subject to inundation by the 1-percent-annual-chance flood event, no Base Flood Elevations.
- **Zone AE:** Areas subject to inundation by the 1-percent-annual-chance flood event, Base Flood Elevations determined.
- **Zone D:** Areas in which flood hazards are undetermined, but possible.

Alternatives 13, 17, and 14

There are four FEMA-identified floodplains and one undetermined floodplain that may be impacted by Alternatives 13, 17, and 14. The San Juan Creek (L01) Channel, Prima Deshecha Cañada (M01) Channel, and Segunda Deshecha Cañada (M02) Channel are OCFCD drainage facilities that may be impacted by Alternatives 13, 17, and 14.

Segment 1. There is one FEMA-identified floodplain that may be impacted by Alternatives 13, 17, and 14 in Segment 1 of the Study Area. The floodplain is the San Juan Creek Channel, which is north of the Ortega Highway and the proposed Build Alternative crossing. The San Juan Creek Channel SR 241 crossing is mapped as a 1-percent-annual-chance Special Flood Hazard Area (SFHA) Zone A. The San Juan Creek Channel Floodplain is documented on Flood Insurance Rate Map (FIRM) Panel 06059C0465J.

The San Juan Creek Channel crosses Alternatives 13, 17, and 14 north of the Ortega Highway crossing as an earthen and riprap-lined channel.

Segment 2. Alternative 13 crosses the floodplain for Prima Deshecha Cañada Channel at the I-5/Avenida Vaquero overcrossing. Alternative 17 crosses the floodplain for Prima Deshecha Cañada Channel between the I-5/Avenida Vaquero overcrossing and Calle Nuevo. The Prima Deshecha Cañada Channel crossing at I-5 is mapped as a 1-percent-annual-chance SFHA Zone AE.

Alternative 14 would also cross Prima Deshecha Cañada Channel, but at a different location than Alternatives 13 and 17. Alternative 14 would cross the Channel at La Pata Avenue in San Clemente, which is mapped as a 1-percent-annual-chance SFHA Zone A. The location where Alternative 14 crosses Prima Deshecha Cañada Channel Floodplain is documented on FIRM Panel 06059C0526J.

The third floodplain is Cascadita Canyon Storm Channel, north of the I-5/Avenida Vista Hermosa interchange. Alternatives 13 and 17 would cross the Cascadita Canyon Storm Channel mapped 1-percent-annual-chance SFHA Zones A and AE. The Prima Deshecha Cañada and Cascadita Canyon Storm Channel Floodplains are documented on FIRM Panel 06059C0509J. Alternative 14 would not cross the Cascadita Canyon Storm Channel.

The Prima Deshecha Cañada Channel crosses I-5 north of Avenida Vaquero in a 16-foot by 16-foot reinforced concrete arch. Alternatives 13 and 17 would cross this drainage facility at this same location.

The Prima Deshecha Cañada Channel would be crossed by Alternative 14 north of the Avenida La Pata and Camino Del Rio intersection in a natural earthen channel.

Segment 3. The fourth floodplain is the Segunda Deshecha Cañada Channel at the Avenida Pico and I-5 interchange. The Segunda Deshecha Cañada Channel/I-5 crossing is mapped as a 1-percent-annual-chance SFHA Zone AE. Alternatives 13, 17, and 14 would cross this floodplain at this location.

Alternative 14 would cross the Segunda Deshecha Cañada Channel Floodplain at a second location at the Calle Del Cerro connection. The second crossing of the Segunda Deshecha Cañada Channel Floodplain is mapped as a 1-percent-annual-chance SFHA Zone AE.

The San Mateo Creek Channel, south of the Cristianitos Road and I-5 interchange is an undetermined floodplain. The San Mateo Creek Channel/I-5 crossing is mapped as a Flood Area Zone D. The part of San Mateo Creek Channel that traverses under I-5 is a San Diego County facility. FIRM panels were not created for this part of San Mateo Creek; however, on the San Diego County FIRM Index, it shows that the FIRM panels associated with this area are undetermined floodplains. Alternatives 13, 17, and 14 would cross this undetermined floodplain at this location.

The Segunda Deshecha Cañada Channel crosses I-5 at the I-5/Avenida Pico interchange via an 18-foot by 18-foot reinforced concrete arch. Alternatives 13, 17, and 14 would cross this drainage facility at this same location.

The Segunda Deshecha Cañada Channel also crosses Alternative 14 north of the I-5/Avenida Pico interchange via an 8-foot by 10-foot trapezoidal channel.

The OCFCD facilities (i.e., San Juan Creek [L01] Channel, Prima Deshecha Cañada [M01] Channel, and Segunda Deshecha Cañada [M02] Channel) may be impacted as a result of the proposed improvements for Alternatives 13, 17, and 14. A hydraulic analysis is recommended to verify that crossings of OCFCD facilities meet the criteria set by the OCFCD.

Alternative 11

There are 11 FEMA-identified floodplains and 1 undetermined floodplain that may be impacted by Alternative 11.

Alternative 11 would cross Serrano Creek just north of Bake Parkway, which is mapped as a 1-percent-annual-chance SFHA Zone AE. San Diego Creek crosses I-5 just north of the boundary between the cities of Irvine and Lake Forest. A portion of San Diego Creek east of I-5 and Alternative 11 is mapped as a 1-percent-annual-chance SFHA Zone AE. Serrano Creek and San Diego Creek are documented on FIRM Panel 06059C0313J.

Aliso Creek crosses I-5 and Alternative 11 between Los Alisos Boulevard and Alicia Parkway and is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0427J.

The La Paz Channel crosses I-5 and Alternative 11 southeast of La Paz Road and is mapped as a 1-percent-annual-chance SFHA Zone A on FIRM Panel 06059C0431J.

Oso Creek crosses I-5 and Alternative 11, merging with the La Paz Channel south of Oso Parkway. Oso Creek is mapped as a 1-percent-annual-chance SFHA Zone AE in this area on FIRM Panel 06059C0433J.

Trabuco Creek crosses Rancho Viejo Road, I-5, and Camino Capistrano north of Junipero Serra Road, and Horno Creek crosses I-5 north of the Ortega Highway. Trabuco Creek and Horno Creek are each mapped as 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0443J.

Similar to Alternatives 13, 17, and 14 above, Alternative 11 would also cross the San Juan Creek Floodplain, Cascadita Canyon Storm Channel Floodplain, Prima Deshecha Cañada Channel Floodplain, Segunda Deshecha Cañada Channel Floodplain, and the undetermined floodplain associated with the San Mateo Creek Channel, all in locations where the drainages intersect with I-5.

Alternative 12

Alternative 12 utilizes the same alignment as Alternative 11, although the start of this Build Alternative is located farther south. There are 9 FEMA-identified floodplains and 1 undetermined floodplain that may be impacted by Alternative 12.

Aliso Creek, La Paz Channel, Oso Creek, Trabuco Creek, Horno Creek, San Juan Creek, Cascadita Canyon Storm Channel, Prima Deshecha Cañada Channel, and Segunda Deshecha Cañada Channel are OCFCD drainage facilities that may be impacted by Alternative 12 at the same location as described in Alternative 11 above.

Alternative 9

There are two FEMA-identified floodplains that may be impacted by Alternative 9: Horno Creek and Trabuco Creek. Alternative 9 crosses directly north of Horno Creek in unincorporated Orange County and north of Silver Creek Drive in San Juan Capistrano. Horno Creek is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0444J.

Trabuco Creek crosses the Study Area east of I-5 and Capistrano Valley High School. Trabuco Creek is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0443J.

Alternative 18

There are three FEMA-identified floodplains that may be impacted by Alternative 18: Cañada Chiquita, Horno Creek, and Trabuco Creek. The extension of Crown Valley Parkway and the new proposed arterial connection to Los Patrones Parkway would cross Cañada Chiquita, which parallels Tesoro Creek Road, where Alternative 18 terminates at Los Patrones Parkway. Cañada Chiquita is mapped as a 1-percent-annual-chance SFHA Zone A on FIRM Panel 06059C0453J.

Alternative 18 crosses directly north of Horno Creek in unincorporated Orange County and north of Silver Creek Drive in San Juan Capistrano. Horno Creek is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0444J.

Trabuco Creek crosses the Study Area east of I-5 and Capistrano Valley High School. Trabuco Creek is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0443J.

Alternative 21

There are 10 FEMA-identified floodplains that may be impacted by Alternative 21 described below.

There is 1 FEMA-identified floodplain that may be impacted by the extension of Los Patrones Parkway. The floodplain is the San Juan Creek Channel, which is north of the Ortega Highway and the proposed Build Alternative crossing. The San Juan Creek Channel SR 241 crossing is mapped as a 1-percent-annual-chance SFHA Zone A. The San Juan Creek Channel Floodplain is documented on FIRM Panel 06059C0465J. San Juan Creek Channel crosses Alternative 21 north of the Ortega Highway crossing as an earthen and riprap-lined channel.

There are 9 FEMA-identified floodplains that may be impacted by the I-5 segment. Aliso Creek crosses I-5 and Alternative 21 between Los Alisos Boulevard and Alicia Parkway and is mapped as a 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0427J. The La Paz Channel crosses I-5 and Alternative 21 southeast of La Paz Road and is mapped as a 1-percent-annual-chance SFHA Zone A on FIRM Panel 06059C0431J. Oso Creek crosses I-5 and Alternative 21, merging with the La Paz Channel south of Oso Parkway. Oso Creek is mapped as a 1-percent-annual-chance SFHA Zone AE in this area on FIRM Panel 06059C0433J. Trabuco Creek crosses Rancho Viejo Road, I-5, and Camino Capistrano north of Junipero Serra Road, and Horno Creek crosses I-5 north of Ortega Highway. Trabuco Creek and Horno Creek are each mapped as 1-percent-annual-chance SFHA Zone AE on FIRM Panel 06059C0443J.

Alternative 21 would also cross the San Juan Creek Floodplain, Cascadita Canyon Storm Channel Floodplain, Prima Deshecha Cañada Channel Floodplain, Segunda Deshecha Cañada Channel Floodplain, and the undetermined floodplain associated with the San Mateo Creek Channel, all in locations where the drainages intersect with I-5.

Due to the nature of the improvements included in the Build Alternatives, various Caltrans and/or city drainage facilities may be impacted in addition to OCFCD facilities and FEMA floodplains. The impacts are primarily a result of widening roadways that may require extensions of existing drainage crossings, or moving longitudinal drainage systems outside of proposed roadways. Some improvements may also require modifications of drainage systems as a result of the increased impervious area and surface water runoff.

Recommended Technical Analysis

A *Location Hydraulic Study* (LHS) with a *Floodplain Encroachment or Evaluation Report* and *Preliminary Drainage Study* will be required for the Build Alternatives. The designs of all the Build Alternatives will consider the water surface elevation to prevent any adverse impacts in the floodplains. A hydraulic analysis is required to verify that the water surface elevation and base flood elevation are not adversely impacted. These reports will be summarized in the environmental document.

8.9 Water Quality and Storm Water Runoff

All Build Alternatives

During construction activities for the eight Build Alternatives, excavated soil would be exposed and there would be increased potential for soil erosion and sedimentation compared to existing conditions. In addition, during storm events, erosion and sedimentation could occur at an accelerated rate. Also, chemicals, liquid products, and petroleum products (e.g., paints, solvents, and fuels), concrete-related waste, and other construction debris and waste may be spilled or leaked and have the potential to discharge into receiving waters. A *Stormwater Pollution Prevention Plan* (SWPPP) will be prepared consistent with the current Caltrans NPDES permit BMP categories may include but are not limited to measures for temporary sediment control, temporary soil stabilization, scheduling, preservation of existing vegetation, conveyance controls, wind control, temporary stream crossings, and waste management. Other project design features will be implemented to the maximum extent feasible to prevent erosion, sedimentation and pollution including but not limited to:

- Minimization of impervious surfaces;
- Prevention of changes in downstream erosion;
- Stabilization of disturbed soil areas; and
- Maximization of vegetated surfaces.

Pollutants of concern during operation of a transportation facility include sediments, trash, petroleum products, metals, and chemicals. An increase in impervious surface areas as a result of the Build Alternatives will increase the volume of runoff during a storm, which will more effectively transport pollutants to receiving waters and may lead to downstream erosion. The additional runoff will also result in a greater annual loading of pollutants into receiving waters. The SWPPP will meet the applicable provisions of Sections 301 and 402 of the CWA by requiring controls of pollutant discharges that utilize best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT) to reduce pollutants.

The Build Alternatives will include BMPs to address storm water requirements and treatment of the added impervious area created by the Project. These BMPs will include consideration of biofiltration swales, biofiltration devices, infiltration devices, and detention devices.

Landscaping and erosion control will be included as part of the Build Alternatives to address the creation of new slopes and modification of existing slopes. The Proposed Project would be constructed to minimize erosion, including the use of cut-and-fill slopes flat enough to allow revegetation and limit erosion to preconstruction rates, and facilitate the collection of concentrated flows in stabilized drains and channels. Various slope and surface protection

measures will be identified to address site soil stabilization and reduce deposition of sediments in the adjacent surface waters.

Recommended Technical Analysis

A *Water Quality Assessment Report* (WQAR) will be prepared. The WQAR will evaluate potential water quality impacts of the proposed improvements with implementation of the BMPs identified for inclusion in the Build Alternatives and will be summarized in the environmental document.

8.10 Geology, Soils, Seismic, and Topography

A site-specific review of existing geologic literature and reports of past geotechnical investigations was conducted to assess the soils, seismic hazards, topography, and geology in the Study Area for the eight Build Alternatives. All Build Alternatives have a net loss of elevation of approximately 100 feet north to south, traversing ridges and canyons with topographic relief of up to 600 feet.

The San Juan Hills are situated on the southern flank of the Santa Ana Mountains, which are part of the Peninsular Range Province of Southern California. Bedrock exposures consist of a sequence of Tertiary marine sedimentary formations originally deposited in the Capistrano Embayment. The Capistrano Embayment was a structural trough that developed during the Late Miocene through the Pliocene due to down-dropping along the west side of the Cristianitos Fault and crustal downwarping along the east side of the San Joaquin Hills. Bedrock formations exposed in the Study Area include (in stratigraphic order from oldest to youngest): the Santiago, San Onofre, Monterey, Capistrano, and Niguel Formations. The Middle Eocene Santiago Formation is exposed only in the eastern San Juan Hills and underlies portions of Alternatives 13, 17, and 18. The Middle Miocene San Onofre Formation is dominated by its breccia sub-member. Approximately 0.25 mile of Alternatives 13, 17, 14 and 21 traverse the San Onofre Breccia, beginning approximately 0.5 mile south of San Juan Creek. The northern spur of Alternative 18 is underlain by San Onofre Breccia for nearly its entire length. The Middle to Late Miocene Monterey Formation and Late Miocene to Early Eocene Capistrano Formation are primarily thinly bedded, fine-grained, marine sedimentary deposits that are notoriously prone to landsliding. Alternative 9 has an approximately 1-mile section traversing exposures of Monterey Shale. The Capistrano Formation is the most prevalent bedrock formation throughout the Study Area and underlies each Build Alternative, where not otherwise specified. Quaternary deposits in the San Juan Hills consist primarily of alluvium, which is present in the canyon bottoms, and landslide deposits that are ubiquitous in the Study Area.

The Study Area is in the vicinity of known faults and within a seismically active region. Southern California is a highly tectonically active province, a transform boundary between the Pacific and North American plates, with strain accommodated on the San Andreas Fault and numerous smaller faults throughout the region. The closest active faults to the Study Area are the San Joaquin Hills Fault, the Newport-Inglewood Fault, and the Elsinore Fault. The United States Geological Survey (USGS) defines an active fault as one that has experienced motion within the Holocene epoch in the last 11,000 years. The San Joaquin Hills Fault is a north-to-northwest-trending blind thrust (having no surface rupture) that is located approximately 2 miles west of the southern terminus of Alternative 13. The Newport-Inglewood Fault is a northwest-trending,

strike-slip fault that runs offshore of Dana Point, approximately 5 miles southwest of the Study Area. The Elsinore Fault Zone is made up of several northwest-trending, strike-slip faults and is located approximately 20 miles northeast of the Study Area. Alternatives 13, 17, 14, 18, and 21 also cross the Cristianitos Fault, a northerly striking, west-dipping normal fault in the eastern portion of the Study Area. The Cristianitos Fault does not show evidence of seismic activity within the Holocene, and is therefore not considered an active fault.

Much of the San Juan Hills is designated as an earthquake-induced landslide hazard zone by the California Department of Conservation, Division of Mines and Geology. Numerous landslides are mapped in the canyons of the San Juan Hills, commonly where the shallow bedrock is either Monterey Shale or Capistrano Formation. These stratigraphic units are prone to landsliding due to high proportions of silt and clay in their matrices, thin sedimentary bedding, and a gently folded structure that produces out-of-slope conditions. Landslide remediation is expected to be a design component of all eight Build Alternatives.

Other slope stability concerns may arise during construction in areas with soils that are prone to landsliding. Final project design will consider these areas in further detail, and will develop remedial grading to ensure that slopes are stable at the completion of construction. For all other cut and fill slopes, final design and construction will incorporate standard design practices to avoid unstable conditions. Site-specific standard investigation, design and construction practices would be conducted and implemented for the Build Alternatives.

Liquefaction potential in the Study Area exists along San Juan Creek and in the canyon creek beds of the San Juan Hills, where saturated Quaternary Alluvium is present. All eight Build Alternatives cross liquefaction hazard zones, as mapped by the State Division of Mines and Geology. Evaluation of liquefaction potential and any necessary remedial recommendations will be part of the design component of the Build Alternatives.

Recommended Technical Analysis

A *District Preliminary Geotechnical Report* will be prepared to identify potential geotechnical/seismic constraints and design considerations to be included in the Build Alternatives to address these constraints. This report will be summarized in the environmental document.

8.11 Paleontology

A fossil locality search was conducted through the Natural History Museum of Los Angeles County (LACM) that examined geologic maps of the area and reviewed relevant geological and paleontological literature to determine which geologic units are present within the Study Area and whether fossils have been recovered within the Study Area or from similar geologic units elsewhere in the region.

Alternatives 13, 17, and 14

The Study Area contains 11 geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. Moreover, internal records indicate that scientifically important vertebrate fossils have been recovered during paleontological monitoring of excavation activities over the past 3 years within two areas that fall within the Study Area boundaries: Prima Deshecha Landfill and along La Pata Avenue.

Alternative 13

The LACM noted four fossil localities directly within the Study Area boundaries, as well as 14 localities within 1 mile and 64 localities within several miles of the Study Area from the same or similar deposits.

Alternative 17

The LACM noted two fossil localities directly within the Study Area boundaries, as well as 14 localities within 1 mile and 80 localities within several miles of the Study Area from the same or similar deposits.

Alternative 14

The LACM noted six fossil localities directly within the boundaries for Alternative 14, as well as one locality within 1 mile and 89 localities within several miles of the Study Area from the same or similar deposits.

Alternative 11

The Study Area contains 13 geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. The LACM noted six fossil localities directly within the Study Area boundaries, as well as 78 localities within 1 mile and 12 localities within several miles of the Study Area from the same or similar deposits.

Alternative 12

The Study Area contains nine geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. The LACM noted five fossil localities directly within the Study Area boundaries, as well as 73 localities within 1 mile and 18 localities within several miles of the Study Area from the same or similar deposits.

Alternative 9

The Study Area contains five geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. The LACM noted two fossil localities directly within Study Area boundaries, as well as eight localities within 1 mile and 86 localities within several miles of the Study Area from the same or similar deposits.

Alternative 18

The Study Area contains six geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. The LACM noted two fossil localities directly within the Study Area boundaries, as well as eight localities within 1 mile and 86 localities within several miles of the Study Area from the same or similar deposits.

Alternative 21

The Study Area contains seven geologic units that have produced fossils elsewhere in the region and have high paleontological sensitivity. The LACM noted three fossil localities directly within the Study Area boundaries, as well as 31 localities within 1 mile and 62 localities within several miles of the Study Area from the same or similar deposits. Moreover, internal records indicate

scientifically important vertebrate fossils have been recovered during paleontological monitoring of excavation activities over the past 3 years within two areas that fall within the Study Area boundaries: Prima Deshecha Landfill and along La Pata Avenue.

Based on this research, the Study Area for all of the alternatives contains surface and subsurface sediments with the potential to contain scientifically significant, nonrenewable paleontological resources.

Recommended Technical Analysis

Because fossils may be present throughout the Study Area, preparation of a combined Paleontological Identification Report/Paleontological Evaluation Report (PIR/PER) is recommended. The PIR/PER will be summarized in the environmental document. Due to high paleontological sensitivity in portions of the Study Area, it is likely that the PIR/PER will recommend preparation of a Paleontological Mitigation Plan that includes monitoring during construction and proper handling of paleontological resources.

8.12 Hazardous Waste/Materials

An *Initial Site Assessment* (ISA) (March 2018) was prepared for proposed improvements under the Build Alternatives in general accordance with Caltrans' Project Development Procedures Manual (Chapter 18, Article 3, dated February 28, 2006) and the American Society for Testing and Materials (ASTM) International Standard E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-13). The ISA included a review of background documents, an Environmental Data Resources (EDR) database report, an aerial photograph survey, a review of historical topographic maps and a Sanborn fire insurance map, and a site visit of the Study Area that was conducted under limited access conditions. The ISA identified 661 sites of environmental concern within, or in close proximity to, the Study Area. Each of the 661 sites was assigned a risk classification of high, medium, or low based on their potential for contamination.

High risk sites are facilities with known contamination that have likely impacted the Study Area and will likely affect construction activities. Medium risk sites suggest a reasonable chance that contamination exists on a site that could affect the Study Area and possibly affect construction activities. Low risk sites are facilities that are not expected to contribute contamination to the Study Area, including sites that have been remediated and officially closed with no use restrictions. The ISA classified 21 sites as high risk, 72 sites as medium risk, and the remaining 568 sites as low risk.

A high-level summary of the ISA's findings with respect to each Build Alternative is provided below. It should be noted that, based on their descriptions, several of the Build Alternatives include portions that overlap. For this reason, a site identified in the ISA may impact multiple Alternatives.

- **Alternative 13:** The ISA identified 6 high risk sites and 21 medium risk sites that have the potential to impact Alternative 13.
- **Alternative 17:** The ISA identified 5 high risk sites and 16 medium risk sites that have the potential to impact Alternative 17.

- **Alternative 14:** The ISA identified 6 high risk sites and 13 medium risk sites that have the potential to impact Alternative 14.
- **Alternative 11:** The ISA identified 20 high risk sites and 70 medium risk sites that have the potential to impact Alternative 11.
- **Alternative 12:** The ISA identified 20 high risk sites and 59 medium risk sites that have potential to impact Alternative 12.
- **Alternative 9:** The ISA did not identify high or medium risk sites that have the potential to impact Alternative 9.
- **Alternative 18:** The ISA did not identify high or medium risk sites that have the potential to impact Alternative 18.
- **Alternative 21:** The ISA identified 13 high risk sites and 35 medium risk sites that have the potential to impact Alternative 21.

Recommended Technical Analysis

An updated *Initial Site Assessment* and a *Preliminary Site Investigation* (PSI) will be conducted for the environmental document during the Project Approval/Environmental Documentation (PA/ED) phase. A *Hazardous Waste Work Plan* is required prior to preparing the PSI and must be reviewed and concurred by Caltrans. The updated ISA and PSI will be summarized in the environmental document.

8.13 Air Quality

The Study Area is in the South Coast Air Basin (which includes Orange County and the non-desert parts of Los Angeles, Riverside, and San Bernardino Counties) and the San Diego Air Basin (which includes all of San Diego County). Air quality regulation in the South Coast Air Basin is administered by the South Coast Air Quality Management District (SCAQMD). Air quality regulation in the San Diego Air Basin is administered by the Air Pollution Control District (APCD) of San Diego County. The Study Area within the South Coast Air Basin is in a federal and State nonattainment area for ozone (O₃), particulate matter with a diameter of 10 microns or less (PM₁₀), and particulate matter less than 2.5 microns in diameter (PM_{2.5}); within a State nonattainment area for nitrogen dioxide (NO₂); and within a federal attainment/maintenance area for carbon monoxide (CO). The Study Area within the San Diego Air Basin is in federal and State nonattainment for O₃ and State nonattainment for PM₁₀ and PM_{2.5}.

All Build Alternatives

Study area land uses would potentially be impacted by short-term construction and long-term operational air quality impacts associated with the Build Alternatives. The Proposed Project is currently listed as Project ID ORA052 in the 2016 Regional Transportation Plan (RTP) and the 2017 Federal Transportation Improvement Program (FTIP).

The Build Alternatives may result in short-term construction and long-term operational air quality impacts. The Build Alternatives are not exempt from regional emissions analysis, and a project-level *Air Quality Analysis Report* (AQAR) will be required. The AQAR will be prepared during the PA/ED phase using the Project traffic report and identification of anticipated construction activities and phasing to document the potential construction and operational effect on air quality associated with the No-Build Alternative (Alternative 1) and the Build Alternatives. Prior to completion of the environmental review process, the Proposed Project must

be incorporated into the latest RTP and FTIP for conformity purposes. The potential short-term air quality impacts of the Build Alternatives will be assessed in accordance with the SCAQMD CEQA regulations for the South Coast Air Basin and the County of San Diego's CEQA Guidelines for the San Diego Air Basin.

The potential long-term air quality impacts of the Build Alternatives will be assessed in accordance with the Caltrans *Transportation Project Level Carbon Monoxide Protocol* (1997), the United States Environmental Protection Agency (EPA) and FHWA *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas* (November 2015), and the FHWA *Interim Guidelines on Air Toxic Analysis in NEPA Documents* (October 2016).

Recommended Technical Analysis

An *Air Quality Analysis Report* (AQAR) and an *Air Quality Conformity Report* will be prepared during PA/ED. These reports will be summarized in the environmental document.

8.14 Noise and Vibration

A site survey was conducted on June 5, 2017, for the purpose of identifying sensitive land uses and the location of existing noise walls in the Study Area.

All Build Alternatives

Sensitive land uses in the Study Area would potentially be impacted by short-term construction and long-term operational noise associated with the Build Alternatives.

There are no existing noise barriers in the part of the Study Area between the current terminus of SR 241 at Oso Parkway and I-5. There are existing noise barriers along I-5 in the Study Area. See Figure 2, Project Alternatives, for the locations of existing noise barriers along I-5. Potential noise abatement measures in the form of noise barriers would be considered for the Build Alternatives.

The Proposed Project is classified as a Type I project under 23 Code of Federal Regulations (CFR) 772. Therefore, a detailed *Noise Study Report* (NSR) will be prepared in accordance with the May 2011 *Caltrans Traffic Noise Analysis Protocol* to determine the Project's potential short-term and long-term noise impacts. A Noise Study Work Plan is required prior to preparing the NSR and will be submitted to Caltrans for review and approval. Noise abatement measures will be considered when traffic noise impacts are identified. Traffic noise impacts result from one or more of the following occurrences: (1) an increase of 12 A-weighted decibels (dBA) or more over existing noise levels; and/or (2) predicted noise levels that approach or exceed the Noise Abatement Criteria (NAC). Noise abatement measures may include constructing barriers such as walls or berms. The potential noise abatement locations include the edge of shoulder, right-of-way, and/or private property line. The locations of noise abatement measures will be determined after the completion of the detailed NSR. A *Noise Abatement Decision Report* (NADR) will likely be required to determine the reasonableness of the feasible noise barriers. To minimize the construction noise impact for sensitive land uses adjacent to the Project Area, construction activities will comply with Caltrans Standard Specifications Section 14-8.02, "Noise Control."

Recommended Technical Analysis

A *Noise Study Report* and a *Noise Study Abatement Report* will be prepared for the Build Alternatives and summarized in the environmental document.

8.15 Energy and Climate Change

All Build Alternatives

The Build Alternatives are not expected to impact the quantities of energy resources in Southern California. Based on the Energy Decision Tree included in Chapter 13 of the Standard Environmental Reference (SER), the Proposed Project is a “major project” and an *Energy and Climate Change Technical Report* will be required. The *Energy and Climate Change Technical Report* will be prepared during the PA/ED phase using the Project traffic report and identification of anticipated construction activities and phasing to document the potential construction and operational effect on energy and climate change associated with the No-Build Alternative (Alternative 1) and the Build Alternatives. A detailed analysis of the direct and indirect energy consumption, focusing on the construction and vehicle operations of the Build Alternatives, will be included in the *Energy and Climate Change Technical Report*. Direct and indirect energy consumption will be quantified in terms of the British thermal units (BTUs).

An evaluation of greenhouse gas (GHG) emissions will be included in the AQAR. Individual transportation projects, by themselves, do not yield sufficient GHG emissions to have a significant impact on global climate change, but an individual project may make an incremental contribution to cumulative climate change impacts, along with all other global sources of GHGs. Emissions in the Study Area are expected to improve due to reduced vehicle queuing delays on other roads; therefore, GHG emissions are also expected to decrease when compared to existing conditions. A quantitative analysis of carbon dioxide (CO₂) and other GHG emissions will be required.

Emissions of CO₂, a key GHG identified in Assembly Bill (AB) 32, and other major GHGs such as methane (CH₄) and nitrous oxide (N₂O) from direct and indirect Project-related sources, will be estimated by multiplying vehicle emissions factors (emissions per mile) to annual vehicle miles traveled (VMT) in the area. The California Air Resources Board (CARB) EMFAC2014 model will be used to provide on-road emissions and estimated annual VMT by vehicle type, county, and calendar year.

Recommended Technical Analysis

A *Greenhouse Gas Analysis* and an *Energy and Climate Change Technical Report* will be prepared for the Build Alternatives and summarized in the environmental document.

8.16 Biological Environment

For this PEAR, a biological Study Area (BSA) was established that included 0.25 mile on either side of the Build Alternative alignments in natural areas and 200 feet on either side of the alignments in developed areas. The BSA includes areas potentially affected by direct or indirect impacts from construction and operation.

The BSA is generally located in the coastal foothills of south Orange County and extreme northwestern San Diego County. Topographically, this area includes low-lying ridgelines and mountains interspersed with relatively broad valleys and canyon bottoms.

All eight Build Alternatives are in areas subject to the Orange County Southern Subregion Habitat Conservation Plan (HCP). Alternatives 11, 12, 9, 18, and 21 are also in the vicinity of areas subject to the County of Orange (Central/Coastal) Natural Community Conservation Plan (NCCP)/HCP.¹ Therefore, the Build Alternatives would be subject to the requirements of applicable natural communities and HCPs.

Special-status plant and wildlife species that have the potential to occur within the BSA are shown in Table W. It is anticipated that there may be impacts to State- and federally-listed species that will require Section 7 Consultation with the USFWS for listed species under FESA and CDFW 2080.1 Consistency Determination for listed species under CESA.

Alternatives 13, 17, and 14

A literature search to identify special-status plants, wildlife, and habitats reported to occur in the vicinity of the BSA was conducted. This search included a review of the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California*, the CDFW *California Natural Diversity Database* (CNDDB), and the USFWS *South Orange County IPaC Trust Resources Report*. In addition, previously prepared biological resource documents for projects in the vicinity of the Study Area were reviewed, including but not limited to documents from the County of Orange, Caltrans, OCTA, F/ETCA, Rancho Mission Viejo, various cities in the area, and Marine Corps Base Camp Pendleton.

Upon completion of the literature review, a field survey was conducted to map vegetation communities within the BSA.

Alternatives 13, 17, and 14 cross both natural areas (Segments 1 and 2) and developed areas (primarily along I-5) (Segments 2 and 3). The natural areas (Segments 1 and 2) support several major vegetation types including grasslands, scrub, chaparral, oak and riparian woodlands, marshes, and other wetland features. These in turn provide habitat for a wide variety of wildlife, including many invertebrate, amphibian, reptile, bird, and mammal species.

The southwestern part of the BSA (Segment 3 and portions of Segment 2) includes residential and commercial uses, urban parks, golf courses, and a few relatively small parcels used for row crops, nurseries, and orchards. Except for the major stream crossings, which contain bands of natural riparian habitat, there is little native vegetation remaining in the immediate vicinity of I-5, although ornamental landscaping is prevalent throughout the BSA.

Segment 1. Alternatives 13, 17, and 14 may affect special-status State- and federally listed biological resources associated with San Juan Creek. The bridge construction at San Juan Creek may affect habitat for several special-status wildlife species (e.g., arroyo toad and least Bell's vireo) and areas under the jurisdiction of the USACE and CDFW.

¹ <https://www.wildlife.ca.gov/Conservation/Planning/NCCP/Plans/Orange-Coastal>.

Table W: Special-Status Plant and Wildlife Species that Have Potential to Occur in the BSA

Category	Species
Special-Status Plants	Coulter's saltbush Thread-leaved brodiaea Catalina mariposa lily Intermediate mariposa lily Southern tarplant Prostrate spineflower Western dichondra Many-stemmed dudleya Beaked spikerush Palmer's grapplinghook Hedge-leaved horkelia Small-flowered microseris Salt spring checkerbloom
Invertebrates	San Diego fairy shrimp Riverside fairy shrimp
Fish	Arroyo chub Santa Ana speckled dace Southern steelhead trout Tidewater goby
Amphibians and Reptiles	Arroyo toad California glossy snake Coastal whiptail coast patch nose snake Coast Range newt Orange-throated whiptail Red diamond rattlesnake Southwestern pond turtle San Diego horned lizard Two-striped gartersnake Western spadefoot
Special-Status Birds	Burrowing owl Coastal California gnatcatcher Cactus wren Cooper's hawk Ferruginous hawk Grasshopper sparrow California horned lark Golden eagle Least Bell's vireo Loggerhead shrike Long eared owl Merlin Northern harrier Osprey Peregrine falcon Prairie falcon Rufous-crowned sparrow Sharp shinned hawk Southwestern willow flycatcher Tricolored blackbird White-tailed kite Yellow-breasted chat Yellow warbler

Table W: Special-Status Plant and Wildlife Species that Have Potential to Occur in the BSA

Category	Species
Mammals	American badger Northwestern San Diego pocket mouse Pallid bat Pocketed free-tailed bat San Diego desert woodrat Western mastiff bat Yuma myotis Western red bat

Segment 2. Alternatives 13 and 17 may affect special-status State- and federally listed biological resources in the foothills west of Prima Deshecha Landfill. As Alternatives 13 and 17 head southwest across La Pata Avenue and south to Camino Las Ramblas, they have the potential to impact coastal sage scrub habitat known to be occupied by coastal California gnatcatcher and special-status plant species.

At Camino Las Ramblas, Alternative 13 heads west towards I-5, through areas dominated by grasslands and scrub habitat that may also provide habitat for special-status species. No substantial biological resource issues are expected as Alternative 13 travels south along I-5.

Once Alternative 17 crosses Camino De Los Mares, it will be in an area dominated by a golf course and residential uses. These areas do not contain any substantial biological resources, except for the presence of a storm drain system that may be regulated by the USACE and/or the CDFW. No substantial biological resource issues are expected as Alternative 17 travels south along I-5.

Alternative 14 heads south/southeast away from the other alternatives in Segment 2, traverses Prima Deshecha Landfill, and then continues through natural areas between the Talega Planned Community of the Forster Ranch Area. These areas support coastal sage scrub and grassland habitats known to be occupied by the coastal California gnatcatcher and special-status plant species. Alternative 14 then connects to I-5 and, as described above for the other Build Alternatives, there are no substantial biological resource issues expected in this built environment.

Segment 3. Alternatives 13, 17, and 14 may affect special-status State- and federally listed biological resources associated with San Mateo Creek. At the southernmost part of Alternatives 13, 17, and 14, the alignments cross San Mateo Creek with a new bridge structure. The bridge construction at San Mateo Creek may affect habitat for several special-status wildlife species (e.g., tidewater goby, arroyo toad, and southwestern willow flycatcher) and areas under the jurisdiction of the USACE, CDFW, and CCC.

Alternatives 13, 17, and 14 have the potential to directly and indirectly affect special-status plant and wildlife species, including those listed as threatened or endangered by the USFWS and/or CDFW. Protocol or focused surveys for these species will be conducted to confirm their presence or absence.

Alternatives 13, 17, and 14 also have the potential to affect sensitive plant communities such as coastal sage scrub, native grassland, and oak woodland.

Due to potential impacts from bridge construction and widening, Alternatives 13, 17, and 14 would require implementation of avoidance and minimization measures and mitigation (e.g., compensatory or replacement habitat acquisition or habitat restoration) for temporary and permanent impacts to habitat.

Alternatives 11, 12, and 9

A literature search to identify special-status plants, wildlife, and habitats reported to occur in the vicinity of Alternatives 11, 12, and 9 was conducted. This search included a review of the CNPS *Inventory of Rare and Endangered Vascular Plants of California*, the CDFW CNDDDB, and the USFWS *South Orange County IPaC Trust Resources Report*. In addition, previously prepared biological resource documents for projects in the vicinity were reviewed, including but not limited to documents from the County of Orange, Caltrans, OCTA, F/ETCA, Rancho Mission Viejo, various cities in the area, and Marine Corps Base Camp Pendleton. Upon completion of the literature review, a field survey was conducted to map vegetation communities within the BSA.

Alternatives 11 and 12 are primarily located in transportation, residential, and commercial areas. Except for the major stream crossings, which contain bands of natural riparian habitat, there is little native vegetation remaining in the immediate vicinity of I-5 within the Study Area for Alternatives 11 and 12. These alternatives may affect special-status State- and federally listed biological resources associated with San Mateo Creek. At the southernmost part of Alternatives 11 and 12, the alignments cross San Mateo Creek with a new bridge structure. The bridge construction at San Mateo Creek may affect habitat for several special-status wildlife species (e.g., tidewater goby, arroyo toad, and southwestern willow flycatcher). Protocol or focused surveys for these species will be conducted to confirm their presence or absence. In addition, bridge construction may affect resources under the jurisdiction of the USACE, CDFW, and CCC.

Alternative 9 is located in an area that supports transportation, residential, commercial, open space, and recreational (e.g., Arroyo Trabuco Golf Course) areas. In addition to the major stream crossing within the Arroyo Trabuco, the BSA traverses natural open space areas within the Ladera Planned Community. These areas are dominated by grasslands, coastal sage scrub, and drainage features. This alternative may affect special-status State- and federally listed species. Protocol or focused surveys for these species will be conducted to confirm their presence or absence. In addition, Alternative 9 may affect resource areas under the jurisdiction of the USACE and CDFW.

Due to potential impacts, Alternative 9 would require implementation of avoidance and minimization measures and mitigation (e.g., compensatory or replacement habitat acquisition or habitat restoration) for temporary and permanent impacts to habitat.

Alternative 18

A literature search to identify special-status plants, wildlife, and habitats reported to occur in the vicinity of Alternative 18 was conducted. This search included a review of the CNPS *Inventory*

of *Rare and Endangered Vascular Plants of California*, the CDFW CNDDDB, and the USFWS *South Orange County IPaC Trust Resources Report*. In addition, previously prepared biological resource documents for projects in the vicinity were reviewed, including but not limited to documents from the County of Orange, Caltrans, OCTA, F/ETCA, Rancho Mission Viejo, and various cities in the area.

Alternative 18 is located in an area that supports agricultural and open space areas. In addition to the major stream crossing within Chiquita Creek, the alignment traverses natural open space areas within the Ladera Planned Community and The Ranch Plan of Rancho Mission Viejo. These areas are dominated by grasslands, coastal sage scrub, oak woodlands, agricultural crops, and various drainage features. Alternative 18 may affect special-status State- and federally listed biological resources. Protocol or focused surveys for these species will be conducted to confirm their presence or absence. In addition, this alternative may affect resources areas under the jurisdiction of the USACE and CDFW.

Alternative 21

A literature search to identify special-status plants, wildlife, and habitats reported to occur in the vicinity of Alternative 21 was conducted. This search included a review of the CNPS *Inventory of Rare and Endangered Vascular Plants of California*, the CDFW CNDDDB, and the USFWS *South Orange County IPaC Trust Resources Report*. In addition, previously prepared biological resource documents for projects in the vicinity were reviewed, including but not limited to documents from the County of Orange, Caltrans, OCTA, F/ETCA, Rancho Mission Viejo, various cities in the area, and Marine Corps Base Camp Pendleton. Upon completion of the literature review, a field survey was conducted to map vegetation communities within the BSA.

Alternative 21 is composed of two segments. One segment is primarily located in transportation, residential, and commercial areas along I-5. Except for the major stream crossings, which contain bands of natural riparian habitat, there is little native vegetation remaining in the immediate vicinity of I-5 within the BSA for Alternative 21. The second segment is similar alignment to Alternative 14, between Oso Parkway and Avenida La Pata. In this area, the alternative segment crosses natural areas that support several major vegetation types, including grasslands, scrub, chaparral, oak and riparian woodlands, marshes, and other wetland features. These in turn provide habitat for a wide variety of wildlife, including many invertebrate, amphibian, reptile, bird, and mammal species.

The two segments of Alternative 21 may affect special-status State- and federally listed biological resources associated with the areas between Oso Parkway and Avenida La Pata and at San Mateo Creek with a new bridge structure. Protocol or focused surveys for potentially impacted species will be conducted to confirm their presence or absence. In addition, this alternative may affect resources under the jurisdiction of the USACE, CDFW, and CCC.

Due to potential impacts, Alternative 21 would require implementation of avoidance and minimization measures and mitigation (e.g., compensatory or replacement habitat acquisition or habitat restoration) for temporary and permanent impacts to habitat.

Recommended Technical Analysis

Vegetation communities mapping, focused surveys for sensitive plant species, focused surveys for sensitive wildlife species, and a *Wildlife Corridor Study* will be prepared in support of the *Natural Environment Study* (NES) report. The NES will address potential Project impacts to biological resources and suitable biological resource avoidance, minimization, and mitigation recommendations. A *Biological Assessment* will be prepared to document analyses and Section 7 determinations for federally-listed species or critical habitat. These reports will be summarized in the environmental document.

8.17 Wetlands and Other Waters

It is anticipated that there will be impacts to potential jurisdictional drainages that will require a CWA Section 10 and Section 404 permit from the USACE, a Section 401 Water Quality Certification and WDRs from the RWQCB San Diego Region, a Section 1600 et seq. Agreement for Lake or Streambed Alteration from the CDFW, and a Coastal Development Permit from the CCC. In the event that the USACE agrees that drainages are not jurisdictional, the RWQCB would still oversee water quality compliance under CWA Section 402 and the Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

Alternatives 13, 17, and 14

A preliminary identification of features was conducted based on a review of relevant literature and existing resource aids (aerial and topographic maps) and a site determination to verify current conditions and jurisdiction.

Segment 1. Alternatives 13, 17, and 14 intersect San Juan Creek at the northern terminus at Cow Camp Road. San Juan Creek encompasses approximately 134 square miles and is within the San Juan Hydrologic Basin. It begins in the Santa Ana Mountains, where it runs parallel to SR 74 then flows southwest towards Dana Point, ultimately entering the Pacific Ocean at Doheny State Beach. The mouth of San Juan Creek is normally open to the ocean.

Segment 2. Alternatives 13 and 14 intersect with the Segunda Deshecha Cañada Channel near East Avenida Pico. The Segunda Deshecha Cañada Channel, the second main stream draining the San Clemente Coastal Streams Watershed, flows through the Talega development, along Avenida Pico, under I-5 and North El Camino Real, before discharging into the Pacific Ocean at North Beach. The watershed is almost fully developed.

Alternative 17 intersects Prima Deshecha Cañada Channel where the Build Alternative connects to I-5. Prima Deshecha Cañada Channel is one of two main streams that flow through the City of San Clemente (San Juan Hydrologic Basin), ultimately discharging into the Pacific Ocean at Poche Beach. Several small, unnamed drainages, as well as a few larger tributaries, join Prima Deshecha Cañada Channel as it makes its way through the San Clemente Coastal Streams Watershed. The San Clemente Coastal Streams Watershed falls under the San Clemente subunit of the San Juan Hydrologic Basin (designated Hydrologic Sub Areas 1.31 and 1.32). The Basin Plan for the San Juan Hydrologic Basin lists Prima Deshecha Cañada Channel as a receiving water.

Segment 3. Alternatives 13, 17, and 14 intersect San Mateo Creek near I-5 along Camp Pendleton. San Mateo Creek begins in the lower eastern part of the Santa Ana Mountains and receives flows from tributaries along its path, ultimately flowing into the Pacific Ocean. The mouth of San Mateo Creek forms a salt water tidal marsh and is entirely within the Camp Pendleton Marine Corps Base.

Natural earthen drainage courses, including wetlands, were also identified in the BSA. These features may be considered under the jurisdiction of the USACE, RWQCB, CDFW, and CCC. A site determination will be conducted to verify current conditions and jurisdiction within the BSA.

Alternatives 11 and 12

Alternatives 11 and 12 are primarily located in transportation, residential, and commercial areas. A preliminary identification of features was conducted based on a review of relevant geographic information system (GIS) mapping. Except for the major stream crossings, which contain bands of natural riparian habitat, there is little native vegetation remaining in the immediate vicinity of I-5 within the Study Area for Alternatives 11 and 12. However, there are approximately 21 drainages for Alternative 11 and 29 drainages for Alternative 12 that cross the Build Alternatives or are in the immediate vicinity. At the southernmost parts of Alternatives 11 and 12, the alignments cross San Mateo Creek with a new bridge structure. The bridge construction at San Mateo Creek may impact wetland resources.

It is anticipated there will be impacts for Alternatives 11 and 12 to potential jurisdictional drainages that will require a Section 404 permit from the USACE, a Section 401 Water Quality Certification and WDRs from the RWQCB San Diego Region, a Section 1600 et seq. Agreement for Lake or Streambed Alteration from the CDFW, and a Coastal Development Permit from the CCC. In the event the USACE agrees that drainages are not jurisdictional, the RWQCB would still oversee water quality compliance under CWA Section 402 and the Porter-Cologne Act.

Alternative 9

Alternative 9 is located in an area that supports transportation, residential, commercial, open space, and recreational (e.g., Arroyo Trabuco Golf Course) areas. A preliminary identification of features was conducted based on a review of relevant GIS mapping. In addition to the major stream crossing within Arroyo Trabuco and Horno Creek, the alignment traverses natural open space areas that support approximately eight drainages that cross Alternative 9 or are in its immediate vicinity.

It is anticipated that Alternative 9 will impact potential jurisdictional drainages that will require a Section 404 permit from the USACE, a Section 401 Water Quality Certification and WDRs from the RWQCB San Diego Region, and a Section 1600 et seq. Agreement for Lake or Streambed Alteration from the CDFW. In the event the USACE agrees that drainages are not jurisdictional, the RWQCB would still oversee water quality compliance under CWA Section 402 and the Porter-Cologne Act.

Alternative 18

Alternative 18 is located in an area that supports transportation, residential, commercial, open recreational (e.g., Arroyo Trabuco Golf Course), agricultural, and open space areas. A

preliminary identification of features was conducted based on a review of relevant GIS mapping. In addition to the major stream crossing within Arroyo Trabuco, Horno Creek, and Chiquita Creek, the alignment traverses natural open space areas that support approximately nine drainages that cross Alternative 18 or are in its immediate vicinity.

It is anticipated that Alternative 18 will impact potential jurisdictional drainages that will require a Section 404 permit from the USACE, a Section 401 Water Quality Certification and WDRs from the RWQCB San Diego Region, and a Section 1600 et seq. Agreement for Lake or Streambed Alteration from the CDFW. In the event the USACE agrees that drainages are not jurisdictional, the RWQCB would still oversee water quality compliance under CWA Section 402 and the Porter-Cologne Act.

Alternative 21

Alternative 21 is composed of two segments. One segment is primarily located in transportation, residential, and commercial areas along I-5. A preliminary identification of features was conducted based on a review of relevant GIS mapping. There is little native vegetation remaining in the immediate vicinity of I-5 within the Study Area for Alternative 21; however, there are approximately 29 drainages along the I-5 segment that cross Alternative 21 or are in its immediate vicinity. At the southernmost part of Alternative 21, the Study Area crosses San Mateo Creek with a new bridge structure. The bridge construction at San Mateo Creek may impact wetland resources. The eastern segment of Alternative 21 from Oso Parkway to Avenida La Pata includes crossing San Juan Creek, and an additional seven drainages to the south.

It is anticipated there will be impacts to potential jurisdictional drainages that will require a Section 404 permit from the USACE, a Section 401 Water Quality Certification and WDRs from the RWQCB San Diego Region, a Section 1600 et seq. Agreement for Lake or Streambed Alteration from the CDFW, and a Coastal Development Permit from the CCC. In the event the USACE agrees that drainages are not jurisdictional, the RWQCB would still oversee water quality compliance under CWA Section 402 and the Porter-Cologne Act.

Recommended Technical Analysis

A *Jurisdictional Delineation Report* will also be prepared in support of the *Natural Environment Study* (NES) report. The NES will address potential Project impacts to biological resources including wetlands and other waters and suitable biological resource avoidance, minimization, and mitigation recommendations. These reports will be summarized in the environmental document.

8.18 Cumulative Impacts

All Build Alternatives

Known and/or reasonably foreseeable transportation projects and/or land development projects in the vicinity of the Build Alternatives, whether in the planning, environmental, design, or construction phase, will be reviewed to determine if there are any substantive cumulative impacts to applicable resources. Contingent on the results of any related technical study indicating otherwise, it is expected that completion of the eight steps summarized in the Cumulative Impacts section of Caltrans' Annotated Outline for preparation of an EIR/EIS will provide the

required analysis for the Build Alternatives, consistent with and in accordance with Caltrans' Guidance for Preparers of Cumulative Impact Analyses.

Recommended Technical Analysis

A *Cumulative Impacts Analysis* report will be prepared and summarized in the environmental document.

8.19 Context-Sensitive Solutions

Construction of any of the eight Build Alternatives may utilize elements in harmony with the surrounding environment. Examples of context-sensitive solutions may include aesthetic treatments on elevated facilities and noise barriers including texturing and/or utilization of natural materials. Revegetation of the disturbance area may utilize vegetation found naturally within the Project region. Incorporation of these design elements would promote harmony between the transportation facility and community character and natural environment. Context-sensitive solutions are reached through a collaborative, interdisciplinary approach involving all stakeholders.

9. Summary Statement for PSR or PSR-PDS

All eight Build Alternatives have the potential to substantially change the existing condition with respect to these environmental concerns: community impacts, visual impacts, cultural resources, hydrology and floodplains, water quality and storm water runoff, geology, soils, and topography, paleontology, hazardous waste/materials, air quality, noise and vibration, biological resources, wetlands and other waters, and cumulative impacts. Appropriate avoidance, minimization, and mitigation measures will be identified in the technical studies listed below for the Proposed Project.

9.1 Required Technical Studies

To address potential impacts of the Proposed Project, the following studies will be required:

- *Growth Impact Analysis*
- *Farmland Impact Analysis Report*
- *Community Impact Assessment*
- *Section 4(f) Evaluation*
- *Draft Relocation Impact Report*
- *Final Relocation Impact Report*
- *Visual Impact Assessment*
- *Archaeological Survey Report*
- *Historic Property Survey Report*
- *Historical Resources Evaluation Report*
- *Finding of Effect*
- *Memorandum of Agreement*
- *Location Hydraulic Study/Floodplain Encroachment or Evaluation Report*
- *Preliminary Drainage Study*
- *Water Quality Assessment Report*
- *District Preliminary Geotechnical Report*
- *Paleontological Identification Report/Paleontological Evaluation Report*
- *Paleontological Mitigation Plan*
- *Preliminary Site Investigation*
- *Initial Site Assessment*
- *Air Quality Analysis Report*
- *Air Quality Conformity Report*
- *Noise Abatement Decision Report*
- *Noise Study Report*
- *Energy and Climate Change Technical Report*
- *Natural Environment Study*
- *Biological Assessment*
- *Jurisdictional Delineation Report*
- *Wildlife Corridor Study*
- *Cumulative Impact Analysis*
- *Alternatives Analysis Report*

10. Disclaimer

This PEAR provides information to support programming of the Proposed Project. It is not an environmental determination or document. Preliminary analysis, determinations, and estimates of mitigation costs are based on the Project Description provided in the Project Study Report–Project Development Support (PSR-PDS). The estimates and conclusions in this PEAR are approximate and are based on cursory analyses of probable effects. A reevaluation of the PEAR will be needed for changes in Project scope or alternatives, or in environmental laws, regulations, or guidelines.

11. List of Preparers

Cultural Resources Specialist Ivan Strudwick	Date: March 8, 2018
Biologist Ann Johnston	Date: February 12, 2018
Community Impacts Specialist Christina Hirt	Date: February 9, 2018
Noise and Vibration Specialist Jason Lui	Date: February 15, 2018
Air Quality Specialist Michael Slavick	Date: February 5, 2018
Paleontology Specialist/Liaison Sarah Rieboldt	Date: February 20, 2018
Water Quality Specialist Richard Beck	Date: February 8, 2018
Hydrology and Floodplain Specialist Richard Beck	Date: February 9, 2018
Hazardous Waste/Materials Specialist Grace Kellogg	Date: February 23, 2018
Visual/Aesthetics Specialist Christina Hirt	Date: February 19, 2018
Energy and Climate Change Specialist Michael Slavick	Date: February 2, 2018
PEAR Preparer Christina Hirt, Environmental Planner	Date: June 8, 2018

12. Review and Approval

I confirm that environmental cost, scope, and schedule have been satisfactorily completed and that the PEAR meets all Caltrans requirements. Also, if the Proposed Project is scoped as a routine Environmental Assessment (EA), complex EA, or Environmental Impact Statement (EIS), I verify that the HQ DEA Coordinator has concurred in the Preliminary Class of Action.

Environmental Branch Chief

Date: _____

Project Manager

Date: _____

REQUIRED ATTACHMENTS:

Figure 1: Project Location

Figure 2: Project Alternatives

Attachment A: PEAR Environmental Studies Checklist

Attachment B: Schedule

Attachment C: Mitigation and Compliance Cost Estimate (MCCE)

Attachment D: FEMA Floodplain Maps

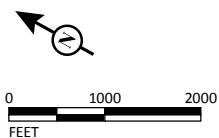
Attachment E: Visual Impact Assessment Checklist

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LEGEND

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|--|---|--|--|---|--|
| Study Area | — Alternative 12 | County Boundary | Existing Noise Barrier | Rancho Mission Viejo
Planned for Development | Forster Ranch Conservation Easement |
| — Alternative 13 | — Alternative 9 | City Boundary | — Waterway | NCCP Reserve | Bellota Offsite Restoration Area |
| — Alternative 17 | — Alternative 18 | Parks | Farmlands (FMMP 2014) | Reserve Lands | Chiquita Canyon Conservation Area |
| — Alternative 14 | — Alternative 21 | Marine Corps Base
Camp Pendleton | NCCP Existing Use | | Gobernadora Ecological Restoration
Area Mitigation Site |
| — Alternative 11 | ■ Prima Deshecha
■ Landfill Boundary | | | | Ladera Ranch Open Space |



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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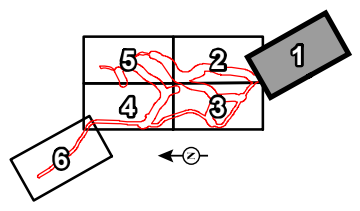
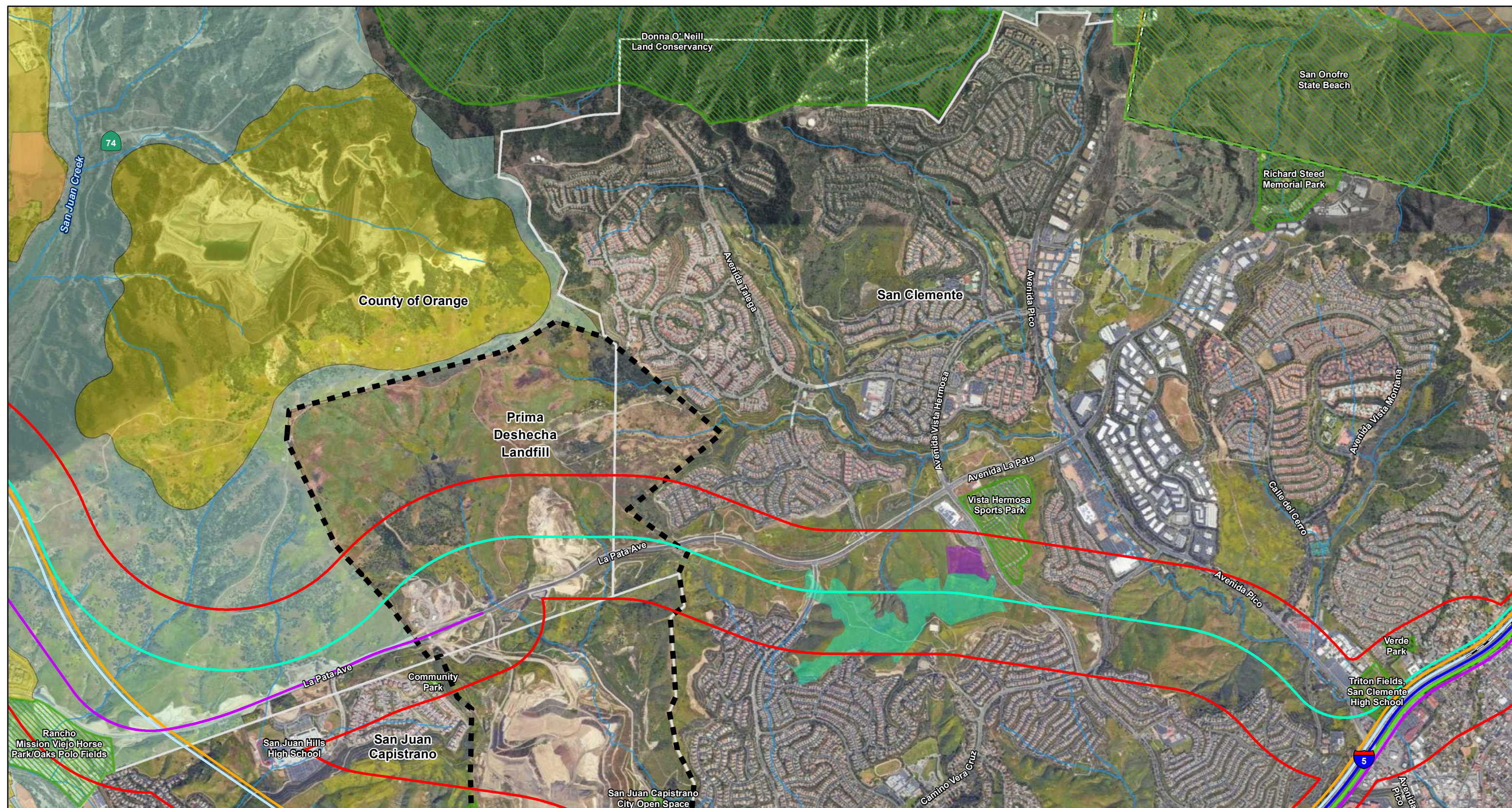


FIGURE 2
Sheet 1 of 6

South County Traffic Relief
Project Alternatives

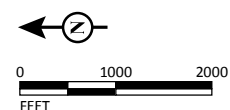
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|--|--|--|---|--|---|
| Study Area | — Alternative 12 | County Boundary | — Existing Noise Barrier | Rancho Mission Viejo
Planned for Development | Forster Ranch Conservation Easement |
| — Alternative 13 | — Alternative 9 | City Boundary | — Waterway | Reserve Lands | Bellota Offsite Restoration Area |
| — Alternative 17 | — Alternative 18 | Parks | Farmlands (FMMP 2014) | NCCP Reserve | Chiquita Canyon Conservation Area |
| — Alternative 14 | — Alternative 21 | Marine Corps Base
Camp Pendleton | NCCP Existing Use | Gobernadora Ecological Restoration
Area Mitigation Site | Ladera Ranch Open Space |
| — Alternative 11 | Prima Deshecha
Landfill Boundary | | | | |



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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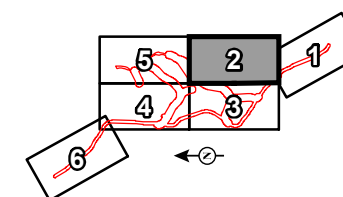


FIGURE 2
Sheet 2 of 6

South County Traffic Relief
Project Alternatives

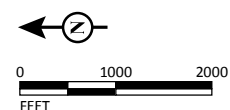
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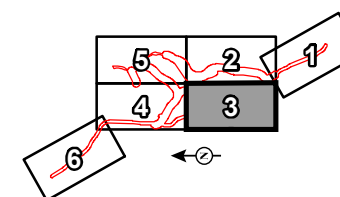
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 Study Area	 Alternative 12	 County Boundary	 Existing Noise Barrier	 Rancho Mission Viejo Planned for Development	 Forster Ranch Conservation Easement
 Alternative 13	 Alternative 9	 City Boundary	 Waterway	 Reserve Lands	 Bellota Offsite Restoration Area
 Alternative 17	 Alternative 18	 Parks	 Farmlands (FMMP 2014)	 NCCP Reserve	 Chiquita Canyon Conservation Area
 Alternative 14	 Alternative 21	 Marine Corps Base Camp Pendleton	 NCCP Existing Use	 Gobernadora Ecological Restoration Area Mitigation Site	 Ladera Ranch Open Space
 Alternative 11	 Prima Deshecha				
	 Landfill Boundary				



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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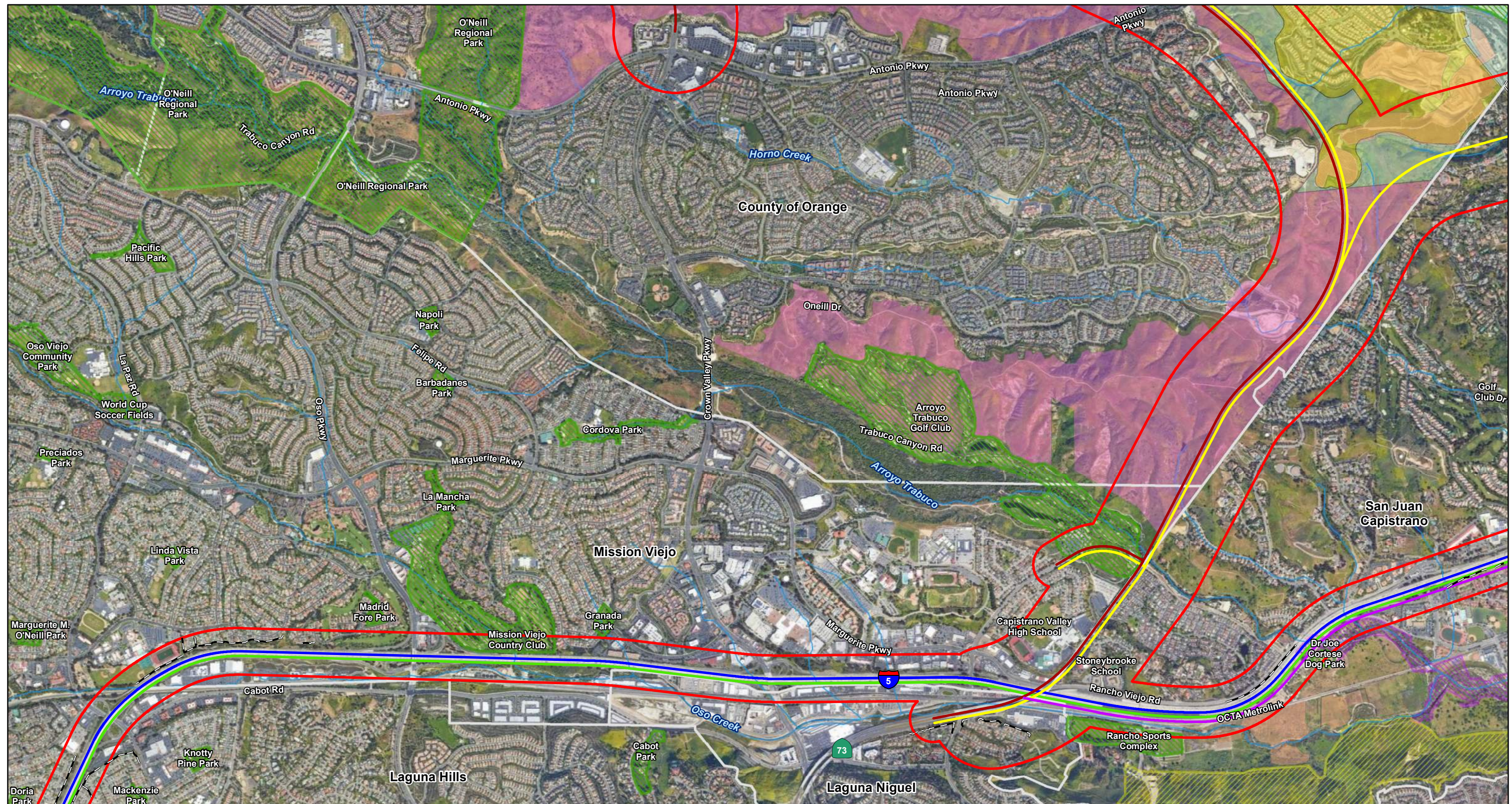
FIGURE 2
Sheet 3 of 6



South County Traffic Relief
Project Alternatives

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- Study Area
- Alternative 13
- Alternative 17
- Alternative 14
- Alternative 11

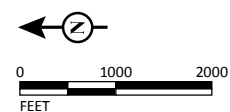
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- Alternative 9
- Alternative 18
- Alternative 21
- Prima Deshecha
- Landfill Boundary

- County Boundary
- City Boundary
- Parks
- Marine Corps Base Camp Pendleton

- Existing Noise Barrier
- Waterway
- Farmlands (FMMP 2014)
- NCCP Reserve
- NCCP Existing Use

- Rancho Mission Viejo
- Planned for Development
- Reserve Lands

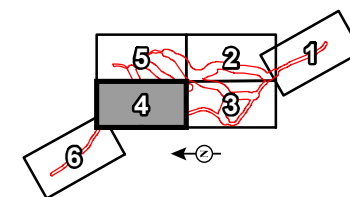
- Forster Ranch Conservation Easement
- Bellota Offsite Restoration Area
- Chiquita Canyon Conservation Area
- Gobernadora Ecological Restoration Area Mitigation Site
- Ladera Ranch Open Space



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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FIGURE 2

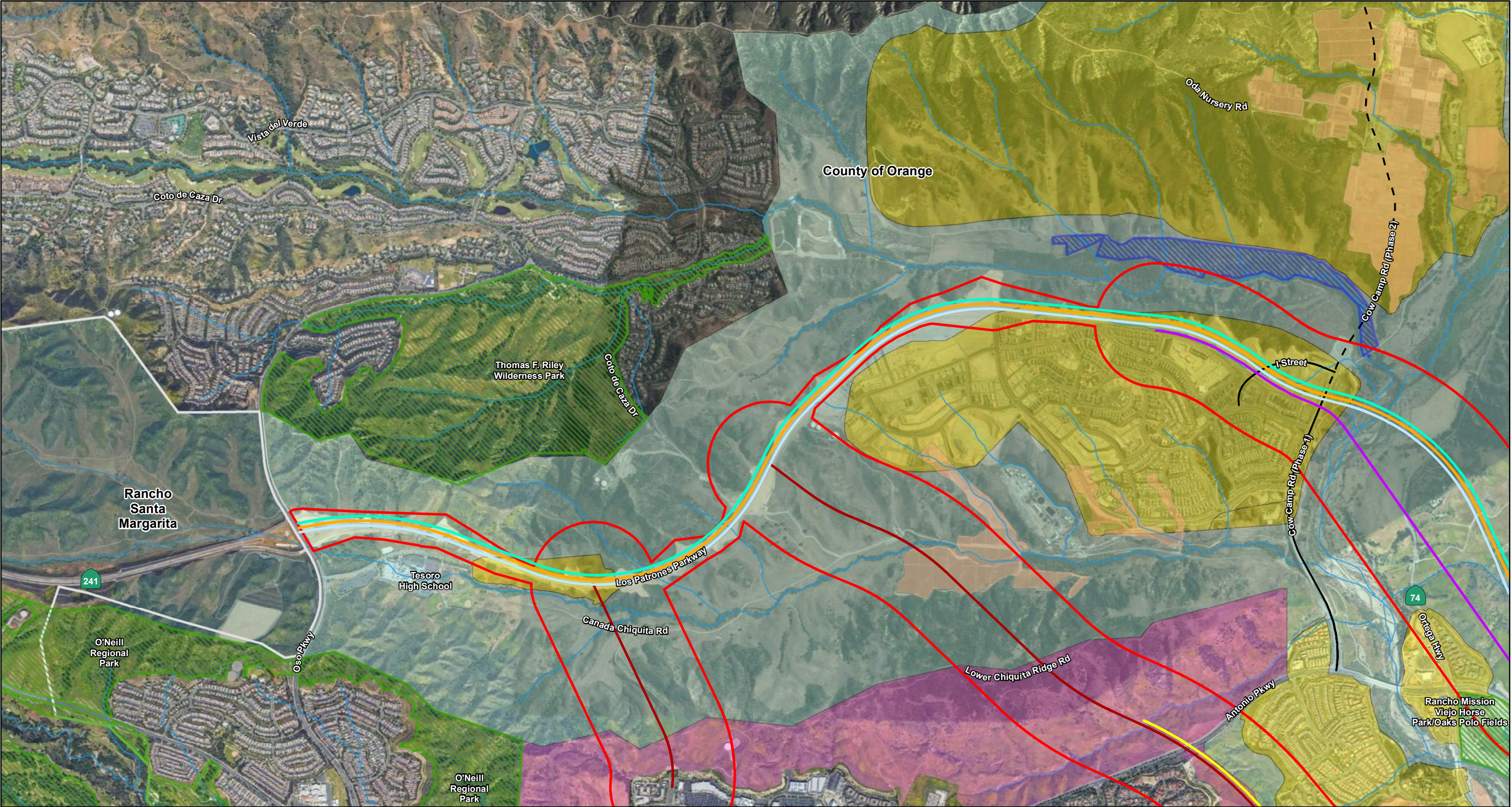
Sheet 4 of 6



South County Traffic Relief
Project Alternatives

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| Study Area | Alternative 12 | County Boundary | Existing Noise Barrier | Rancho Mission Viejo
Planned for Development | Forster Ranch Conservation Easement |
| Alternative 13 | Alternative 9 | City Boundary | Waterway | Reserve Lands | Bellota Offsite Restoration Area |
| Alternative 17 | Alternative 18 | Parks | Farmlands (FMMP 2014) | NCCP Reserve | Chiquita Canyon Conservation Area |
| Alternative 14 | Alternative 21 | Marine Corps Base
Camp Pendleton | NCCP Existing Use | Gobernadora Ecological Restoration
Area Mitigation Site | Ladera Ranch Open Space |
| Alternative 11 | Prima Deshecha
Landfill Boundary | | | | |

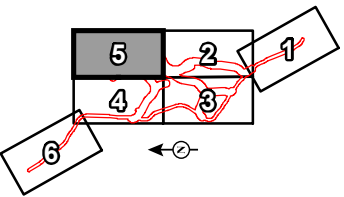
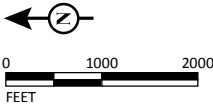


FIGURE 2
Sheet 5 of 6



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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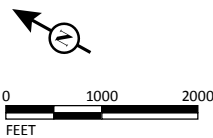
South County Traffic Relief
Project Alternatives

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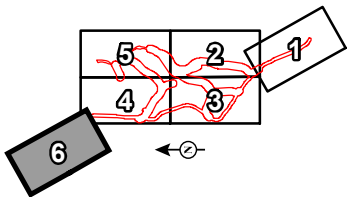
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|----------------|-------------------|----------------------------------|------------------------|-------------------------|---|
| Study Area | Alternative 12 | County Boundary | Existing Noise Barrier | Rancho Mission Viejo | Forster Ranch Conservation Easement |
| Alternative 13 | Alternative 9 | City Boundary | Waterway | Planned for Development | Bellota Offsite Restoration Area |
| Alternative 17 | Alternative 18 | Parks | Farmlands (FMMP 2014) | Reserve Lands | Chiquita Canyon Conservation Area |
| Alternative 14 | Alternative 21 | Marine Corps Base Camp Pendleton | NCCP Reserve | | Gobernadora Ecological Restoration Area Mitigation Site |
| Alternative 11 | Prima Deshecha | | NCCP Existing Use | | Ladera Ranch Open Space |
| | Landfill Boundary | | | | |



SOURCE: Google Maps (2017); TCA (2017); Rancho Mission Viejo (2007); FMMP (2014); NHD (2016); CPAD (2017)
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FIGURE 2

Sheet 6 of 6



South County Traffic Relief
Project Alternatives

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Attachment A

PEAR Environmental Studies Checklist

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Attachment A: PEAR Environmental Studies Checklist

Rev. 11/08

Environmental Studies for PA&ED Checklist					
	Not anticipated	Memo to file	Report required	Risk* L M H	Comments
Land Use	☐	☐	☒	<u>M</u>	CIA
Growth	☐	☐	☒	<u>M</u>	CIA/Growth
Farmlands/Timberlands	☐	☐	☒	<u>M</u>	Farmlands Study
Community Impacts	☐	☐	☒	<u>H</u>	CIA
Community Character and Cohesion	☐	☐	☒	<u>H</u>	CIA
Relocations	☐	☐	☒	<u>H</u>	DRIR and FRIR
Environmental Justice	☐	☐	☒	<u>M</u>	CIA
Utilities/Emergency Services	☐	☐	☒	<u>M</u>	CIA
Visual/Aesthetics	☐	☐	☒	<u>M</u>	VIA
Cultural Resources:	☐	☐	☒	<u>H</u>	
Archaeological Survey Report	☐	☐	☒	<u>H</u>	
Historic Resources Evaluation Report	☐	☐	☒	<u>H</u>	
Historic Property Survey Report	☐	☐	☒	<u>M</u>	
Historic Resource Compliance Report	☐	☐	☐		N/A
Section 106 / PRC 5024 & 5024.5	☐	☐	☒	<u>H</u>	HRER
Native American Coordination	☐	☐	☒	<u>H</u>	ASR/HPSR
Finding of Effect	☐	☐	☒	<u>H</u>	Finding of Effect
Data Recovery Plan	☐	☐	☐	<u>M</u>	Data Recover Plan
Memorandum of Agreement	☐	☐	☒	<u>M</u>	MOU
Other:	☐	☐	☐		
Hydrology and Floodplain	☐	☐	☒	<u>M</u>	LHS/Floodplain
Water Quality and Stormwater Runoff	☐	☐	☒	<u>M</u>	WQAR
Geology, Soils, Seismic and Topography	☐	☐	☒	<u>M</u>	DPGR
Paleontology	☐	☐	☒	<u>M</u>	
PER	☐	☐	☒	<u>M</u>	PER/PIR
PMP	☐	☐	☒	<u>M</u>	PMP
Hazardous Waste/Materials:	☐	☐	☒	<u>M</u>	
ISA (Additional)	☐	☐	☒	<u>M</u>	
PSI	☐	☐	☒	<u>M</u>	
Other:	☐	☐	☐		
Air Quality	☐	☐	☒	<u>M</u>	AQAR, AQCR
Noise and Vibration	☐	☐	☒	<u>M</u>	NSR, NADR
Energy and Climate Change	☐	☐	☒	<u>M</u>	Energy Study
Biological Environment	☐	☐	☒	<u>H</u>	
Natural Environment Study	☐	☐	☒	<u>H</u>	
Section 7:	☐	☐	☒	<u>H</u>	BA
Formal	☐	☐	☒	<u>H</u>	BO
Informal	☐	☐	☐		N/A
No effect	☐	☐	☐		N/A
Section 10	☐	☐	☐		N/A
USFWS Consultation	☐	☐	☒	<u>H</u>	
NMFS Consultation	☐	☐	☐		N/A
Species of Concern (CNPS, USFS, BLM, S, F)	☐	☐	☒	<u>H</u>	NES

Environmental Studies for PA&ED Checklist

	Not anticipated	Memo to file	Report required	Risk* L M H	Comments
Wetlands & Other Waters/Delineation	☐	☐	☒	<u>H</u>	JD report
404(b)(1) Alternatives Analysis	☒	☐	☐	<u>L</u>	
Invasive Species	☐	☐	☒	<u>L</u>	NES/ED
Wild & Scenic River Consistency	☐	☐	☐		N/A
Coastal Management Plan	☐	☐	☒	<u>L</u>	ED
HMMP	☐	☐	☒	<u>H</u>	
DFG Consistency Determination	☐	☐	☒	<u>M</u>	
2081	☒	☐	☐		
Other:	☐	☐	☐		
Cumulative Impacts	☐	☐	☒	<u>M</u>	Cumulative report
Context Sensitive Solutions	☐	☐	☐	<u>L</u>	
Section 4(f) Evaluation	☐	☐	☒	<u>H</u>	
Permits:					
401 Certification Coordination	☐	☐	☒	<u>H</u>	
404 Permit Coordination, IP, NWP, or LOP	☐	☐	☒	<u>H</u>	NWP
1602 Agreement Coordination	☐	☐	☒	<u>H</u>	
Local Coastal Development Permit Coordination	☐	☐	☒	<u>H</u>	
State Coastal Development Permit Coordination	☐	☐	☒	<u>H</u>	
NPDES Coordination	☐	☐	☒	<u>L</u>	SWDR
US Coast Guard (Section 10)	☐	☐	☐		N/A
TRPA	☐	☐	☐		N/A
BCDC	☐	☐	☐		N/A

N/A = Not Applicable

Attachment B

Schedule

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**South County Traffic Relief Effort
Project Milestone Schedule**

Project Milestones		Milestone Delivery Date (Month, Year)
PROGRAM PROJECT	M015	August 2018
BEGIN ENVIRONMENTAL	M020	January 2019
NOTICE OF INTENT / NOTICE OF PREPARATION	M030	January 2019
CIRCULATE DED EXTERNALLY (Begin / End)	M120 / M140	January 2021 / March 2021
PROJECT APPROVAL AND ENVIRONMENTAL DOCUMENT (PA&ED) APPROVAL	M200	January 2022
DRAFT STRUCTURES PLANS, SPECIFICATIONS AND ESTIMATES (PS&E)	M378	December 2022
PROJECT PLANS, SPECIFICATIONS AND ESTIMATES (PS&E)	M380	December 2023
RIGHT-OF-WAY CERTIFICATION	M410	June 2024
READY-TO-LIST	M460	January 2024
AWARD	M495	March 2024
APPROVE CONTRACT/BEGIN CONSTRUCTION	M500	July 2024
CONTRACT ACCEPTANCE/END CONSTRUCTION	M600	July 2027
END PROJECT	M800	September 2027

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Attachment C

Mitigation and Compliance Cost Estimate (MCCE)

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Alternative 13
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to: materially improve north-south regional mobility and accommodate regional travel demand in South Orange County, by widening Los Patrones Parkway and extending State Route 241 (SR 241) from north of Cow Camp Road to Interstate 5 (I-5) at La Novia Avenue in Orange County. I-5 would also be widened from La Novia Avenue to Basilone Road just south of the Orange County/San Diego County line and a tolled lane would be added in each direction along this segment of I-5.

Project Cost: \$3.0 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide					
404 Permit- Individual					2022-2031
RWQCB 401 certification	\$50,000				2022-2031
Fish & Game 1602 Agreement	\$5,000	\$20,000,000			2022-2036
USFWS Sect 7		\$125,000,000			
NMFS Sect 7					
Coastal Development Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological Monitoring		\$9,000,000			2023-2024
Historical					
Paleontological		\$9,000,000			
Other ³ : (Bat/Bird Exclusions)		\$13,000,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$33,000,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$176,750,000	0	\$33,000,000	

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 17
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by widening Los Patrones Parkway and extend SR 241 from north of Cow Camp Road to I-5 at Avenida Vaquero in Orange County. I-5 would also be widened from Avenida Vaquero to Basilone Road just south of the Orange County/San Diego County line and a tolled lane would be added in each direction along this segment of I-5.

Project Cost: \$2.0 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$18,000,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$18,000,000	0	0	2022-2036
USFWS Sect 7	NA	\$98,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$10,500,000			2023-2024
Historical					
Paleontological		\$9,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)	CEQA/NEPA Mitigation	\$12,100,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$27,500,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$166,350,000	0	\$27,500,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 14
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by widening Los Patrones Parkway and extending SR 241 from north of Cow Camp Road to I-5 at Avenida Pico in Orange County. I-5 would also be widened from Avenida Pico to Basilone Road just south of the Orange County/San Diego County line and a tolled lane would be added in each direction along this segment of I-5.

Project Cost: \$1.8 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$23,000,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$23,000,000	0	0	2022-2036
USFWS Sect 7	NA	\$77,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$9,000,000			2023-2024
Historical					
Paleontological		\$9,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)	CEQA/NEPA Mitigation	\$16,500,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$14,500,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$158,250,000	0	\$14,500,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 11
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by widening I-5 with one general purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Orange County/San Diego County line.

Project Cost: \$2.6 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$12,500,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$12,500,000	0	0	2022-2036
USFWS Sect 7	NA	\$24,500,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$6,500,000			2023-2024
Historical					
Paleontological		\$10,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)		\$2,000,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$23,500,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$68,750,000	0	\$23,500,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 12
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by converting two HOV lanes to HOT lanes in each direction on I-5 from Alicia Parkway to El Toro Road in Orange County. One HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from El Toro Road to Avenida Pico. Two HOT lanes would be added from Avenida Pico to Basilone Road just south of the Orange County/San Diego County line.

Project Cost: \$2.3 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$9,000,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$9,000,000	0	0	2022-2036
USFWS Sect 7	NA	\$21,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$9,500,000			2023-2024
Historical					
Paleontological		\$8,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)		\$1,500,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$56,500,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$58,750,000	0	\$56,500,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 9
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 12-0Q680K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by constructing an arterial connection from SR 73 to Ortega Highway and Antonio Parkway.

Project Cost: \$1.2 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$5,000,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$5,000,000	0	0	2022-2036
USFWS Sect 7	NA	\$7,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$7,000,000			2023-2024
Historical					
Paleontological		\$2,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)		\$7,000,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$20,000,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$33,750,000	0	\$20,000,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 18
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 111020K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by constructing an arterial connection from SR 73 to Antonio Parkway. The connection would continue northeast to Los Patrones Parkway, ultimately connecting with SR 241. Crown Valley Parkway would also be extended to connection to Los Patrones Parkway and SR 241.

Project Cost: \$1.3 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$21,500,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$21,500,000	0	0	2022-2036
USFWS Sect 7	NA	\$100,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$9,000,000			2023-2024
Historical					
Paleontological		\$3,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)		\$28,000,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$16,000,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$183,750,000	0	\$16,000,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Alternative 21
Mitigation and Compliance Cost Estimate (MCCE)

Dist.-Co.-Rte.-PMs: 12-ORA-241-2.1/14.4/12-ORA-5-0.0/20.5/11-SD-5-71.3/72.4 **EA:** 111020K **E-FIS#:**

Project Description: The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County by extending Los Patrones Parkway from Cow Camp Road to La Pata Avenue. In addition, one HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 to Avenida Pico. Two HOT lanes would be added from Avenida Pico to Basilone Road just south of the Orange County/San Diego County line.

Project Cost: \$1.6 billion

Person completing form: Christina Hirt, LSA, (949) 553-0666

Project Manager: Farid Nowshiravan, Caltrans District 12, (657) 328-6303

Date this MCCE form was filled out: May 23, 2018

	Mitigation			Permit Non-Mitigation Obligation ⁴	Year(s) funds are to be spent ⁵
	Permit Cost ¹	Permit Mitigation Obligation ²	Statutory Requirement or Other ³		
404 Permit- Nationwide	NA	NA	NA	NA	NA
404 Permit- Individual	NA	\$24,500,000	0	0	2022-2031
RWQCB 401 certification	\$50,000	NA	0	0	2022-2031
Fish & Game 1602 Agreement	\$5,000	\$24,500,000	0	0	2022-2036
USFWS Sect 7	NA	\$34,000,000	0	0	NA
NMFS Sect 7	NA	0	0	0	NA
Coastal Devel. Permit					
COE Section 10 Permit					
COE Section 9 Permit					
Landscape					
Archaeological		\$9,500,000			2023-2024
Historical					
Paleontological		\$8,000,000			2023-2024
Other ³ : (Bat/Bird Exclusions)		\$9,000,000			2022-2031
Other: Noise (Potential Noise Barriers)				\$43,500,000	2023-2026
Biological Monitoring		\$750,000			2023-2024
TOTAL (Enter zeros if no cost)	\$55,000	\$110,250,000	0	\$43,500,000	

Note: A copy of the completed form is to be included in the project approval report (PSR/PDS), and provided to ROW, and the Project Manager responsible for this route regardless if they were involved directly in PID.

¹ Actual permit costs. We will need a check to pay resource agencies for this permit/agreement/certification processing fee.

² Mitigation Caltrans would not normally do but is required by conditions of a permit or environmental agreement.

³ Mitigation Caltrans would not normally do and is not required by a permit or environmental agreement but is required by a law/statute. Other could include Cultural or other expenses – please provide details in the first column after “Other”.

⁴ Non-mitigation Caltrans would not normally do but is required by conditions of a permit or agreement.

⁵ Best estimate given schedule provided by PSR/PDS or PM.

Attachment D
FEMA Floodplain Maps

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **flowways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 17 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 (GRS80 spheroid). Differences in datum, spheroid, projection or UTM zones used in the production of FRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://nvl.noaa.gov> or contact the National Geodetic Survey at the following address:

NOS Information Services
NOAA NW0512
National Geodetic Survey
SSMC-3, 6032
1215 Galveston Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Agriculture Imagery Program, dated 2005.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel features that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or dis-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program data for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

City of
San Juan Capistrano
060231

JOINS PANEL 0508

6130000 FT

117°02'31"

33°28'15"

2115000 FT

JOINS PANEL 0504

2115000 FT

Pacific Ocean

117°02'31"

33°28'15"

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas are the areas subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, AV, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of ponding); average depths determined. For areas of ponding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system not currently maintained. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance flood to adjacent flood.
- ZONE ARB** Area to be protected from the 1% annual chance flood by a Federal Flood protection system under construction; no Base Flood Elevation determined.
- ZONE AV** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average areas less than 1 square mile; or areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE S Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHER PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary (including Special Flood Hazard Area Zones) and boundary (including Special Flood Hazard Areas) of different base flood elevations, flood heights or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within cross section in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

100-meter Universal Transverse Mercator grid values, zone 11

100-meter Universal Transverse Mercator grid values, zone 11

100-meter grid values California State Plane coordinate system, zone VI (PPS20N 04N), Lambert Conformal Conic projection

Bench mark (see explanation in Notes to Users section of this FIS report)

1:500

Water File

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 15, 1999

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

February 5, 1992; November 5, 1993; January 3, 1997; February 18, 2004; December 3, 2008

For design of structures, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

100 0 100 200 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0508J

FIRM
FLOOD INSURANCE RATE MAP

ORANGE COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 508 OF 539

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	DATE	STATUS
ORANGE COUNTY	060231	2008	A
SAN JUAN CAPISTRANO	060231	2008	A
CLAYTON	060231	2008	A

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06059C0508J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **flowways** have been determined, users are encouraged to consult the Flood Profiles and Flowway Data and/or Summary of Shallow Water Elevations (SWEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Shallow Water Elevations (SWEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **flowways** were computed at cross sections and interpreted between cross sections. The flowways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Flowway widths and other pertinent flowway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of maps for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NGA, W9552
National Geodetic Survey
SSMC-3, #0202
1315 Oak View Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Aerial Imagery Program, dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and flowways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Flowway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of Communities taking National Flood Insurance Program rates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9622 and its website at <http://www.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNATION

1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AD, AH, V, and VE. The base flood elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AH Base Flood Elevation determined.

ZONE AD Flood depths of 1 to 3 feet (usually less than 100 years return period); average depths determined. For areas of elevated far flooding, vehicles also determined.

ZONE AR Special Flood Hazard Area formerly produced from the 1% annual chance flood but for flood control system that was subsequently abandoned. Zone AR indicates that the former flood control system is being removed to provide protection to the area from the 1% annual chance flood.

ZONE AH Areas to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to ensure the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average depths of 1 to 3 feet.

OTHER AREAS

ZONE S Areas determined to be outside the 0.2% annual chance floodplain.

ZONE O Areas in which flood heights are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary (including Special Flood Hazard Area Zones and boundaries) showing Special Flood Hazard Areas of different base flood elevations, flood depths or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value uniform within each map section in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) (WGS 84)

1000-meter Universal Transverse Mercator grid values, zone 18Q UTM Zone 11N

1000-foot and 1000-foot California State Plane coordinate system, zone VI (FIPS ZONE 4005), Lambert Conformal Conic projection

Reach (note: see explanation in Notes to Users section of this FIRM)

Map Index

Refer to listing of Map Repositories on Map Index

Effective date of community flood insurance rate map

Effective date of community flood insurance rate map

Effective date of community flood insurance rate map

Effective date of community flood insurance rate map

Effective date of community flood insurance rate map

Effective date of community flood insurance rate map

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **roadways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Differential Elevations (SDEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These SDEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NCA, NW532
National Geodetic Survey
SSM-C-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was derived from the National Aerial Photography Program, dated 2005.

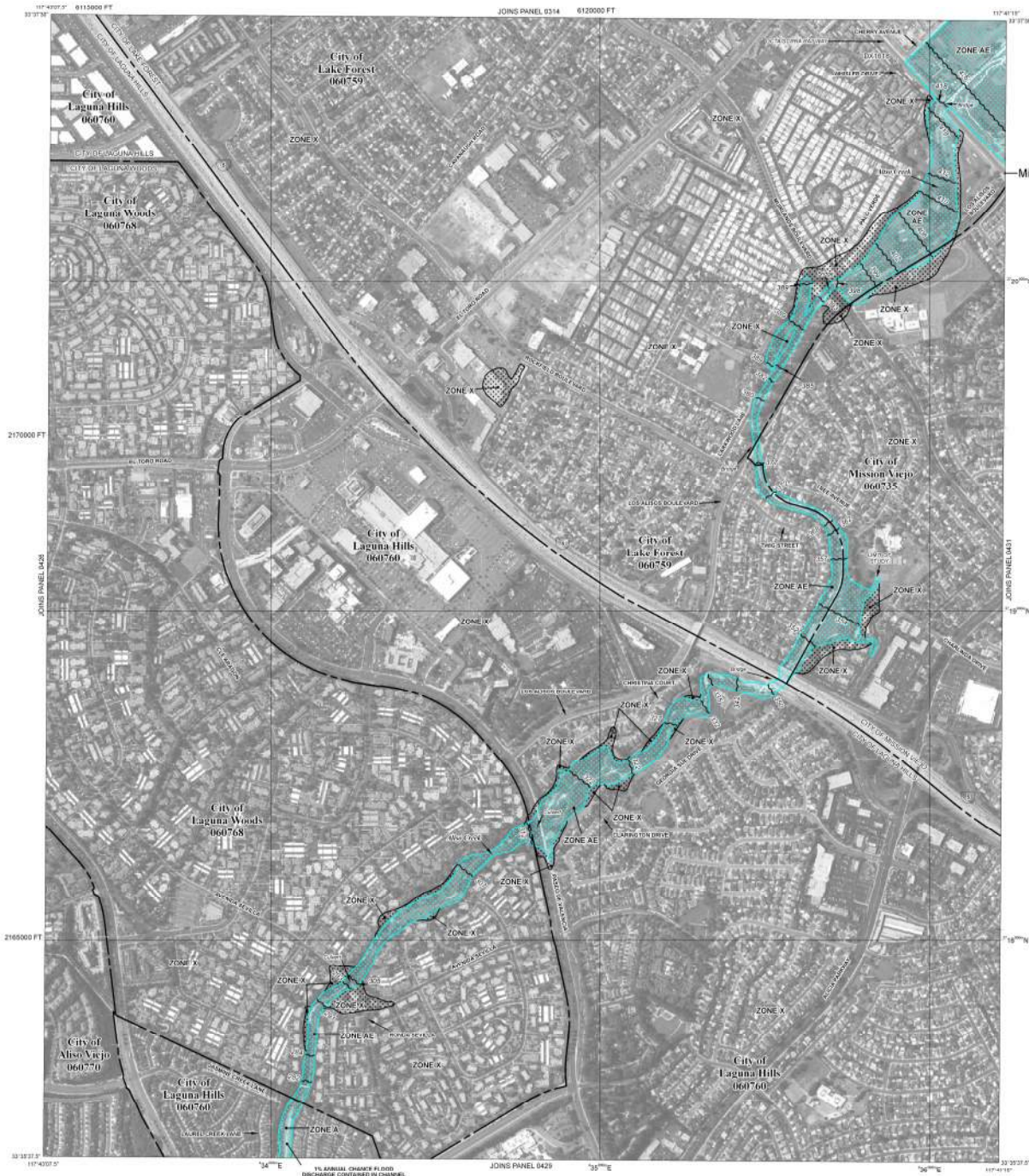
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to this separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program data for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9600 and its website at <http://msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNINDATION
BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AD, AH, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of sloping terrain); average depths determined. For areas of sloping terrain, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood but has been revised to reflect more current information. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance flood or greater flood.
- ZONE ARH** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to limit the 1% annual chance flood to be controlled without substantial increases in flood heights.

OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with depths of more than 1 foot, and areas protected by levees from the 1% annual chance flood.

OTHER AREAS
ZONE S Areas determined to be outside the 0.2% annual chance floodplain.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPA)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone boundary
- CBRS and OPA boundary
- Boundary defining Special Flood Hazard Areas and boundary defining Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
- Base Flood Elevation line and value, elevation in feet
- Base Flood Elevation value where uniform within zone, elevation in feet

- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Traverse line
- Geographic coordinate referenced to the North American Datum of 1983 (NAD 83) UTM Zone 11N
- 1000 meter Universal Transverse Mercator grid values, zone 11N UTM Zone 11N
- 1000 foot grid lines, California State Plane coordinate system, zone VI (FIPS ZONE 0406), Lambert Conformal Conic projection
- Reach mark (see explanation in Notes to Users section of this FIRM panel)
- River file
- MAP REPOSITORY
- Refer to listing of Map Repositories on Map Index
- EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP
- September 15, 1999

EFFECTIVE DATE OF REVISIONS TO THIS PANEL
February 5, 1992; November 3, 1993; January 3, 1997; February 18, 2004; December 5, 2008
For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-633-6623.

MAP SCALE 1" = 500'
250 500 1000
0 100 200
FEET
METERS

NFIP PANEL 0427J

FIRM
FLOOD INSURANCE RATE MAP

ORANGE COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 427 OF 539
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COUNTY	COMMUNITY	NUMBER	DATE	STATUS
ORANGE	ALHAMBRA CITY	06070	06/07	1
ORANGE	LA HABRA CITY	06071	06/07	1
ORANGE	LA HABRA CITY	06072	06/07	1
ORANGE	LA HABRA CITY	06073	06/07	1
ORANGE	LA HABRA CITY	06074	06/07	1

Note to User: The Map Number shown below should be used when obtaining this FIRM. The Community Number shown above should be used on insurance applications for the major community.

MAP NUMBER
06059C0427J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **flowways** have been determined, users are encouraged to consult the Flood Profiles and Flowway Data and/or Summary of Differential Elevations (SDEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **flowways** were computed at cross sections and interpolated between cross sections. The flowways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Flowway widths and other pertinent flowway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NSA 4605.2
National Geodetic Survey
SSM-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Agriculture Imagery Program, dated 2005.

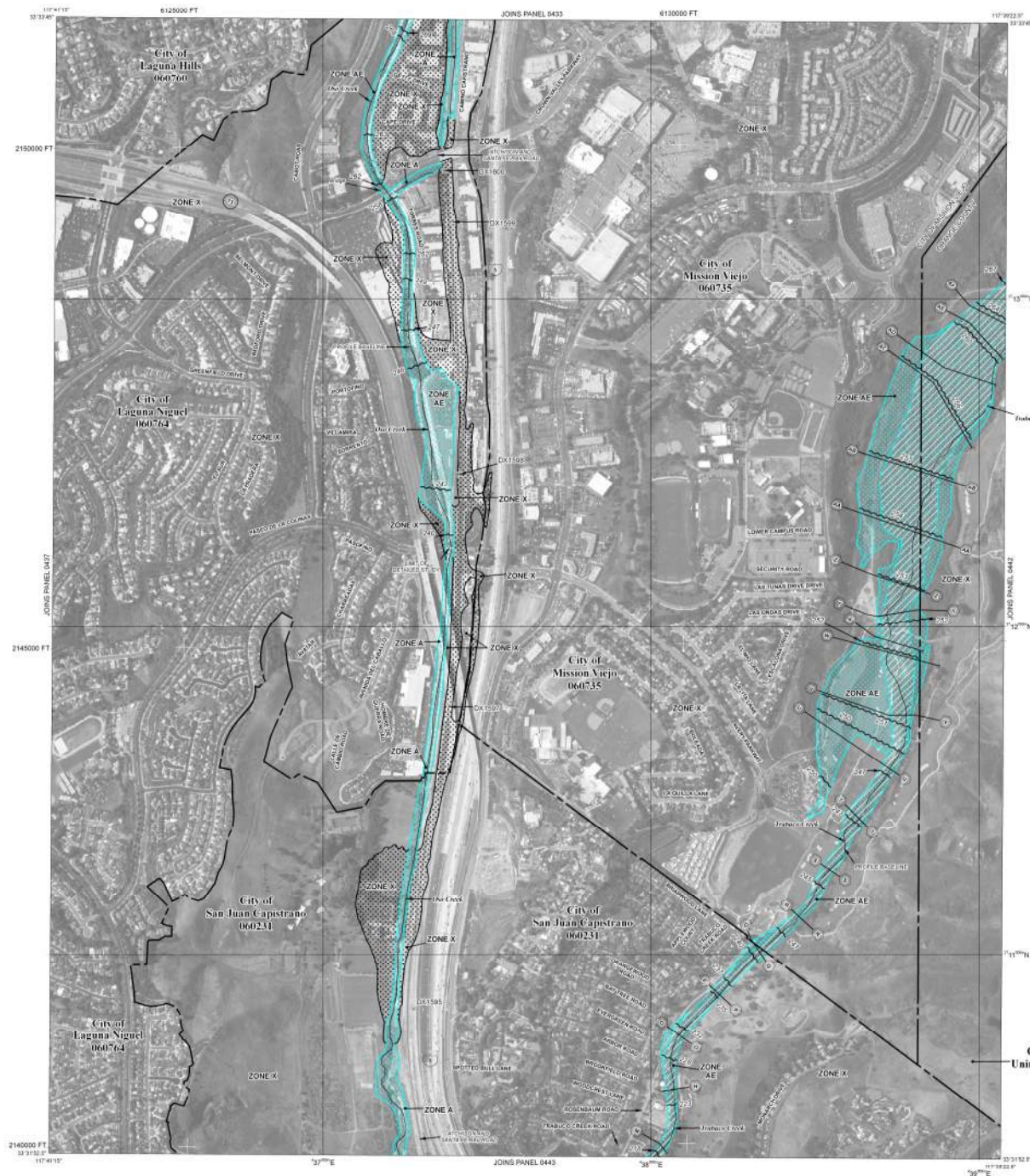
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The flowways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Flowway Data table in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of Communities table containing National Flood Insurance Program rates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNIDATION
BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AV, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of flow on sloping terrain); average depths determined. For areas of shallow flow, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood, but in which flood depths are not uniformly determined. Zone AR indicates that the former flood control system is being retained to provide protection from flooding at a level greater than the 1% annual chance flood.
- ZONE ARH** Area to be protected from 0% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE AV** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOWWAY AREAS IN ZONE AE
The flowway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to limit the 1% annual chance flood on the bank without substantial increases in flood heights.

OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average depths of 1 to 2 feet; areas of 1% annual chance flood with average depths of less than 1 foot or with average depths of 1 to 2 feet; areas of 1% annual chance flood with average depths of less than 1 foot or with average depths of 1 to 2 feet.

OTHER AREAS
ZONE A Areas determined to be outside the 0.2% annual chance floodplain.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPA)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone boundary
- CBRS and OPA boundary
- Boundary defining Special Flood Hazard Area Zones and boundary defining Special Flood Hazard Areas of different Base Flood Elevation, Flood Depth or Flood Velocity
- Base Flood Elevation line and value, elevation in feet
- Base Flood Elevation value where uniform water stage, elevation in feet

- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Traverse line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) UTM Zone 11N
- 1000-meter Universal Transverse Mercator grid values, zone 11N UTM Zone 11N
- 1000-foot grid values, California State Plane coordinate system, zone VI (FIPS202E 1040), Lambert Conformal Conic projection
- Reach mark (see explanation in Notes to Users section of this FIRM report)
- River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP
September 1, 1997

EFFECTIVE DATES OF REVISIONS TO THIS PANEL
February 5, 1992; November 3, 1993; January 3, 1997; February 18, 2004; December 3, 2008

For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map repository history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-633-6623.

MAP SCALE 1" = 500'

200 0 200 400 FEET

200 0 200 400 METERS

NFIP PANEL 0443J

FIRM
FLOOD INSURANCE RATE MAP

ORANGE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 441 OF 539
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COUNTY	COMMUNITY	NUMBER	DATE	STATUS
ORANGE COUNTY, CITY OF	060710	0607	0607	1
LAGUNA HILLS, CITY OF	060711	0607	0607	1
LAGUNA NIGUEL, CITY OF	060712	0607	0607	1
SAN JUAN CAPISTRANO, CITY OF	060713	0607	0607	1
MISSION VIEJO, CITY OF	060714	0607	0607	1

NOTE TO USER: The Map Number shown below should be used when stating map issues. No Community Number shown should be used on insurance applications for the insured community.

MAP NUMBER
06059C0441J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **Flowways** have been determined, users are encouraged to consult the Flood Profiles and Flowway Data and/or Summary of Differential Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.7 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **flowways** were computed at cross sections and interpolated between cross sections. The flowways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Flowway widths and other pertinent flowway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NSA, NWS02
National Geodetic Survey
SSM-3, #0202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Aerial Imagery Program, dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The flowways and flowway widths that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Flowway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel dimensions that differ from what is shown on this map.

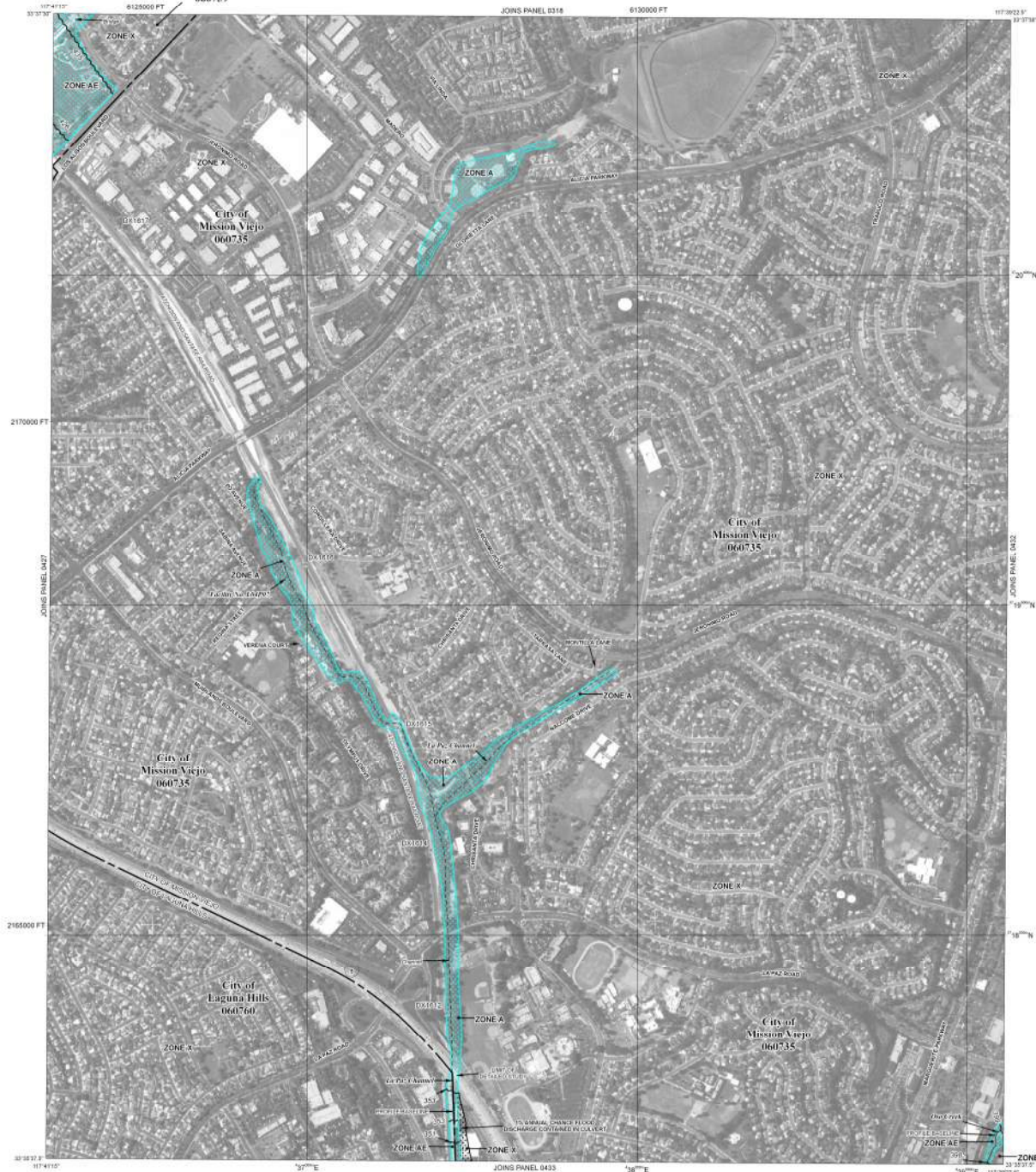
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If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-366-2277) or visit the FEMA website at <http://www.fema.gov>.

City of
Lake Forest
060759



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNNATION

1% ANNUAL CHANCE FLOOD
The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, A1, A2, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A**
No Base Flood Elevation determined.
- ZONE AH**
Base Flood Elevation determined.
Flow depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AO**
Flow depths of 1 to 3 feet (usually areas of sloping terrain); average depths determined. For areas of sloped far flooding, velocities also determined.
- ZONE AR**
Special Flood Hazard Area formerly produced from the 1% annual chance flood but now determined to be a 0.2% annual chance flood. Zone AR indicates that the former flood control system is being retained to provide protection for areas of greater flood risk.
- ZONE ARH**
Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE V**
Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE**
Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOWWAY AREAS IN ZONE AE
The flowway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to limit the 1% annual chance flood on or below without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X
Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average velocities less than 2 square miles, and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X
Areas determined to be outside the 0.2% annual chance floodplain.

ZONE G
Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone to boundary

CBRS and OPA boundary

Boundary defining Special Flood Hazard Area Zones and boundary defining Special Flood Hazard Areas of different Base Flood Elevation, flow depths or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within cross section in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) UTM Zone 11N

1000 meter Universal Transverse Mercator grid values, zone 11N UTM Zone 11N

1000 foot grid values, California State Plane coordinate system, zone VI (FIPS202E 1000), Lambert Conformal Conic projection

Reach mark (see explanation in Notes to Users section of this FIS report)

River Mile

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 18, 1999

EFFECTIVE DATES OF PREVIOUS TO THIS PANEL

February 5, 1992 - November 3, 1995 - January 3, 1997 - February 18, 2004 - December 3, 2008

For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-633-6623.

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Offwater Elevations (SOFELs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Offwater Elevations (SOFELs) in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Offwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRM for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NCAI, NW5512
National Geodetic Survey
SSMC-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was derived from the National Agriculture Imagery Program, dated 2005.

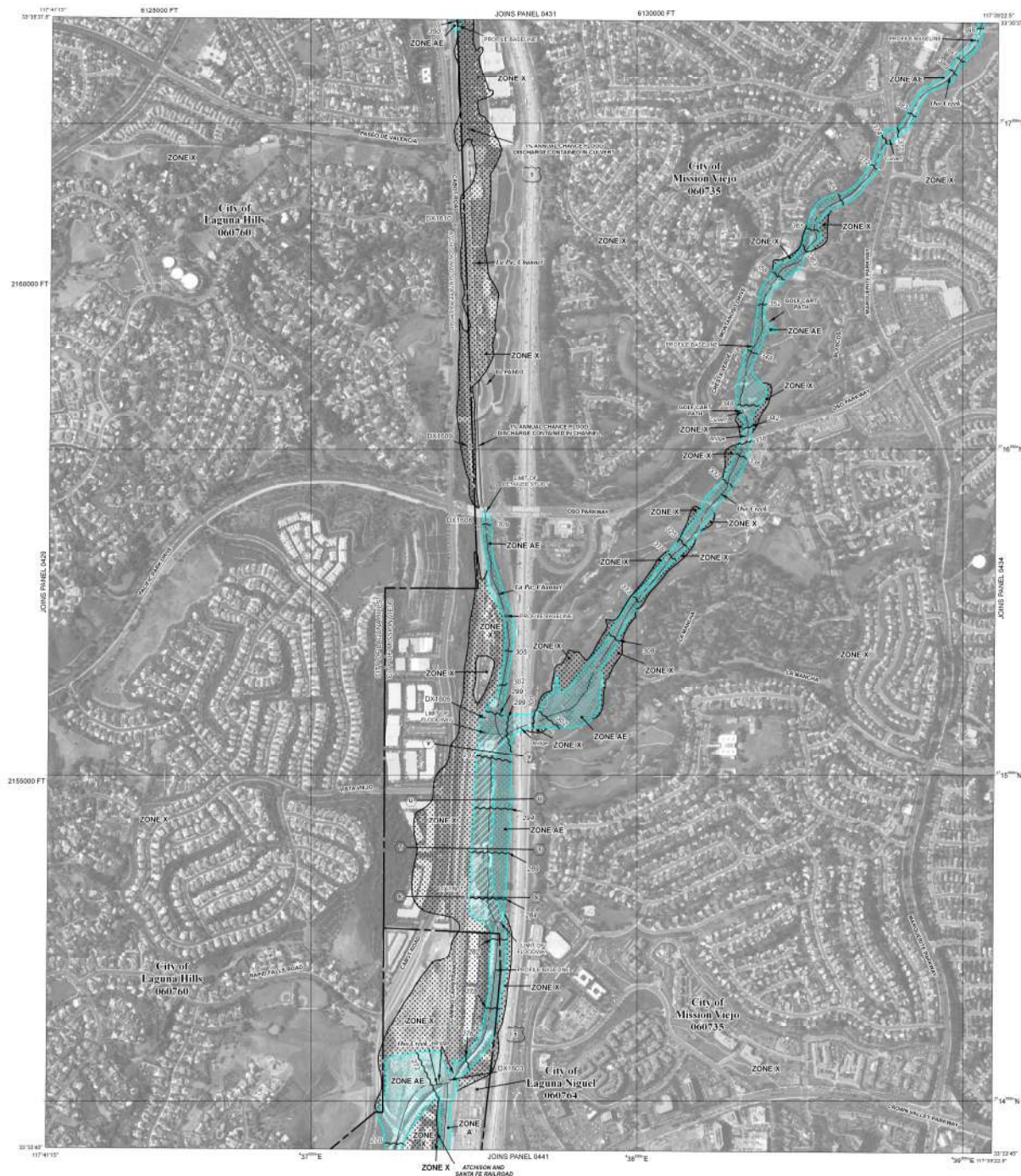
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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNINDATION
BT THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AD, AR, AN, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AD** Flood depths of 1 to 3 feet (usually areas of sloping terrain); average depth determined. For areas of sloping terrain, flood depths are determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood. In flood control areas, the former flood control system is being retained to provide protection or greater flood protection.
- ZONE AN** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAYS AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to limit the 1% annual chance flood on or below without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with other hazards identified. Zone AE indicates that the former flood control system is being retained to provide protection or greater flood protection.

OTHER AREAS

ZONE I Areas determined to be outside the 0.2% annual chance floodplain.

ZONE OI Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary shading Special Flood Hazard Areas, Zones, and floodways

Base Flood Elevation line and value; elevation in feet

Base Flood Elevation value where uniform within cross section in feet

* Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) (WGS 84)

1000-meter Universal Transverse Mercator grid values, zone 18Q UTM Zone 11N

1000-foot grid values, California State Plane coordinate system, zone VI (FIPS ZONE 1046), Lambert Conformal Conic projection

Reach mark (see explanation in Notes to Users section of this FIRM panel)

River file

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP: September 1, 1997

EFFECTIVE DATES OF REVISIONS TO THIS PANEL: February 5, 1992; November 3, 1993; January 3, 1997; February 18, 2004; December 3, 2009. For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-633-6623.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NSA, NWS02
National Geodetic Survey
SSM-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was derived from the National Agriculture Imagery Program, dated 2005.

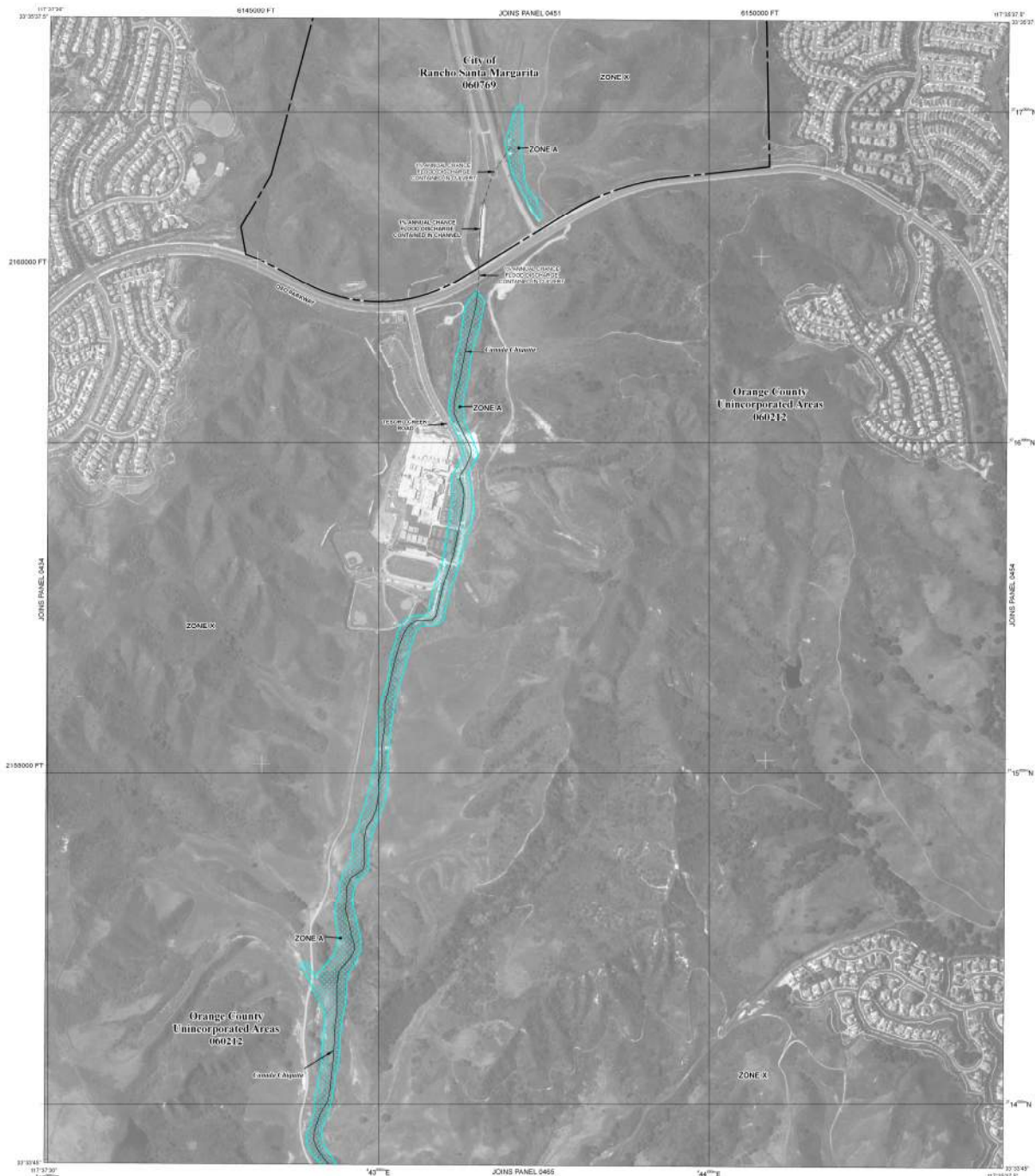
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data table in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel delineations that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9600 and its website at <http://msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-6627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNIDUN

BT THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, AN, VE, and V. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AH Base Flood Elevation determined.

Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.

ZONE AO Flood depths of 1 to 3 feet (usually areas of sloping terrain); average depths determined. For areas of sloping terrain, velocities also determined.

ZONE AR Special Flood Hazard Area formerly produced from the 1% annual chance flood, but now subject to the 0.2% annual chance flood.

Areas in which flood depths are undetermined, but possible.

ZONE AN Areas to be protected from 0% annual chance flood by a Federal Flood Protection System under construction; no Base Flood Elevation determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment to the 1% annual chance flood on or below without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.

OTHER AREAS

ZONE S Areas determined to be outside the 0.2% annual chance floodplain.

ZONE G Areas in which flood heights are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary defining Special Flood Hazard Area Zones and boundaries defining Special Flood Hazard Areas of different base flood elevations, flood depths or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within zone, elevation in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) (WGS 1984)

1000-meter Universal Transverse Mercator grid values, zone 11N

1000-foot grid values, California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection

Reach scale (see explanation in Notes to Users section of this FIRM)

River Mile

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 18, 1999

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

February 5, 1992; November 2, 1993; January 3, 1997; February 18, 2004; December 3, 2008

For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6623.

MAP SCALE 1" = 500'

200 0 500 1000 FEET

200 0 500 1000 METERS

100 0 100 200

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **Flowways** have been determined, users are encouraged to consult the Flood Profiles and Flowway Data and/or Summary of Stillwater Elevations (SSEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 17 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **Flowways** were computed at cross sections and interpolated between cross sections. The flowways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Flowway widths and other pertinent flowway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zone used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NORA, NW5512
National Geodetic Survey
SCMC-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Agriculture Imagery Program, dated 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The flowways and flowways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Flowway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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Contact the **FEMA Map Service Center** at 1-800-358-6619 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-6620 and its website at <http://mfc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of ponding); average depths determined. For areas of ponding, flood depths are determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently abandoned. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance flood.
- ZONE AR99** Area to be protected from 1% annual chance flood by a Federal Flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal Flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal Flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with flood depths of less than 1 foot or with discharge areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood.

OTHER AREAS

- ZONE D** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE G** Areas in which flood heights are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHER PROTECTED AREAS (OPA)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone V boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundaries dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
- Base Flood Elevation line and value, elevation in feet
- Base Flood Elevation value where uniform within zone, elevation in feet

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Traffic line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western hemisphere
- 100-meter Universal Transverse Mercator grid values, zone 11C
- 100-meter Universal Transverse Mercator grid values, zone 11D
- 100-meter grid values California State Plane coordinate system, zone VI (PPS2004) (NAD 83), Lambert Conformal Conic projection
- Section mark (see explanation in Notes to Users section of the FIS report)
- Survey file

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

September 1, 1999

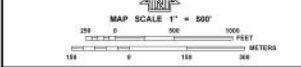
EFFECTIVE DATES OF REVISIONS TO THIS PANEL

February 5, 2002; November 2, 1983; June 1, 1987; February 18, 2004; December 3, 2004

For design of structures, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History page located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0528J

FIRM

FLOOD INSURANCE RATE MAP

ORANGE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 528 OF 539

(SEE MAP INDEX FOR FIRM LAYOUT)

CONTAINS	COMMUNITY	SHEET	SHEET
SAN CLEMENTE, CITY OF	0528J	0528J	0

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06059C0528J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **flowways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Differential Elevations (SDEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD85). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **flowways** were computed at cross sections and interpolated between cross sections. The flowways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Flowway widths and other pertinent flowway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NCAI, NW5512
National Geodetic Survey
SSM-C-3, #6202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNIDATION

BT THE ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, AV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AH** Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain; average depths determined). For areas of sheet flow flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood that is now under control of a levee or other flood control system. Zone AR indicates that the former flood control system is being retained to provide protection to the community or greater flood protection.
- ZONE AV** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment to allow the 1% annual chance flood to be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with depths of more than 1 foot.

Areas in which flood heights are undetermined, but possible.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE G Areas in which flood heights are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary defining Special Flood Hazard Area Zones and boundary defining Special Flood Hazard Areas of different Base Flood Elevation, Flood Depth or Flood Velocity.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform water stage, elevation in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) (N, E, S, W)

1000 meter Universal Transverse Mercator grid values, zone 18Q UTM (10°N Zone 11)

1000 foot grid lines, California State Plane coordinate system, zone VI (PSPZONE 040), Lambert Conformal Conic projection

Reach mark (see explanation in Notes to Users section of this FIS report)

River Mile

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 15, 1999

EFFECTIVE DATES OF PREVIOUS TO THIS PANEL

February 5, 1992 - November 3, 1995 - January 3, 1997 - February 18, 2004 - December 3, 2008

For description of previous versions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6633.

MAP SCALE 1" = 500'

250 500 1000 FEET

100 200 300 METERS

100 200 300 METERS

100 200 300 METERS

100 200 300 METERS

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Boundaries of the **footways** were computed at cross sections and interpolated between cross sections. The footways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Footway widths and other pertinent footway data are provided in the Flood Insurance Study report for this jurisdiction.

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NOS Information Services
NCAA, NW0512
National Geodetic Survey
SSMC-3, #0202
1215 Sand-Way Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (200-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, ADV, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponds); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of sloping terrain); average depths determined. For areas of shallow fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system no longer in existence. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance flood.
- ZONE ARB** Area to be protected from 1% annual chance flood by a Federal Flood protection system under construction; no Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot with average areas less than 1 square mile; or areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood heights are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone V boundary

CBRS and OPA boundary

Boundary (including Special Flood Hazard Area Zones) and boundary (including Special Flood Hazard Areas) of different base Flood Elevation, flood heights or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within cross section in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western hemisphere

100-meter Universal Transverse Mercator grid values, zone 18Q

100-meter Universal Transverse Mercator grid values, zone 18Q

100-foot grid and ticks: California State Plane coordinate system, zone VI (PPS20NE 0406), Lambert Conformal Conic projection

Bench mark (see explanation in Notes to Users section of this FIS panel)

Slow Flow

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

September 15, 1999

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

February 5, 1992; November 5, 1993; January 1, 1997; February 18, 2004; December 3, 2004

For design of structures, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History page located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

For community map revision history prior to countywide mapping, refer to the Community Map History page located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

For community map revision history prior to countywide mapping, refer to the Community Map History page located in the Flood Insurance Study report for this jurisdiction.

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To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **roadways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Differential Elevations (SDEs) contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 6' North American Vertical Datum of 1988 (NAVD85). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NOS Information Services
NOSAI NW5512
National Geodetic Survey
SSMCO-3 #6202
1315 Sand West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was derived from the National Aerial Photography Program, dated 2005.

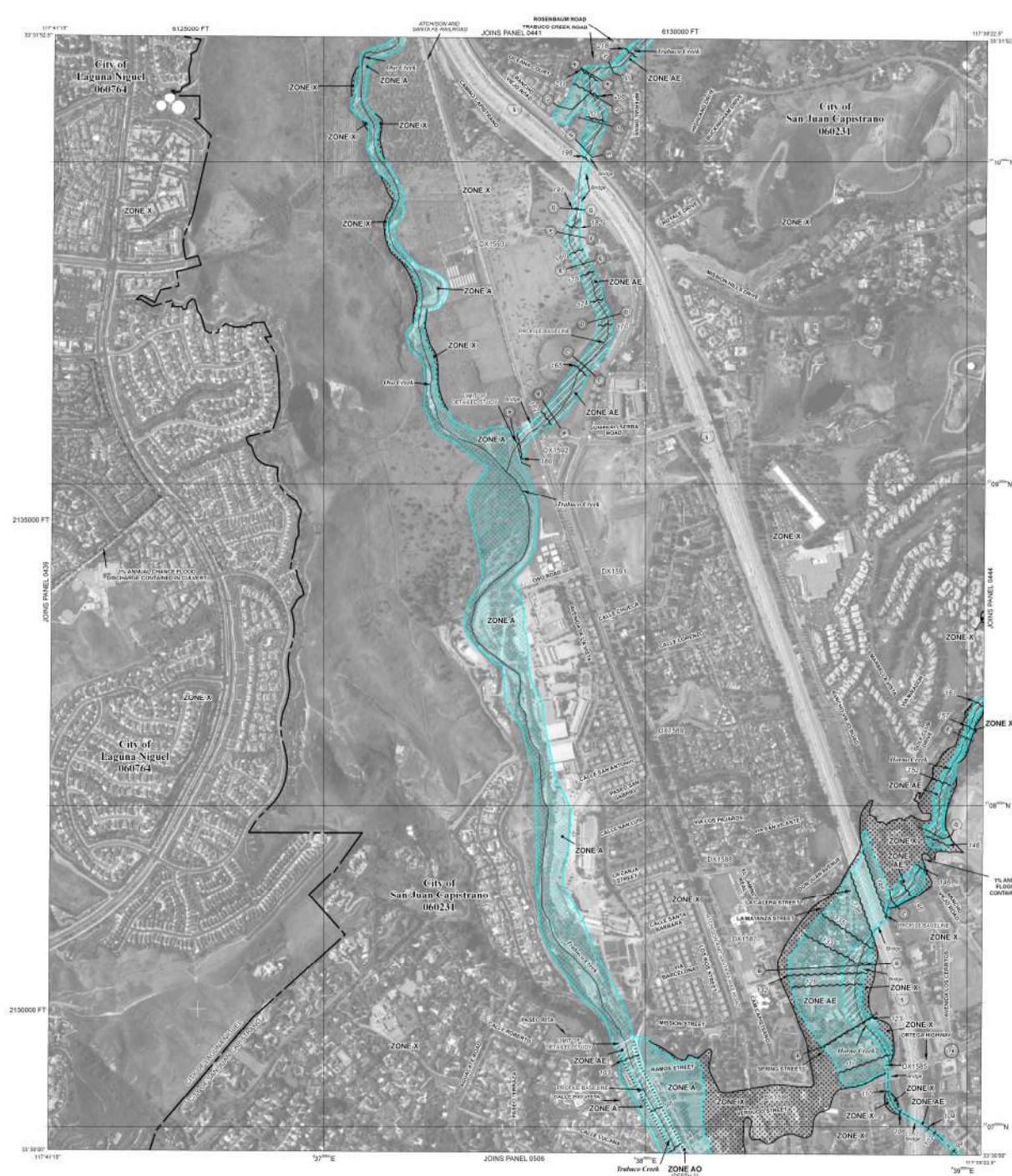
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9600 and its website at <http://www.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-6277) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNIDATION
BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AD, AR, AHX, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevation determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponding); Base Flood Elevation determined.
- ZONE AD** Flood depths of 1 to 3 feet (usually areas of sloping terrain); average depths determined. For areas of shallow fast flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood that the former flood control system is being retained to provide protection from the 1% annual chance flood.
- ZONE AHX** Area to be protected from 0% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment to limit the 1% annual chance flood to be controlled without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with depths of less than 1 foot and a square mile or areas protected by levees from 0% annual chance flood.

OTHER AREAS

ZONE G Areas determined to be outside the 0.2% annual chance floodplain.

ZONE I Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary defining Special Flood Hazard Area Zones and boundaries defining Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform water course elevation is less

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinate referenced to the North American Datum of 1983 (NAD 83) (NAD 83) (NAD 83) (NAD 83)

1000-meter Universal Transverse Mercator grid values, zone 18Q UTM Zone 11N

1000-foot grid values, California State Plane coordinate system, zone VI (FIPSZONE 0405), Lambert Conformal Conic projection

Reach mark (see explanation in Notes to Users section of this FIS report)

River Mile

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 1, 1999

EFFECTIVE DATES OF PREVIOUS TO THIS PANEL

February 5, 1992; November 2, 1985; January 1, 1987; February 18, 2004; December 3, 2008

For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6633.

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **Flowways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 17 North American Vertical Datum of 1988 (NAVD 88). Users of the FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was NAD 83. GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NOS Information Services
NCAA, NW5012
National Geodetic Survey
SSM-3, #022
1215 Sand-Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the National Agriculture Imagery Program, dated 2005.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of Communities table containing National Flood Insurance Program data for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-Map (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas are the areas subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, ADV, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 2 feet (usually areas of ponds); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of low-lying terrain); average depths determined. For areas of shallow fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that has been abandoned or dismantled. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance flood.
- ZONE ARB** Areas protected from the 1% annual chance flood by a Federal Flood protection system under construction; no Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment to keep the 1% annual chance flood on or below substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average rates less than 1 square mile; and areas protected by levees from the 1% annual chance flood.

OTHER AREAS

ZONE S Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood heights are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHER PROTECTED AREAS (OPA)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone boundary

CBRS and OPA boundary

Boundary (including Special Flood Hazard Area Zones) and boundary (including Special Flood Hazard Areas of different base Flood Elevations, flood heights or flood velocities)

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within zone, elevation in feet

Referenced to the North American Vertical Datum of 1988

Cross section line

Traverse line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western hemisphere

100-meter Universal Transverse Mercator grid values, zone 18Q UTM Zone 11N

200-foot grid lines: California State Plane coordinate system, zone VI (PPZONE 0468), Lambert Conformal Conic projection

Section scale (see explanation in Notes to Users section of the FIS report)

Scale bar

MAP REPOSITORY

Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP

September 15, 1999

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

February 5, 1992; November 5, 1993; January 1, 1997; January 18, 2004; December 5, 2004

For design of structures, see Notes to Users (page 1) of the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-433-6633.

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **roadways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Differential Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 12' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Differential Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Differential Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM Zone 11). The horizontal datum was NAD 83 GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRM for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NSA, NWS512
National Geodetic Survey
SSM-3, #202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was derived from the National Agriculture Imagery Program, dated 2005.

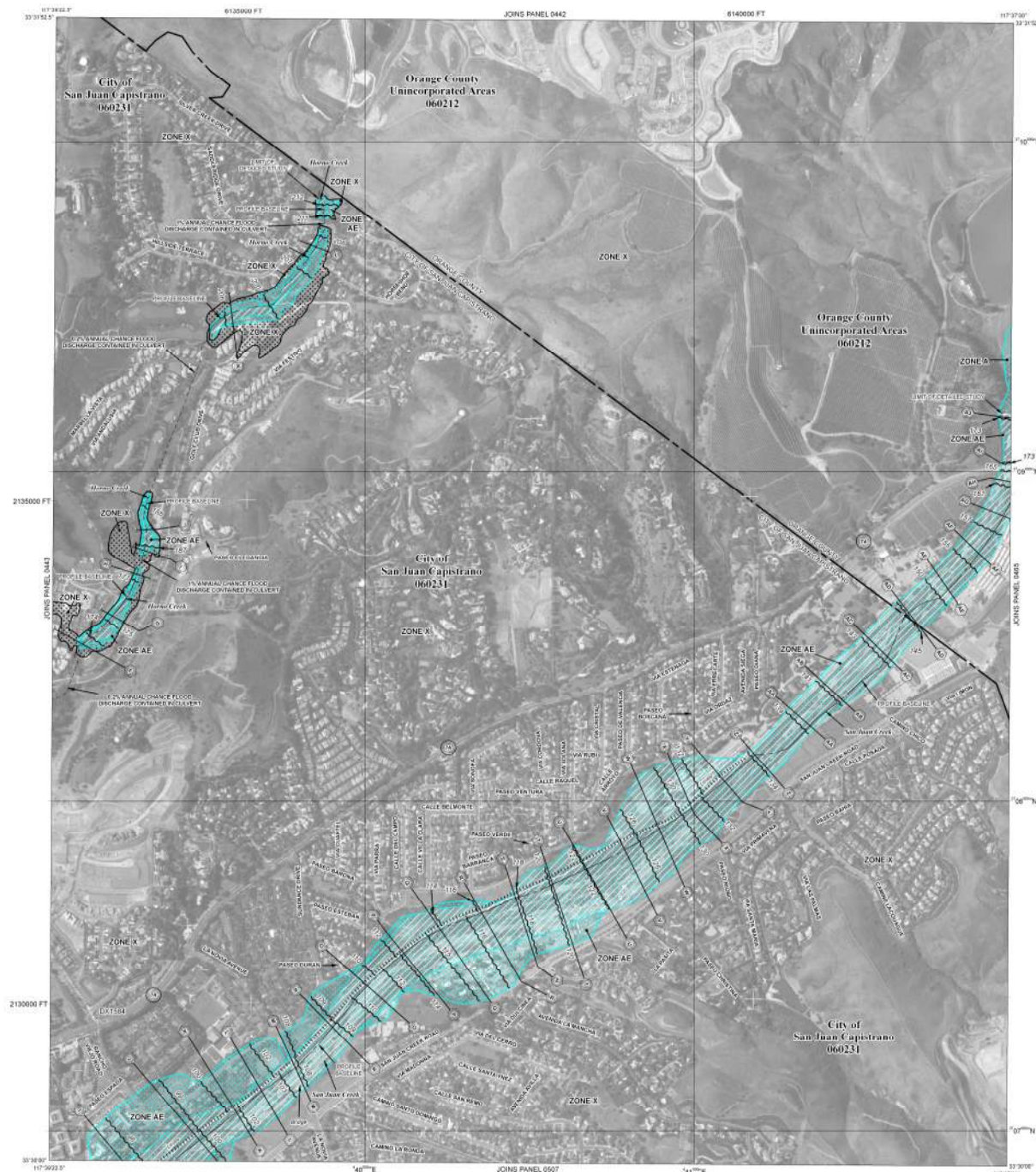
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or disannexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program data for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-6277) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO BRUNIDATION
BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (25-year flood), also known as the base flood, is the flood that has a 1% chance of being equal or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, AO, AV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevation determined.
- ZONE AH** Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually about four to six feet); average depth determined. For areas of shallow flood, vehicles also determined.
- ZONE AR** Special Flood Hazard Area formerly produced from the 1% annual chance flood. Areas of Special Flood Hazard that are not currently shown. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance flood.
- ZONE AV** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction. No Base Flood Elevation determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action). No Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action). Base Flood Elevation determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment to limit the 1% annual chance flood to be controlled without substantial increases in flood heights.

OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average areas less than 2 square miles; and areas protected by levees from 1% annual chance flood.

OTHER AREAS
ZONE I Areas determined to be outside the 0.2% annual chance floodplain.

ZONE O Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPA)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone boundary
CBRS and OPA boundary
Boundary defining Special Flood Hazard Areas
Boundary defining Special Flood Hazard Areas of different base flood elevations, flood depths or flood velocities
Base Flood Elevation line and value, elevation in feet
Base Flood Elevation value where uniform within cross section in feet
IS 187

Referenced to the North American Vertical Datum of 1988
Cross section line
Traverse line
Geographic coordinate referenced to the North American Datum of 1983 (NAD 83) UTM Zone 11N
1000 meter Universal Transverse Mercator grid values, zone 11N
1000 foot grid values, California State Plane coordinate system, zone VI (FIPS202) NAD83, Lambert Conformal Conic projection
Reach mark (see explanation in Notes to Users section of this FIRM panel)
River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP
September 15, 1999

EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP
February 5, 1992; November 3, 1985; January 3, 1987; February 18, 2004; December 3, 2008
For description of revisions, see Notes to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6633.

MAP SCALE 1" = 500'
250 500 1000
FEET
75 150 300
METERS

NFIP PANEL 6444J

FIRM
FLOOD INSURANCE RATE MAP

ORANGE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 444 OF 539
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	DATE	STATUS
ORANGE COUNTY, CALIFORNIA (CAPITOL)	10001	1999	1
CITY OF	10002	1999	1

Notes to Users: The Map Number shown below should be used when obtaining your policy. No Community Number shown below should be used on insurance applications for the insured community.

MAP NUMBER
06059C0444J

MAP REVISED
DECEMBER 3, 2009

Federal Emergency Management Agency

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Attachment E

Visual Impact Assessment Checklist

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Questionnaire to Determine Visual Impact Assessment (VIA) Level

Use the following questions and subsequent score as a guide to help determine the appropriate level of VIA documentation. This questionnaire assists the VIA preparer (i.e. Landscape Architect) in estimating the probable visual impacts of a proposed project on the environment and in understanding the degree and breadth of the possible visual issues. The goal is to develop a suitable document strategy that is thorough, concise and defensible.

Enter the project name and consider each of the ten questions below. Select the response that most closely applies to the proposed project and corresponding number on the right side of the table. Points are automatically computed at the bottom of the table and the total score should be matched to one of the five groups of scores at the end of the questionnaire that include recommended levels of VIA study and associated annotated outlines (i.e., minor, moderate, advanced/complex).

This scoring system should be used as a preliminary guide and should not be used as a substitute for objective analysis on the part of the preparer. Although the total score may recommend a certain level of VIA document, circumstances associated with any one of the ten question-areas may indicate the need to elevate the VIA to a greater level of detail. For projects done by others on the State Highway System, the District Landscape Architect should be consulted when scoping the VIA level and provide concurrence on the level of analysis used.

The Standard Environmental Reference, Environmental Handbook, Volume I: Chapter 27-Visual & Aesthetics Review lists preparer qualifications for conducting the visual impact assessment process. Landscape Architects receive formal training in the area of visual resource management and can appropriately determine which VIA level is appropriate.

Preparer Qualifications:

"Scenic Resource Evaluations and VIAs are performed under the direction of licensed Landscape Architects. Landscape Architects receive formal training in the area of visual resource management with a curriculum that emphasizes environmental design, human factors, and context sensitive solutions. When recommending specific visual mitigation measures, Landscape Architects can appropriately weigh the benefits of these different measures and consider construction feasibility and maintainability."

Calculate VIA Level Score

PROJECT NAME: South County Traffic Relief Effort	
PROJECT EA: EA 12-0Q680K	
PREPARER NAME: Christina Hirt	
FOR PROJECTS ON STATE HIGHWAY SYSTEM ONLY, NAME OF CALTRANS DISTRICT LANDSCAPE ARCHITECT (DLA) PROVIDING VIA QUESTIONNAIRE SCORE CONCURRENCE- IF DIFFERENT THAN ABOVE: For Projects on State Highway System Only, Enter DLA Name	
CHANGE TO VISUAL ENVIRONMENT	
1. Will the project result in a noticeable change in the physical characteristics of the existing environment? Consider all project components and construction impacts - both permanent and temporary, including landform changes, structures, noise barriers, vegetation removal, railing, signage, and contractor activities.	High Level of Change (3 points) ▼
2. Will the project complement or contrast with the visual character desired by the community? Evaluate the scale and extent of the project features compared to the surrounding scale of the community. Is the project likely to give an urban appearance to an existing rural or suburban community? Do you anticipate that the change will be viewed by the public as positive or negative? Research planning documents, or talk with local planners and community	Low Compatibility (3 points) ▼

representatives to understand the type of visual environment local residents envision for their community.	
3. What level of local concern is there for the types of project features (e.g., bridge structures, large excavations, sound barriers, or median planting removal) and construction impacts that are proposed? Certain project improvements can be of special interest to local citizens, causing a heightened level of public concern, and requiring a more focused visual analysis.	High Concern (3 points) ▼
4. Will the project require redesign or realignment to minimize adverse change or will mitigation, such as landscape or architectural treatment, likely be necessary? Consider the type of changes caused by the project, i.e., can undesirable views be screened or will desirable views be permanently obscured so a redesign should be considered?	Project Redesign Needed (3 points) ▼
5. Will this project, when seen collectively with other projects, result in an aggregate adverse change (cumulative impacts) in overall visual quality or character? Identify any projects (both Caltrans and local) in the area that have been constructed in recent years and those currently planned for future construction. The window of time and the extent of area applicable to possible cumulative impacts should be based on a reasonable anticipation of the viewing public's perception.	Cumulative Impacts Likely to Occur Within 0-5 Years (3 points) ▼
VIEWER SENSITIVITY	
1. What is the potential that the project proposal will be controversial within the community, or opposed by any organized group? This can be researched initially by talking with Caltrans and local agency management and staff familiar with the affected community's sentiments as evidenced by past projects and/or current information.	High Potential (3 points) ▼
2. How sensitive are potential viewer-groups likely to be regarding visible changes proposed by the project? Consider among other factors the number of viewers within the group, probable viewer expectations, activities, viewing duration, and orientation. The expected viewer sensitivity level may be scoped by applying professional judgment, and by soliciting information from other Caltrans staff, local agencies and community representatives familiar with the affected community's sentiments and demonstrated concerns.	High Sensitivity (3 points) ▼
3. To what degree does the project's aesthetic approach appear to be consistent with applicable laws, ordinances, regulations, policies or standards? Although the State is not always required to comply with local planning ordinances, these documents are critical in understanding the importance that communities place on aesthetic issues. The Caltrans Environmental Planning branch may have copies of the planning documents that pertain to the	Low Compatibility (3 points) ▼

project. If not, this information can be obtained by contacting the local planning department. Also, many local and state planning documents can be found online at the [California Land Use Planning Network](#).

4. Are permits going to be required by outside regulatory agencies (i.e., Federal, State, or local)?

Permit requirements can have an unintended consequence on the visual environment. Anticipated permits, as well as specific permit requirements - which are defined by the permitted, may be determined by talking with the project Environmental Planner and Project Engineer. Note: coordinate with the Caltrans representative responsible for obtaining the permit prior to communicating directly with any permitting agency.

Yes (3 points) ▼

5. Will the project sponsor or public benefit from a more detailed visual analysis in order to help reach consensus on a course of action to address potential visual impacts?

Consider the proposed project features, possible visual impacts, and probable mitigation recommendations.

Yes (3 points) ▼

Calculate Total

[It is recommended that you print a copy of these calculations for the project file.](#)

PROJECT SCORE: 30

Select An Outline Based Upon Project Score

The total score will indicate the recommended VIA level for the project. In addition to considering circumstances relating to any one of the ten questions-areas that would justify elevating the VIA level, also consider any other project factors that would have an effect on level selection.

SCORE 6-9

No noticeable visual changes to the environment are proposed and no further analysis is required. Print out a copy of this completed questionnaire for your project file or Preliminary Environmental Study (PES).

SCORE 10-14

Negligible visual changes to the environment are proposed. A brief [Memorandum](#) (see sample) addressing visual issues providing a rationale why a technical study is not required.

SCORE 15-19

Noticeable visual changes to the environment are proposed. An abbreviated VIA is appropriate in this case. The assessment would briefly describe project features, impacts and any avoidance and minimization measures. Visual simulations would be optional. Go to the [Directions](#) for using and accessing the Minor VIA Annotated Outline.

SCORE 20-24

Noticeable visual changes to the environment are proposed. A fully developed VIA is appropriate. This technical study will likely receive public review. Go to the [Directions](#) for using and accessing the Moderate VIA Annotated Outline.

SCORE 25-30

Noticeable visual changes to the environment are proposed. A fully developed VIA is appropriate that includes photo simulations. It is appropriate to alert the Project Development Team to the potential for highly adverse impacts and to consider project alternatives to avoid those impacts. Go to the [Directions](#) for using and accessing the Advanced/Complex VIA Annotated Outline.

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT F:
TRANSPORATION PLANNING SCOPING INFORMATION SHEET**

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ARTICLE 4 Transportation Planning Scoping Information Sheet

PROJECT INFORMATION

				Project ID No/
District	County	Route	Post Miles	Expenditure Authorization No.
12	Ora	241	2.1/14.4	EA 12-0Q680K
12	Ora	73	10.34/11.28	
12	Ora	5	0.0/20.5	
11	SD	5	71.3/72.4	
Project Name and Description : South County Traffic Relief Effort				

Prepared by:

District Information Sheet Point of Contact*:	Name: Janilee Jablonski	Functional Unit:	Transportation Engineer, Advance Planning – Project Studies, Branch B
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* The District Information Sheet Point of Contact is responsible for completing Project Information, PDT Team and Stakeholder Information, and coordinating the completion of project-related information with the Transportation Planning Stakeholders. Upon completion, provides the Transportation Planning PDT Representative and Project Manager with a copy of the Information Sheet.

Project Development Team (PDT) Information		
Title	Name	Phone Number
Project Manager	Farid Nowshiravan	(657) 328-6303
Project Engineer		
Transportation Planning PDT Representative**	Cameron Palm	(657) 328-6286

Transportation Planning Stakeholder Information		
Title	Name	Phone Number
Regional Planner		
System Planner		
Local Development- Intergovernmental Review (LD-IGR) Planner		
Community Planner		
Goods Movement Planner		
Transit Planner		
Bicycle and Pedestrian Coordinator		
Park and Ride Coordinator		
Native American Liaison		
Other Coordinators:		

Project Purpose and Need** –

Purpose

The purpose and fundamental objectives of the Project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on I-5 during peak commuting hours and weekends
- Provide additional north-south capacity in case of traffic incidents on I-5
- Provide additional north-south capacity in case of emergencies
- Enhance multi-modal mobility opportunities

Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5
- The lack of sufficient north-south capacity impairs evacuation and emergency response

** The Transportation Planning PDT Representative is responsible for providing the PDT with the system-wide and corridor level deficiencies identified by Transportation Planning. The PDT uses the information provided by Transportation Planning to develop the purpose and need with contributions from other Caltrans functional units and external stakeholders at the initiation of the PID and is refined throughout the PID process. As the project moves past the project initiation stage and more data becomes available, the purpose and need is refined. For additional information on purpose and need see: www.dot.ca.gov/hq/env/emo/purpose_need.htm

1. Project Funding:

a	List all known and potential funding sources and percent splits: (ie. State Transportation Improvement Program (STIP)/State Highway Operations and Protection Program (SHOPP)/Transportation Enhancement (TE)/Environmental Enhancement and Mitigation (EEM)/Safe Routes to School (SR2S)/etc.).
	Development Impact Fees, Toll Revenue Bonds
b	Is this a measure project? No . If yes, name and describe the measure.
	Not Applicable.

2. Regional Planning:

a	Name of and contact information for Metropolitan Planning Organization (MPO) or Regional Transportation Planning Agency (RTPA)
	Rongsheng Luo, Program Manager of Air Quality and Conformity, Southern California Association of Governments (SCAG), (213) 236-1994

b	Name of and contact information for local jurisdiction (City or County) Valerie McFall, Chief Environmental Planning Officer, Project Sponsor, Foothill/Eastern Transportation Corridor Agency(F/ETCA), (949) 754-3475
c	Provide the page number and project description as identified in the Regional Transportation Plan (RTP) and the date of adoption, or provide an explanation if not in RTP. RTP adopted April 2016, Appendix <i>Project List</i>, Page 58, ORA052: Foothill Transportation Corridor-South (FTC-S - SR 241). 10.3-mile toll road between San Diego County Line and Oso Pkwy, consistent with SCAG/TCA MOU dated 4/05/01. 2 M/F each direction from Oso Pkwy to Cow Camp Rd by 2017. 2 M/F each direction from Cow Camp Rd to San Diego Co Line by 2021. 1 Additional M/F each direction plus climbing & auxiliary lanes by 2030.
d	Provide nexus between the RTP objectives and the project to establish the basis for the project purpose and need. RTP objective is for improved mobility.
e	Is the project located in an area susceptible to sea-level rise? No. Though a portion of the project is in the coastal zone, the project would not be affected by sea level rise.
f	Name of Air Quality Management District (AQMD) South Coast Air Quality Management District
g	If the project is located in a federal non-attainment or attainment-maintenance area is the project: - Regionally Significant? (per 40 (Code of Federal Regulations (CFR) 93.101) Yes. - Exempt from conformity? (per 40 CFR 93.126 and 93.128) No. - Exempt from regional analysis? (per 40 CFR 93.127) No. - Not exempt from conformity (must meet all requirements)? Yes.

3. Native American Consultation and Coordination:

a	If project is within or near an Indian Reservation or Rancheria? If so, provide the name of Tribe. Tribes and tribal cultural resources that may be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
b	Has/have the Tribal Government(s) been consulted? N/A. If no, why not? Tribal consultation will be conducted in the PA&ED phase.
c	If the project requires Caltrans to use right-of-way on trust or allotted lands, this information needs to be included as soon as possible as a key topic in the consultation with the Tribe(s). Has the Tribe been consulted on this topic? No. If no, why not? Tribal consultation will be conducted in the PA&ED phase.
d	Has the Bureau of Indian Affairs (BIA) been notified? No. Tribal consultation will be conducted in the PA&ED phase.
e	Have all applicable Tribal laws, ordinances and regulations [Tribal Employment Rights Ordinances (TERO), etc.] been reviewed for required contract language and coordination? Tribal consultation will be conducted in the PA&ED phase.
f	If the Tribe has a TERO, is there a related Memorandum of Understanding between the District and the Tribe? Tribal consultation will be conducted in the PA&ED phase.
g	Has the area surrounding the project been checked for prehistoric, archeological, cultural, spiritual, or ceremonial sites, or areas of potentially high sensitivity? If such areas exist, has the Tribe, Native American Heritage Commission or other applicable persons or entities been consulted?

	Tribes and tribal cultural resources that may be impacted by the project have not been identified at this time. Tribal consultation will be conducted in the PA&ED phase.
h	If a Native American monitor is required for this project, will this cost be reflected in cost estimates? Tribes and tribal cultural resources that may be impacted by the project have not been identified at this time. Costs for Native American monitors will be evaluated as part of the PA&ED phase.
i	In the event of project redesign, will the changes impact a Native American community as described above in d, e, or h? Tribes and tribal cultural resources that may be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.

4. System Planning:

a	Is the project consistent with the DSMP? Yes. If yes document approval date. If no, explain. November 2014
b	Is the project identified in the TSDP? No. If yes, document approval date _____. If no, explain. TSDP not available at this time.
c	Is the project identified in the TCR/RCR or CSMP? Yes. If yes, document approval date 2000 _____. If no, explain. Is the project consistent with the future route concept? Yes. If no, explain. Alternatives connecting I-5 to SR-241 are included in the I-5 TCR (dated 2000) as part of the long-range projects.
d	Provide the Concept Level of Service (LOS) through project area. E0-E2, per I-5 TCR (dated 2000).
e	Provide the Concept Facility – include the number of lanes. Does the Concept Facility include High Occupancy Vehicle lanes? Yes. Concept facility for 2020 per I-5 TCR, ranges from 8 to 14 Mainline Lanes (ML) and 2 to 4 High Occupancy Vehicle (HOV) + Aux lane on I-5.
f	Provide the Ultimate Transportation Corridor (UTC) – include the number of lanes. Does the UTC include High Occupancy Vehicle Lanes? Yes. Ultimate Transportation Corridor per I-5 TCR ranges from an 8 to 12 lane facility, including HOV lanes.
g	Describe the physical characteristics of the corridor through the project area (i.e. flat, rolling or mountainous terrain...). Rolling.
h	Is the highway in an urban or rural area? Urban and Rural. Provide Functional Classification. I-5 is a Freeway (Urban); SR-241 is an Expressway (Rural)
i	Is facility a freeway, expressway or conventional highway? I-5 is a Freeway (Urban); SR-241 is an Expressway (Rural)

j	Provide Route Designations: (i.e. Interregional Transportation Strategic Plan (ITSP) High Emphasis or Focus Route, Surface Transportation Assistance Act (STAA) Route, Scenic Route...).
j	SR-241 and I-5 are part of the National Highway System (NHS) and California Freeway and Expressway System, adopted by the CTC and included in the Surface Transportation Assistance Act (STAA) Trucks National Network.
k	Describe the land uses adjacent to project limits (i.e. agricultural, industrial...).
k	Agricultural, Residential, Commercial, Open Space, Community Facilities.
l	Describe any park and ride facility needs identified in the TCR/CSMP, local plans, and RTP.
l	There are 22 park and ride facilities within Orange County, per the DSMP. There are three park and ride facilities off the I-5 within the project corridor (two in San Juan Capistrano, and one in Laguna Hills). Park and Ride locations have not been studied within the project limits at this time. They will be evaluated during the PA&ED phase.
m	Describe the Forecasted 10 and 20-year Vehicle Miles Traveled (VMT), Annual Average Daily Traffic (AADT), and Peak Hour truck data in the TCR. Include the source and year of Forecast, and names and types of traffic and travel demand analysis tools used.
m	The I-5 TCR (dated 2000) does not include this information.
n	Has analysis on Daily Vehicle Hours of Delay (DVHD) from the Highway Congestion Monitoring Program (HICOMP) been completed and included? No.
n	They will be evaluated during the PA&ED phase.

5. Local Development – Intergovernmental Review (LD-IGR):

List LD-IGR projects that may directly or indirectly impact the proposed Caltrans project or that the proposed Caltrans project may impact. (Attach additional project information if needed.)

LD-IGR Project Information		Project
a	County-Route-Postmile & Distance to Development.	LD-IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
b	Development name, type, and size.	The preliminary analysis of the Build Alternatives has identified the potential for impacts related to existing and future land use. This will be studied in more detail during the PA&ED phase. LD-IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
c	Local agency and/or private sponsor, and contact information.	Valerie McFall, Chief Environmental Planning Officer, Project Sponsor (F/ETCA), (949) 754-3475
d	California Environmental Quality Act (CEQA) status and Implementation Date.	In conjunction with documenting compliance with CEQA requirements, an EIR will be the appropriate environmental document for the project. The Draft EIR and EIS will be prepared as a combined Environmental Document (EIR/EIS) during the PA&ED phase. LD-IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.

e	If project includes federal funding, National Environmental Policy Act (NEPA) status.	An EIS will be the appropriate environmental document for NEPA compliance. The Draft EIR and EIS will be prepared as a combined Environmental Document (EIR/EIS) during the PA&ED phase. LD/IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
f	All vehicular and non-vehicular unmitigated impacts and planned mitigation measures including Transportation Demand Management (TDM) and Transportation System Management (TSM) that would affect Caltrans facilities.	LD-IGR projects that would impact or be impacted by the project have not been identified at this time. The project TSM/TDM components will be further studied during the PA&ED phase.
g	Approved mitigation measures and implementing party.	LD-IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
h	Value of constructed mitigation and/or amount of funds provided.	LD/IGR projects that would impact or be impacted by the project have not been identified at this time. This will be further evaluated in the PA&ED phase.
i	Encroachment Permit, Transportation Permit, Traffic Management Plan, or California Transportation Commission (CTC) Access approvals needed.	Will be identified during the PA&ED phase.
j	Describe relationship to Regional Blueprint, General Plans, or County Congestion Management Plans.	Will be identified during the PA&ED phase.
k	Inclusion in a Regional Transportation Plan Sustainable Community Strategy or Alternative Planning Strategy?	Will be identified during the PA&ED phase.
l	Regional or local mitigation fee program in place?	Will be identified during the PA&ED phase.

6. Community Planning:

	INITIAL PID INFORMATION
a	Has lead agency staff worked with any neighborhood/community groups in the area of the proposed improvements? Yes. If yes, summarize the process and its results including any commitments made to the community. If no, why not? Building from the 2016 Community Ascertainment Study, a collaborative multi-faceted, broad-based stakeholder and public engagement process has been established as part of the project to include: collaboration with environmental stakeholders (SSOC); collaboration with local stakeholders (South Orange County Mobility Working Group) [SOCMWG]; public forums;

	collaboration with regional stakeholders; online engagement; implementation of a comprehensive community involvement plan; and development of transportation ideas from collaborative public engagement. The key project stakeholders include F/ETCA and Caltrans. F/ETCA has been working in partnership with Caltrans to originate the Purpose and Need and to initiate the PSR-PDS effort subsequent to completion of the Community Ascertainment Study in 2016. Project stakeholders have been participating in project development, and features included in the alternatives/build ideas discussed in this PSR-PDS are based upon the input received to date.
b	Are any active/completed/proposed Environmental Justice (EJ) or Community-Based Transportation (CBTP) Planning Grants in the project area? No. If yes, summarize the project, its location, and whether/how it may interact with the proposed project. Not Applicable.
c	Describe any community participation plans for this PID including how recommendations will be incorporated and/or addressed. Has a context sensitive solutions (CSS) approach been applied? Yes. On December 14, 2017, F/ETCA circulated the South County Traffic Relief Initial Screening (Attachment I of the PSR-PDS) for the Project Initiation Document Phase (PID) which evaluated the 20 ideas suggested by the public during the three public forums. Eight build ideas and a no-build were recommended for further study as a conclusion of the screening document, and these are being evaluated in this PSR-PDS for Caltrans, OCTA, and FHWA input and approval. As the project progresses through the project development cycle, viable concepts and alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions in order to incorporate Context Sensitive Solutions. The first two public forums were held on June 16, 2016, and October 5, 2016, to present data regarding transportation issues and to solicit input from the public for transportation solutions. These two public forums resulted in sixteen ideas brought forward for a more detailed evaluation. The sixteen ideas were grouped into six packages: Alternative Modes and Operations (Ideas 1-5), Arterial Widening (Ideas 1-7), Substantial Roadway Projects (Ideas 1-9), I-5 Options (Ideas 1-7 and 10-12), SR 241/I-5 Options (Ideas 1-7 and 13-15, and Technology (efficiency enhancement; Idea 16). A preliminary traffic evaluation (including daily congested vehicle miles traveled and daily vehicle hours of delay) was presented to the public regarding the performance of the six packages. On November 16, 2016, F/ETCA submitted a transmittal letter and the sixteen ideas with supporting documentation to OCTA and Caltrans District 12 for review and comment. The supporting documentation included figures with alignments of the sixteen ideas, preliminary traffic data that evaluated the performance of the 6 packages, and fact sheets that ranked the packages and listed benefits, challenges, funding sources, and estimated costs. Idea 17 was developed by F/ETCA in January 2017. On April 4, 2017, the City of San Clemente submitted a letter to F/ETCA recommending evaluation of an additional idea (Idea 18). In 2017, F/ETCA established the website called Get Moving Orange County (http://getmovingoc.com/) to provide the public with information regarding upcoming public forums as well as videos of previous public forums and to provide a method to provide feedback to F/ETCA regarding the public forums. A third public forum was conducted on June 5, 2017. This forum consisted of two discussion panels and responses to questions submitted by the attendees. The first panel discussed the Settlement Agreement (signed in November 2016) and the second panel discussed the Project development

	process, evaluation of ideas, and coordination with Caltrans District 12 and OCTA. All written questions were answered and posted on the Get Moving Orange County website. Ideas 19 and 20 were suggested at this meeting. On December 14, 2017, F/ETCA circulated the South County Traffic Relief Initial Screening (Attachment I of the PSR-PDS) which evaluated the 20 ideas suggested by the public during the three public forums. Seven build ideas and a no-build were recommended for further study as a conclusion of the screening document, and these are being evaluated in this PSR-PDS. On February 8, 2018, an additional transportation idea called Idea 21 (Build Alternative 9) was introduced by F/ETCA during the its Board Meeting. Based upon discussions during that Board Meeting, this Build Alternative has been added to the list of alternatives under consideration in this PSR-PDS. The Project is currently in the PID phase. Future evaluation of Project Build Alternatives will occur during the PA&ED phase. Public and agency involvement will be performed during various public comment and public meeting phases of the CEQA/NEPA process of the Project as well. Additional public outreach will be performed at subsequent stages to inform the local community and stakeholders regarding the Project.
	FINAL PID INFORMATION
d	How will the proposed transportation improvements impact the local community? Is the project likely to create or exacerbate existing environmental or other issues, including public health and safety, air quality, water quality, noise, environmental justice or social equity? To be determined. Describe issues, concerns, and recommendations (from sources including neighborhood/community groups) and what measures will be taken to reduce existing or potential negative effects. The preliminary analysis of the build alternatives has identified the potential for impacts related to existing and future land use. A Preliminary Environmental Analysis Report (PEAR) has been prepared for this project, and is included as Attachment E of the PSR-PDS. Based on the results of initial environmental studies included in the PEAR, it is unknown at this time if all potential impacts associated with the build alternatives could be reduced or mitigated.
e	Does this highway serve as a main street? No. If yes, what main street functions and features need to be protected or preserved? Not Applicable.

7. Freight Planning:

	INITIAL PID INFORMATION
a	Identify all modal and intermodal facilities that may affect or be affected by the project. The following modes/transportation facilities are located within or adjacent to project limits • The OCTA bus network has 77 bus routes and nearly 6,200 bus stops • There are 22 Park and Ride facilities • Metrolink has 11 stations in Orange County operating on three separate lines: Orange County Line, Inland Empire-Orange County (IEOC) Line and 91 Line. • The 351-mile Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor stretches from San Luis Obispo to San Diego.
	FINAL PID INFORMATION

b	Describe how the design of this project could facilitate or impede Goods Movement and relieve choke points both locally and statewide through grade separations, lane separations, or other measures (e.g., special features to accommodate truck traffic and at-grade railroad crossings).
	Additional capacity on I-5 segment of project will facilitate Goods Movement. An alternate north-south facility (SR-241) in South Orange County as well as truck climbing lanes will facilitate Goods Movement.
c	Describe how the project integrates and interconnects with other modes (rail, maritime, air, etc.). Do possibilities exist for an intermodal facility or other features to improve long-distance hauling, farm-to-market transportation and/or accessibility between warehouses, storage facilities, and terminals?
	Not Applicable. Currently integration/interconnection with other modes is not planned.
d	Is the project located in a high priority goods movement area, included in the Goods Movement Action Plan (GMAP) or on a Global Gateways Development Program (GGDP) route? Yes. If yes, describe.
	The project is within one of four goods movement priority regions and corridors in California – the Los Angeles/Inland Empire Region, as identified in the GMAP.
e	Is the project on a current and/or projected high truck volume route [e.g., Average Annual Daily Truck Traffic (AADTT) of 5 axle trucks is greater than 3000]? Yes. If yes, describe how the project addresses this demand.
	This has not been evaluated at this time, and will be studied during the PA&ED phase.
f	If the project is located near an airport, seaport, or railroad depot, describe how circulation (including truck parking) needs are addressed.
	• John Wayne Airport in Orange County. • Metrolink has 11 stations in Orange County operating on three separate lines: Orange County Line, Inland Empire-Orange County (IEOC) Line and 91/Perris Valley Line. • Amtrak Pacific Surfliner in Orange County. Circulation needs will be evaluated during the PA&ED phase.
g	Describe any other freight issues.
	The LOSSAN (Los Angeles – San Diego – San Luis Obispo Rail) Corridor in general, parallels the I-5 between San Clemente and Laguna Hills. Some of the alternatives have greater impact on the LOSSAN corridor than others, particularly near Camino Capistrano, San Onofre, and the I-5/SR-73 interchange where the freeway is in close proximity to the rail corridor. In addition, the El Toro Rail overcrossing, south of the La Paz Road interchange would be widened under some of the alternatives. This will be evaluated further during the PA&ED phase.

8. Transit (bus, light rail, commuter rail, intercity rail, high speed rail):

	INITIAL PID INFORMATION
a	List all local transit providers that operate within the corridor. OCTA, Metrolink, Amtrak
b	Have transit agencies been contacted for possible project coordination? No. If no, why not?
	Coordination will occur during PA&ED phase.

c	Describe existing transit services and transit features (bus stops, train crossings, and transit lines) within the corridor. The following modes/transportation facilities are located within or adjacent to project limits • The OCTA bus network has 77 bus routes and nearly 6,200 bus stops • Metrolink has 11 stations in Orange County operating on three separate lines: Orange County Line, Inland Empire-Orange County (IEOC) Line and 91 Line. • The 351-mile Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor stretches from San Luis Obispo to San Diego.
d	Describe transit facility needs identified in short- and long-range transit plans and RTP. Describe how these future plans affect the corridor. The Project is currently included in the federally-adopted 2017 FTIP and it is included in the 2017 California FSTIP. SCAG is in the process of updating its current FTIPs. The Project is being carried over into SCAG's Draft 2019 FTIP.
FINAL PID INFORMATION	
e	Describe how the proposed project integrates transit and addresses impacts to transit services and transit facilities. Not Applicable. Currently integration/interconnection with other modes is not planned.
f	Have transit alternatives and improvement features been considered in this project? No. If yes, describe. If no, why not? Not Applicable.

9. Bicycle:

INITIAL PID INFORMATION	
a	Does the facility provide for bicyclist safety and mobility needs? If no, please explain. A pedestrian/bike pathway is intended along the SR-241 segment of the project.
b	Are any improvements for bicyclist safety and mobility proposed for this facility by any local agencies or included in bicycle master plans? If yes, describe (including location, time frame, funding, etc.). Where feasible, bike route connections to local bike facilities will be considered.
c	Are there any external bicycle advocacy groups and bicycle advisory committees that should be included in the project stakeholder list? If so, provide contact information. Currently, they are not included in the project stakeholder list. Will discuss during PA/ED phase
FINAL PID INFORMATION	
d	Will bicycle travel deficiencies be corrected? How or why not? Bicycle deficiencies have not been identified. A pedestrian/bike pathway is intended along the SR-241 segment of the project.
e	How will this project affect local agency plans for bicycle safety and mobility improvements? The project is not anticipated to affect local agency plans for bicycle safety or mobility improvements.
f	If the project is the construction of a new freeway or modification to an existing freeway, will it sever or destroy existing provisions for bicycle travel? If yes, describe how bicycle travel provisions will be included in this project. No.

10. Pedestrian including Americans with Disabilities Act (ADA):

	INITIAL PID INFORMATION
a	Does this facility provide for pedestrian safety and mobility needs? If so, describe pedestrian facilities. Do continuous and well-maintained sidewalks exist? Are pedestrians forced to walk in the roadway at any locations due to lack of adequate pedestrian facilities? Please explain. ADA pedestrian improvements will be included at connections with existing local street facilities.
b	Are pedestrian crossings located at reasonable intervals? Not Applicable.
c	Are all pedestrian facilities within the corridor ADA accessible and in compliance with Federal and State ADA laws and regulations? Pedestrian facilities for each alternative will conform to ADA standards and guidance.
	FINAL PID INFORMATION
d	Will pedestrian travel deficiencies be corrected? How or why not? Pedestrian deficiencies have not been identified. A pedestrian/bike pathway is intended along the SR-241 segment of the project. Bicycle lanes will be provided, to the extent feasible, on portions of the arterial between signalized intersections. For portions of the Project where the arterial forms a direct connection to SR 73, bicycles would not be permitted.
e	How will this project affect local agency plans for pedestrian safety and mobility improvements? The project is not anticipated to affect local agency plans for pedestrian safety or mobility improvements.
f	If the project is the construction of a new freeway or modification to an existing freeway, will it sever or destroy existing provisions for pedestrian travel? If yes, describe how pedestrian travel provisions will be included in this project. No.
g	Are there any external pedestrian advocacy groups and advisory committees that should be included in the project stakeholder list? If so, provide contact information. Currently, they are not included in the project stakeholder list. Will discuss during PA&ED phase.
h	Have ADA barriers as noted in the District's ADA Transition Plan been identified within the project limits? If not included in the project, provide justification and indicate whether District Design coordinator approval was obtained. ADA pedestrian improvements will be included at connections with existing street facilities. Details will be further developed during the PA&ED and PS&E phases.

11. Equestrian:

	INITIAL PID INFORMATION
a	If this corridor accommodates equestrian traffic, describe any project features that are being considered to improve safety for equestrian and vehicular traffic? Not Applicable.
	FINAL PID INFORMATION
b	Have features that accommodate equestrian traffic been identified? If so, are they included a part of this project? Describe. If no, why not? No. Not Applicable.

12. Intelligent Transportation Systems (ITS):

	INITIAL PID INFORMATION
a	Have ITS features such as closed-circuit television cameras, signal timing, multi-jurisdictional or multimodal system coordination been considered in the project? Yes. If yes, describe. If no, explain. The project ITS elements will be further studied during the PA&ED phase. The ITS elements may include electronic tolling, 511 traveler information, changeable message signs, closed circuit televisions (CCTVs), Active Traffic Management (ATMs), Title-21 and automated vehicle/occupancy detection/monitoring technology improvements.
	FINAL PID INFORMATION
b	Have ITS features been identified? If so, are they included a part of this project? Describe. If no, why not? The project ITS elements will be further studied during the PA&ED phase. The ITS elements may include electronic tolling, 511 traveler information, changeable message signs, closed circuit televisions (CCTVs), Active Traffic Management (ATMs), Title-21 and automated vehicle/occupancy detection/monitoring technology improvements.

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G:
CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY COMPONENT**

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-1:
ALTERNATIVE 13 – CONCEPTUAL COST ESTIMATE RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

**K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY
Alternative 13 – Build Idea 13 (ID13)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler		Dave Speirs Project Manager HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 13 – Build Idea 13 (ID13) connects SR 241 to I-5 via Western Alignment (local connection at La Novia Avenue). Additionally, the project consists of north and south bound widening of Interstate 5 from the SR 241/I-5 proposed connector to the San Diego County / Orange County border. The project is located primarily within the cities of San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>50-100</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☐ Yes	☒ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☒ No	☐ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0*

**the preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.*

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs\$ \$500,001-\$1,000,000(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☒ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☒ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 3 Support Costs (CON)

Tasks: 270.25, 285

☐ \$0-\$100,000☐ \$100,001-\$250,000☒ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000**Schedule**

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-2:
ALTERNATIVE 17 – CONCEPTUAL COST ESTIMATE RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 17 – Build Idea 17 (ID17)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler		Dave Speirs Project Manager HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 17 – Build Idea 17 (ID 17) connects SR 241 to I-5 via Shore Cliffs (local connection at Avenida Vaquero). Additionally, the project consists of north and south bound widening of Interstate 5 from the SR 241/I-5 proposed connector to the San Diego County / Orange County border. The project is located primarily within the cities of San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>150-200</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

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USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☐ Yes	☒ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☒ No	☐ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0*

**The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.*

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs
(PA&ED)\$ \$500,001-\$1,000,000

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☒ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

- | | |
|--|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☒ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 3 Support Costs (CON)

Tasks: 270.25, 285

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☒ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Schedule

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-3:
ALTERNATIVE 14 – CONCEPTUAL COST ESTIMATE RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 14 – Build Idea 14 (ID14)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler		Dave Speirs Project Manager HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 14 – Build Idea 14 (ID 14) connects SR 241 to I-5 via La Pata Avenue Crossing (local connection at Avenida Pico). Additionally, the project consists of north and south bound widening of Interstate 5 from the SR 241/I-5 proposed connector to the San Diego County / Orange County border. The project is located primarily within the cities of San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☒ 51-100 ☐ >100

Right of Way Requirements:

Number of Fee Parcels <u>50-100</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☐ Yes	☒ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☒ No	☐ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0***The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.***DRAFT**

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs \$ \$250,001-\$500,000
(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☒ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

- | | |
|--|--|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☒ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 3 Support Costs (CON)

Tasks: 270.25, 285

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☒ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Schedule

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT G-4:
ALTERNATIVE 11 – CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY
COMPONENT

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 11 – Build Idea 11 (ID11)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To: Farid Nowshiravan
Project Manager
Caltrans District 12

Date: August 2018

Dist-Co-Rte-PM: 12-Ora-241 – 2.1/14.4
12-Ora-73 – 10.34/11.28
12-Ora-5 – 0.0/20.5
11-SD-5 – 71.3/72.4

Project ID: 1217000087
EA: 12-0Q680K

From: Maile Kop
Agent/ROW Engineering Analyst
Overland, Pacific & Cutler

Dave Speirs
Project Manager
HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Build Alternative 11 - ID 11 adds I-5 general purpose lanes from I-405 to San Diego County. The project is located primarily within the cities of Irvine, Lake Forest, Laguna Hills, Laguna Woods, Laguna Niguel, Mission Viejo, San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Rail, Flood Control, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No

Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>251-300</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>100-150</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☒ Yes	☐ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☐ No	☒ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u> </u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u> </u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u> </u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0*

**The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.*

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

**Phase 0 Support Costs
(PA&ED)**\$ \$1,000,001-\$2,500,000

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

- | | |
|--|---|
| ☐ \$0-\$100,000 | ☒ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

- | | |
|--|--|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☒ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 3 Support Costs (CON)

Tasks: 270.25, 285

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☒ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Schedule

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-5:
ALTERNATIVE 12 – CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 12 – Build Idea 12 (ID12)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To: Farid Nowshiravan
Project Manager
Caltrans District 12

Date: August 2018

Dist-Co-Rte-PM: 12-Ora-241 – 2.1/14.4
12-Ora-73 – 10.34/11.28
12-Ora-5 – 0.0/20.5
11-SD-5 – 71.3/72.4

Project ID: 1217000087
EA: 12-0Q680K

From: Maile Kop
Agent/ROW Engineering Analyst
Overland, Pacific & Cutler

Dave Speirs
Project Manager
HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 12 – Build Idea 12 (ID 12) adds I-5 high-occupancy/toll (HOT) lanes from I-405 to San Diego County. The project is located primarily within the cities of Laguna Hills, Mission Viejo, Laguna Niguel, San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Rail, Flood Control, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No

Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>150-200</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☒ Yes	☐ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☐ No	☒ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

Capital Costs-Phase 9

☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

Capital Costs-Phase 4

☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0***The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.***DRAFT**

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs \$ \$1,000,001-\$2,500,000
(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

- | | |
|--|---|
| ☐ \$0-\$100,000 | ☒ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

- | | |
|--|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☒ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 3 Support Costs (CON)

Tasks: 270.25, 285

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☒ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Schedule

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT G-6:
ALTERNATIVE 9 – CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY
COMPONENT

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

**K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY
Alternative 9 – Build Idea 9 (ID9)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler	Dave Speirs Project Manager HNTB Corporation	

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 9 – Build Idea 9 (ID 9) connects Ortega Highway and Antonio Parkway to Avery Parkway and SR 73. The project is located primarily within the cities of San Juan Capistrano, Laguna Niguel, Mission Viejo and Rancho Mission Viejo. Impacted properties generally consist of Commercial, Residential, Government, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>100-150</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☐ Yes	☒ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☒ No	☐ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0*

**The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.*

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs \$ \$500,001-\$1,000,000
(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☒ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☒ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 3 Support Costs (CON)

Tasks: 270.25, 285

☐ \$0-\$100,000☒ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000**Schedule**

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-7:
ALTERNATIVE 18 – CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 18 – Build Idea 18 (ID18)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler		Dave Speirs Project Manager HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 18 – Build Idea 18 (ID 18) connects SR 241 to SR 73 and extends Crown Valley Parkway to SR 241. The project is located primarily within the cities of San Juan Capistrano, Laguna Niguel, Mission Viejo and Rancho Mission Viejo. Impacted properties generally consist of Commercial, Residential, Government, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☐ 51-100 ☒ >100

Right of Way Requirements:

Number of Fee Parcels <u>100-150</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☐ Yes	☒ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☒ No	☐ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

Capital Costs-Phase 9

☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

Capital Costs-Phase 4

☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0***The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.***DRAFT**

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs \$ \$500,001-\$1,000,000
(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☒ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

☐ \$0-\$100,000☐ \$100,001-\$250,000☐ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☒ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000Phase 3 Support Costs (CON)

Tasks: 270.25, 285

☐ \$0-\$100,000☐ \$100,001-\$250,000☒ \$250,001-\$500,000☐ \$500,001-\$1,000,000☐ \$1,000,001-\$2,500,000☐ \$2,500,001-\$5,000,000☐ \$5,000,001-\$10,000,000☐ \$10,000,001-\$25,000,000☐ \$25,000,001-\$100,000,000☐ >\$100,000,000**Schedule**

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

(Provide a description of any other specific assumptions and limiting conditions. Also document all known risks to future cost, scope, schedule or changes in performance for inclusion in the project Risk Register.)

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT G-8:
ALTERNATIVE 21 – CONCEPTUAL COST ESTIMATES RIGHT-OF-WAY
COMPONENT**

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**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 1 of 4

K PHASE CONCEPTUAL COST ESTIMATE FORM - RIGHT OF WAY**Alternative 21 – Build Idea 21 (ID21)******A RIGHT OF WAY DATA SHEET WILL NEED TO BE COMPLETED FOR SUBSEQUENT PHASES****

To:	Farid Nowshiravan Project Manager Caltrans District 12	Date:	August 2018
		Dist-Co-Rte-PM:	12-Ora-241 – 2.1/14.4 12-Ora-73 – 10.34/11.28 12-Ora-5 – 0.0/20.5 11-SD-5 – 71.3/72.4
		Project ID:	1217000087
		EA:	12-0Q680K
From:	Maile Kop Agent/ROW Engineering Analyst Overland, Pacific & Cutler		Dave Speirs Project Manager HNTB Corporation

The Conceptual Cost Estimate Request was received for the above-referenced project with a requested completion date of (August 2018).

Scope of the Right of Way

Description of Required Right of Way: Alternative 21 – Build Idea 21 (ID21) consists of extending Los Patrones Parkway and adding high-occupancy/toll (HOT) lanes to the I-5. The second corridor runs from the SR 73/I-5 southward to Basilone Road, consisting of north and south bound widening of the I-5. The project is located primarily within the cities of Mission Viejo, Laguna Niguel, Dana Point, San Juan Capistrano and San Clemente. Impacted properties generally consist of Commercial, Residential, Government, Railroad, Vacant and Open Space property types.

Right of Way Required: ☒ Yes ☐ No
 Number of Total Parcels: ☐ 1-10 ☐ 11-25 ☐ 26-50 ☒ 51-100 ☐ >100

Right of Way Requirements:

Number of Fee Parcels <u>50-100</u>	Total Fee Area <u>TBD</u>
Number of Permanent Easements <u>50-100</u>	Total Permanent Easement Area <u>TBD</u>
Number of Temporary Easements <u>TBD</u>	Total Temporary Easement Area <u>TBD</u>
Length of Term Required for Temporary Easements <u>TBD</u>	
Number of Excess Parcels/Other <u>TBD</u>	

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

EXHIBIT

4-EX-8 (REV 10/2017)

Page 2 of 4

USA Lands:	☐ Yes	☒ No	☐ Unknown	
BIA Lands:	☐ Yes	☒ No	☐ Unknown	
Displaced Persons/Businesses:	☒ Yes	☐ No	☐ Unknown	Number of displacees <u>TBD</u>
Demolition/Clearance Required:	☒ Yes	☐ No	☐ Unknown	Number of demos <u>TBD</u>
Railroad Involvement:	☒ Yes	☐ No	☐ Unknown	
C&M Agreement Needed	☐ Yes	☐ No	☒ Unknown	
Utility Involvement:	☒ Yes	☐ No	☐ Unknown	Number of Utilities in Area <u>5-10</u>
UT Relocations Anticipated:	☒ Yes	☐ No	☐ Unknown	
Potholing Needed:	☒ Yes	☐ No	☐ Unknown	
Project Public Meetings:	☒ Yes	☐ No	☐ Unknown	Number of Meetings <u>TBD</u>
Permits To Enter ENV/ENG:	☐ Yes	☐ No	☒ Unknown	Number of Permits <u></u>
Environmental Mitigation:	☐ Yes	☐ No	☒ Unknown	Type <u></u>
Outdoor Advertising Signs:	☐ Yes	☐ No	☒ Unknown	Number of Signs <u></u>

Cost Estimates

Estimate reflects Right of Way only and does not include any capital costs for Right of Way Engineering/Land Surveys.

<u>Capital Costs-Phase 9</u>	☐ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☒ >\$100,000,000

<u>Capital Costs-Phase 4</u>	☒ \$0-\$100,000	☐ \$2,500,001-\$5,000,000
	☐ \$100,001-\$250,000	☐ \$5,000,001-\$10,000,000
	☐ \$250,001-\$500,000	☐ \$10,000,001-\$25,000,000
	☐ \$500,001-\$1,000,000	☐ \$25,000,001-\$100,000,000
	☐ \$1,000,001-\$2,500,000	☐ >\$100,000,000

Phase 9 - Recommended R/W Capital Cost for Programming

\$ >\$100,000,000

Phase 4 - Recommended R/W Capital Cost for Programming

\$ \$0*

**The preliminary nature of the analysis does not provide a number for this cost at this time and will be addressed at future phases.*

DRAFT

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

Estimate reflects Right of Way only and does not include any support costs for Right of Way Engineering/Land Surveys.

Phase 0 Support Costs \$ \$500,001-\$1,000,000
(PA&ED)

Tasks: 100.10, 160.10, 160.30,
165.10, 170.10, 170.15, 170.25,
175.10, 180.05, 180.10

Phase 1 Support Costs (PS&E)

Tasks: 100.15, 185.05, 185.20,
185.25, 205.10, 205.15, 205.25,
235.05, 235.10, 255

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☒ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 2 Support Costs (RW)

Tasks: 100.25, 195.40, 195.45,
200.15, 200.20, 200.25, 200.30,
225.50, 225.60, 225.65, 225.70,
225.75, 225.80, 245.50, 245.60,
245.65, 245.70, 245.75, 245.80

- | | |
|--|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☐ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☒ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Phase 3 Support Costs (CON)

Tasks: 270.25, 285

- | | |
|---|---|
| ☐ \$0-\$100,000 | ☐ \$2,500,001-\$5,000,000 |
| ☒ \$100,001-\$250,000 | ☐ \$5,000,001-\$10,000,000 |
| ☐ \$250,001-\$500,000 | ☐ \$10,000,001-\$25,000,000 |
| ☐ \$500,001-\$1,000,000 | ☐ \$25,000,001-\$100,000,000 |
| ☐ \$1,000,001-\$2,500,000 | ☐ >\$100,000,000 |

Schedule

Right of Way will require a minimum of 24 months to deliver a Right of Way Certification once final right of way requirements and mapping have been received, necessary environmental clearances have been obtained, and required freeway agreements have been approved. This schedule is based on a Right of Way Certification #1 with an anticipated cert date of 12/1/2025.

Areas of Concern

Potential areas of concern are noted below:

Level of detail is too high to define specific concerns at this time.

Assumptions and Limiting Conditions/Risks

This estimate is based on the following assumptions and limiting conditions and documented project risks:

**CONCEPTUAL COST ESTIMATE FORM -
RIGHT OF WAY**

(Form #)

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The Scope of the Right of Way analysis includes applicable:

- Acquisition Costs (including any Excess Lands, Damages, Mitigation, etc.)
- Utility Relocation
- Railroad Involvement
- Relocation Assistance
- Clearance/Demolition
- Permits
- Title and Escrow Fees
- Construction Contract Work

Capital Costs are based on eminent domain estimating and appraisal methodologies and current market information.

Support Costs are based on district workload estimating tools and historical data from previous similar projects.

Escalation and Contingency Rates were applied based on the proposed project schedule and previous district experience to account for changes in market conditions and other unanticipated project-related costs.

Check as applicable:

- ☐ A field review was not performed as part of this estimate.
- ☒ Mapping received did not provide sufficient detail to determine the limits of the right of way requirements and/or to determine damages to the remainder parcels impacted by the project.
- ☒ Additional right of way requirements may be anticipated but are not defined due to the preliminary nature of the early design requirements.
- ☐ We have determined that there are no right of way functional involvements in the proposed project at this time as currently designed.
- ☐ Utility lead time begins after PA&ED is met and we have received conflict maps.
- ☐ Right of Way certification is at risk. The current schedule does not provide Right of Way with sufficient lead time.

Contact

For further information regarding this estimate, please contact person below:

Title: Maile Kop
Phone Number: (562) 304-2000

David Speirs
(949) 754-3400

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**ATTACHMENT H:
RISK REGISTER**

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LEVEL 1 - RISK REGISTER				Project Name: South County Traffic Relief Effort			DIST- EA	12-0Q680K	Project Manager	David Speirs			
Risk Identification							Risk Rating		Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Priority Rating	Rationale for Rating	Strategy	Response Actions		Risk Owner	Updated
Active	1	Threat	PM	Bond Funding	As a result of the economy, bond sales could be below projected amounts, insufficient to fund the project		Medium		Mitigate	- Rigorously identify and mitigate project risks to increase investor confidence - If required, reduce project scope and increase project schedule to use cash on hand to fund project costs - Raise tolls earlier than expected		Owner	5/11/2017
Active	2	Threat	Construction	Construction Cost	As a result of future economic conditions, inflation may occur which could cause the cost of construction to exceed the project budget		Low		Mitigate	- Preliminary design phase included in contract to identify and quantify work items and unit prices prior to final design and construction. - Performed independent cost evaluation by CDM and cost reasonableness evaluation in conjunction with Caltrans and FHWA. Additional cost assessment to be performed by CEM prior to construction.		PM	5/11/2017
Active	3	Threat	Environmental	Demographic and Economic Changes	As a result of demographic and economic changes, toll revenue could be less than expected.		Low		Mitigate	- Traffic and revenue study prepared to project toll revenue for the facility. - Report incorporates demographic and economic characteristics of the region and a sensitivity analysis of toll rates and transaction volumes. - Effects of recession and conservative growth assumptions included in study.		PM	5/11/2017
Active	4	Threat	Design	Las Patrones Parkway	Las Patrones Parkway is not constructed by RMV		Low	Parkway needs to be constructed in order to provide connectivity to existing SR 241	Accept	since this work is currently underway, this risk is low. Monitor completion of construction of open to public		Owner	5/11/2017
Active	5	Threat	Environmental	Public Opposition	As a result of opposition by past groups on SR 241 completion, it is expected that public opposition would occur.		High		Mitigate	- Increased outreach to these groups to identify updates to design, construction, and mitigation features that minimize and avoid sensitive areas and doesn't preclude any identified alternatives - Monitoring correspondence with members and elected officials		PM	5/24/2018
Active	6	Threat	Environmental	Stakeholders	New stakeholders emerge		Medium		Mitigate	Constant contact with local and regional elected officials and community groups to proactively identify and educate stakeholders		PM	5/11/2017
Active	7	Threat	Environmental	Environmental Permits	Changes to environmental rules or requirements, including new permits		Low		Mitigate	Establish contingency for possible changes in mitigations and/or construction requirements		EIR Person	5/11/2017
Active	8	Threat	Environmental	Design Changes	Design change outside limits of environmental document study limits		Low		Mitigate	- Preliminary design phase of design-build contract to ensure that environmental document limits capture probable impact areas - Environmental clearance limits include contingency areas - Establish contingency for additional clearance document work		EIR Person	5/11/2017

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LEVEL 1 - RISK REGISTER				Project Name: South County Traffic Relief Effort			DIST- EA	12-0Q680K	Project Manager	David Speirs			
Risk Identification							Risk Rating		Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Priority Rating	Rationale for Rating	Strategy	Response Actions		Risk Owner	Updated
Active	9	Threat	Environmental	Resource Agency Coordination	Changes during design and/or construction require additional coordination with resource agencies		Medium		Mitigate	- Importance of design and construction within permitted limits and conditions has been conveyed to the Contractor - Continued communication of project status with resource agencies during final design and construction - Establish contingency for possible changes in mitigations and/or construction requirements		EIR Person	5/11/2017
Active	10	Threat	Environmental	Permit Approvals	Delay in permit approvals		Medium		Mitigate	- Identified County nexus to facilitate coordination - Close coordination with County and Caltrans to obtain timely review, comment adjudication, and permit approvals		EIR Person	5/11/2017
Active	11	Threat	Environmental	Environmental Clearance	Clearance Document Dispute/Litigation		Low		Mitigate	- Obtain concurrence of involved agencies prior to public release of clearance documents - Obtain all permits and approvals prior to Board action - Establish contingency for additional clearance document work		EIR Person	5/11/2017
Active	12	Threat	Environmental	Schedule Delays	Possible schedule delays due to review times by the resource agencies		Low		Mitigate	- Conduct partnering meetings with County and Caltrans to engage both agencies and establish approval processes		EIR Person	5/11/2017
Active	13	Threat	ROW	Right of Way Needs	Caltrans may require additional right-of-way		Low		Mitigate	- Conduct joint meeting between County and Caltrans to determine right of way requirements of both agencies.		ROW Person	5/11/2017
Active	14	Threat	Design	Design Criteria	Caltrans acceptance of design criteria and preliminary design		Medium		Mitigate	- Review of preliminary and final reports and design plans for conceptual comments and concurrence routed through Caltrans' functional units to ensure compliance with design, maintenance, environmental protection, and operational requirements. - Documentation of review and concurrence		Design Manager	5/11/2017
Active	15	Threat	Design	New or revised design standards	As a result of revisions to the Caltrans Highway Design Manual, standards followed to design the improvements could change or additional requirements added which would lead to redesign of roadway elements.		Medium		Avoid	- Document date of start of final design. - Project will be defined as "in construction" for intents and purposes of policy implementation - Stay notified of standard changes and new DIBs and work with Caltrans to identify changes to design standards early and incorporate into project		Design Manager	1/30/2018
Active	16	Threat	Design	Permit Conditions	Permit conditions change project design/construction		Low		Avoid	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred		PM	5/11/2017

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LEVEL 1 - RISK REGISTER				Project Name: South County Traffic Relief Effort			DIST- EA	12-0Q680K	Project Manager	David Speirs			
Risk Identification							Risk Rating		Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Priority Rating	Rationale for Rating	Strategy	Response Actions		Risk Owner	Updated
Active	17	Threat	Design	Final Design	Refinements made in Final design may impact other disciplines		Medium		Mitigate	- Working on value engineering in preliminary design to identify geometrics as early as possible - Refinements limited to environmentally cleared areas - Coordinate and communicate revisions concept to all discipline leads for input		Design Manager	5/11/2017
Active	18	Threat	ROW	Utility Relocations	Electrical utility companies may require long lead times for relocation of existing high-voltage overhead lines		Medium		Mitigate	Establish early coordination with affected utility companies		PM	5/11/2017
Active	19	Threat	Design	Adjacent Projects Coordination	Adjacent projects could impact the design and require re-design, cause schedule delay, etc.		Medium		Mitigate	Review concurrent projects to limit impacts with specific focus on utility coordination, work area overlap, and duplication of design or funding efforts		PM	5/11/2017
Active	20	Threat	Design	Constructability	Constructability of the project		Low		Mitigate	- Use of design-build contract - Constructability reviews, with Agency and Caltrans, included in contract for design prior to ready for construction plans - Define staging and storage areas during design		PM	5/11/2017
Active	21	Threat	Design	Geotechnical Data	Unable to gather geotechnical data for design in some locations due to environmental restrictions or access restrictions		Medium		Mitigate	Conservative assumptions made for design. Will refine when access is permitted		Design Manager	5/11/2017
Active	22	Threat	Construction	Maintaining Traffic	Maintaining traffic during construction when crossing over existing roadways.		Medium		Mitigate	The construction of bridges and interchange ramps will be carefully staged to avoid traffic inconvenience.		Design Manager	5/11/2017
Active	23	Threat	Construction	Protected Species	New protected species (regulated or discovered)		Low		Mitigate	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred		PM	5/11/2017
Active	24	Threat	Construction	SWPP	Changes in SWPPP and RWQCB requirements could add construction requirements and increase cost		Low		Mitigate	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred		EIR Person	5/11/2017
Active	25	Threat	Construction	Weather	As a result of an extremely wet winter, weather delays my occur which would reduce working delays and increse costs for labor, materials and equipment.		Low		Mitigate	Determined reasonable expectation of weather delays for project site and build into schedule and cost		PM	5/11/2017
Active	26	Threat	Construction	Buried Objects	Buried objects (utilities, paleo, arch, abandoned)		Medium		Mitigate	- Establish chain of response - Ensure contract includes compensation for extra costs incurred		PM	5/11/2017
Active	27	Threat	Construction	Environmental Conditions	Environmental Conditions (e.g. noise, nesting birds, etc.)		Low		Mitigate	- Identify requirements and mitigations in clearance documents and permits - Communicate to all working on job at all levels - Requirements built into schedule and cost		PM	5/11/2017
Active	28	Threat	Construction	Materials	Availability of special components or materials		Low		Mitigate	Identify long lead time items & consider early procurement for these items.		PM	5/11/2017

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LEVEL 1 - RISK REGISTER				Project Name: South County Traffic Relief Effort			DIST- EA	12-0Q680K	Project Manager	David Speirs			
Risk Identification							Risk Rating		Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Priority Rating	Rationale for Rating	Strategy	Response Actions		Risk Owner	Updated
Active	29	Threat	Construction	Force Majeure	Force Majeure during construction Damage during construction due to wind and seismic		Low		Mitigate	Design for seismic while under construction; Include Builder's Risk on insurance program; Develop disaster response policies		PM	5/11/2017
Active	30	Threat	Organizational	Route Adoption	Route adoption into the state highway system		Low		Avoid	Maintain management control while under CTC, Caltrans and County oversight		PM	5/11/2017
Active	31	Threat	Organizational	Agency lead	TCA is assuming to be lead agency for AAA of contract		Low		Avoid	Partnering meeting with all parties to verify lead agency for construction		Owner	5/11/2017
Active	32	Threat	Organizational	FTIP/RT completion dates	FTIP and RTP listings completion date		Low		Avoid	- Contractual obligation to be open to traffic by listing date - Identify early action design and construction elements to be performed by the Contractor.		Owner	5/11/2017
Active	33	Threat	Design	Survey File	Inaccuracies or incomplete information in the survey file could lead to rework of the design.		Medium		Mitigate	Check available survey information against project limits to determine if coverage is sufficient. Have survey data independently checked to confirm accuracy.		PM	5/11/2017
Active	34	Threat	Construction	Buried Objects	Unanticipated buried man-made objects uncovered during construction require removal and disposal resulting in		Medium		Accept	Include a Supplemental Work item to cover this risk.		PM	5/11/2017
Active	35	Threat	Construction	Unidentified utilities	Construction may impact unidentified utilities		Medium		Mitigate	Include a Supplemental Work item to cover this risk.		PM	5/11/2017
Active	36	Threat	Construction	Electrical conflicts	Electrical power lines not identified as in conflict with construction		Medium		Mitigate	Include a Supplemental Work item to cover this risk.		PM	5/11/2017
Active	37	Threat	Construction	Fossils	Unexpected paleontology findings		Medium		Mitigate	Include a Supplemental Work item to cover this risk.		PM	5/11/2017
Active	38	Threat	Organizational	Funding	Funding unavailable for right of way or construction		Low		Mitigate	TCA will work to secure the necessary funding.		Owner	5/11/2017
Active	39	Threat	R/W	Delay of R/W Acquisition	Parcels and businesses impacted by the project, may have difficulty in processing all the acquisitions, permanent and temporary construction easements, etc. in time to meet the schedule, which could delay start of construction by up to one year.		High		Mitigate	Determine number of staff required to handle workload based on the total time to complete and the number of days to accomplish the task (per schedule)		R/W Person	1/30/2018
Active	40	Threat	Construction	Hazardous Materials	Hazardous materials encountered during construction will require an on-site storage area and potential		Medium		Accept	Ensure storage space will be available		PM	5/11/2017
Active	41	Threat	R/W	Delay of R/W Acquisition	Property acquisitions and property owners reluctance to sell and/or opposition to the project, may have to use the condemnation process to acquire R/W, which could delay start of construction by up to two years, increasing construction costs and extend the time for COS.		High		Mitigate	Perform public outreach, show benefit to the public, show project is for the common good of the public.		R/W Person	1/30/2018

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LEVEL 1 - RISK REGISTER				Project Name: South County Traffic Relief Effort			DIST- EA	12-0Q680K	Project Manager	David Speirs			
Risk Identification							Risk Rating		Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Priority Rating	Rationale for Rating	Strategy	Response Actions		Risk Owner	Updated
Active	42	Threat	R/W	Additional R/W	Due to the complex nature of the staging, additional right of way or construction easements may be required to complete the work as contemplated, resulting in additional cost to the project.		Low		Mitigate	Re-sequence the work as may be required.		PM	1/30/2018
Active	43	Threat	Design	Design Exception Approval	As a result of Caltrans not approving design exceptions, redesign of the Project to eliminate the exceptions may		Low		Mitigate	Review design exceptions with Caltrans and document in the Project Report		Design Manager	1/30/2018
Active	44	Threat	Design	Proposed 230KV transmission line	proposed 230 KV overhead transmission line could impact the project costs due to potential for relocation if build prior to this project		Low		Mitigate	recommend ongoing coordination with SDG&E and interface during PA/ED so that we can try to avoid any conflicts as the project alternatives are being developed			1/30/2018
Active	45	Threat	PM	Acceptance of Toll Facility	Public Opposition to a Toll Facility		Medium		Accept	- Increased outreach to define concerns for each identified alternative - Monitoring correspondence with members and elected officials			1/30/2018
Active	46	Threat	Environmental	Long Range Regional Models	Long Range Transportation Models may depict lower volumes		Medium		Mitigate	Review of traffic models with agencies for consistency with long term growth in the County			1/30/2018
Active	47	Threat	PM	Consistency with OCTA Measure M	Funding should be identified for the project		Low		Mitigate	ongoing coordination with OCTA to identify the funding allocated and definition of the project			1/30/2018

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LEVEL 2 - RISK REGISTER				Project Name:		South County Traffic Relief Effort		DIST- EA	12-0Q680K	Project Manager	David Speirs						
Risk Identification							Risk Assessment						Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Probability	Cost Impact	Cost Score	Time Impact	Time Score	Rationale	Strategy	Response Actions	Risk Owner	Updated	
Active	1	Threat	PM	Bond Funding	As a result of the economy, bond sales could be below projected amounts, insufficient to fund the project		3-Moderate	4 -Moderate	12	4 -Moderate	12		Mitigate	- Rigorously identify and mitigate project risks to increase investor confidence - If required, reduce project scope and increase project schedule to use cash on hand to fund project costs - Raise tolls earlier than expected	Owner	5/11/2017	
Active	2	Threat	Construction	Construction Cost	As a result of future economic conditions, inflation may occur which could cause the cost of construction to exceed the project budget		2-Low	4 -Moderate	8	1 -Very Low	2		Mitigate	- Preliminary design phase included in contract to identify and quantify work items and unit prices prior to final design and construction. - Performed independent cost evaluation by CDM and cost reasonableness evaluation in conjunction with Caltrans and FHWA. Additional cost assessment to be performed by CEM prior to construction.	PM	5/11/2017	
Active	3	Threat	Environmental	Demographic and Economic Changes	As a result of demographic and economic changes, toll revenue could be less than expected.		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	- Traffic and revenue study prepared to project toll revenue for the facility. - Report incorporates demographic and economic characteristics of the region and a sensitivity analysis of toll rates and transaction volumes. - Effects of recession and conservative growth assumptions included in study.	PM	5/11/2017	
Active	4	Threat	Design	Las Patrones Parkway	Las Patrones Parkway is not constructed by RMV		2-Low	2 -Low	4	1 -Very Low	2		Accept	since this work is currently underway, this risk is low. Monitor completion of construction of open to public	Owner	5/11/2017	
Active	5	Threat	Environmental	Public Opposition	As a result of opposition by past groups on SR 241 completion, it is expected that public opposition would occur.		4-High	4 -Moderate	16	8 -High	32		Mitigate	- Increased outreach to these groups to identify updates to design, construction, and mitigation features that minimize and avoid sensitive areas and doesn't preclude any identified alternatives - Monitoring correspondence with members and elected officials	PM	5/24/2018	
Active	6	Threat	Environmental	Stakeholders	New stakeholders emerge		3-Moderate	2 -Low	6	2 -Low	6		Mitigate	Constant contact with local and regional elected officials and community groups to proactively identify and educate stakeholders	PM	5/11/2017	
Active	7	Threat	Environmental	Environmental Permits	Changes to environmental rules or requirements, including new permits		2-Low	2 -Low	4	2 -Low	4		Mitigate	Establish contingency for possible changes in mitigations and/or construction requirements	EIR Person	5/11/2017	
Active	8	Threat	Environmental	Design Changes	Design change outside limits of environmental document study limits		2-Low	4 -Moderate	8	4 -Moderate	8		Mitigate	- Preliminary design phase of design-build contract to ensure that environmental document limits capture probable impact areas - Environmental clearance limits include contingency areas - Establish contingency for additional clearance document work	EIR Person	5/11/2017	
Active	9	Threat	Environmental	Resource Agency Coordination	Changes during design and/or construction require additional coordination with resource agencies		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	- Importance of design and construction within permitted limits and conditions has been conveyed to the Contractor - Continued communication of project status with resource agencies during final design and construction - Establish contingency for possible changes in mitigations and/or construction requirements	EIR Person	5/11/2017	
Active	10	Threat	Environmental	Permit Approvals	Delay in permit approvals		2-Low	2 -Low	4	4 -Moderate	8		Mitigate	- Identified County nexus to facilitate coordination - Close coordination with County and Caltrans to obtain timely review, comment adjudication, and permit approvals	EIR Person	5/11/2017	

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LEVEL 2 - RISK REGISTER				Project Name:		South County Traffic Relief Effort		DIST- EA	12-0Q680K	Project Manager	David Speirs						
Risk Identification							Risk Assessment						Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Probability	Cost Impact	Cost Score	Time Impact	Time Score	Rationale	Strategy	Response Actions	Risk Owner	Updated	
Active	11	Threat	Environmental	Environmental Clearance	Clearance Document Dispute/Litigation		3-Moderate	2 -Low	6	8 -High	24		Mitigate	- Obtain concurrence of involved agencies prior to public release of clearance documents - Obtain all permits and approvals prior to Board action - Establish contingency for additional clearance document work	EIR Person	5/11/2017	
Active	12	Threat	Environmental	Schedule Delays	Possible schedule delays due to review times by the resource agencies		3-Moderate	2 -Low	6	4 -Moderate	12		Mitigate	- Conduct partnering meetings with County and Caltrans to engage both agencies and establish approval processes	EIR Person	5/11/2017	
Active	13	Threat	ROW	Right of Way Needs	Caltrans may require additional right-of-way		3-Moderate	4 -Moderate	12	1 -Very Low	3		Mitigate	- Conduct joint meeting between County and Caltrans to determine right of way requirements of both agencies.	ROW Person	5/11/2017	
Active	14	Threat	Design	Design Criteria	Caltrans acceptance of design criteria and preliminary design		3-Moderate	2 -Low	6	8 -High	24		Mitigate	- Review of preliminary and final reports and design plans for conceptual comments and concurrence routed through Caltrans' functional units to ensure compliance with design, maintenance, environmental protection, and operational requirements. - Documentation of review and concurrence	Design Manager	5/11/2017	
Active	15	Threat	Design	New or revised design standards	As a result of revisions to the Caltrans Highway Design Manual, standards followed to design the improvements could change or additional requirements added which would lead to redesign of roadway elements.		3-Moderate	4 -Moderate	12	8 -High	24		Avoid	- Document date of start of final design. - Project will be defined as "in construction" for intents and purposes of policy implementation - Stay notified of standard changes and new DIBs and work with Caltrans to identify changes to design standards early and incorporate into project	Design Manager	1/30/2018	
Active	16	Threat	Design	Permit Conditions	Permit conditions change project design/construction		2-Low	2 -Low	4	4 -Moderate	8		Avoid	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred	PM	5/11/2017	
Active	17	Threat	Design	Final Design	Refinements made in Final design may impact other disciplines		2-Low	2 -Low	4	8 -High	16		Mitigate	- Working on value engineering in preliminary design to identify geometrics as early as possible - Refinements limited to environmentally cleared areas - Coordinate and communicate revisions concept to all discipline leads for input	Design Manager	5/11/2017	
Active	18	Threat	ROW	Utility Relocations	Electrical utility companies may require long lead times for relocation of existing high-voltage overhead lines		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	Establish early coordination with affected utility companies	PM	5/11/2017	
Active	19	Threat	Design	Adjacent Projects Coordination	Adjacent projects could impact the design and require re-design, cause schedule delay, etc.		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	Review concurrent projects to limit impacts with specific focus on utility coordination, work area overlap, and duplication of design or funding efforts	PM	5/11/2017	
Active	20	Threat	Design	Constructability	Constructability of the project		2-Low	4 -Moderate	8	8 -High	16		Mitigate	- Use of design-build contract - Constructability reviews, with Agency and Caltrans, included in contract for design prior to ready for construction plans - Define staging and storage areas during design	PM	5/11/2017	
Active	21	Threat	Design	Geotechnical Data	Unable to gather geotechnical data for design in some locations due to environmental restrictions or access restrictions		2-Low	2 -Low	4	2 -Low	4		Mitigate	Conservative assumptions made for design. Will refine when access is permitted	Design Manager	5/11/2017	
Active	22	Threat	Construction	Maintaining Traffic	Maintaining traffic during construction when crossing over existing roadways.		3-Moderate	2 -Low	6	4 -Moderate	12		Mitigate	The construction of bridges and interchange ramps will be carefully staged to avoid traffic inconvenience.	Design Manager	5/11/2017	
Active	23	Threat	Construction	Protected Species	New protected species (regulated or discovered)	t	2-Low	2 -Low	4	1 -Very Low	2		Mitigate	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred	PM	5/11/2017	

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LEVEL 2 - RISK REGISTER				Project Name:		South County Traffic Relief Effort		DIST- EA	12-0Q680K	Project Manager	David Speirs						
Risk Identification							Risk Assessment						Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Probability	Cost Impact	Cost Score	Time Impact	Time Score	Rationale	Strategy	Response Actions	Risk Owner	Updated	
Active	24	Threat	Construction	SWPP	Changes in SWPPP and RWQCB requirements could add construction requirements and increase cost		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	- Establish contingency for possible changes in mitigations and/or construction requirements - Ensure contract includes compensation for extra costs incurred	EIR Person	5/11/2017	
Active	25	Threat	Construction	Weather	As a result of an extremely wet winter, weather delays my occur which would reduce working delays and incese costs for labor, materials and equipment.		2-Low	2 -Low	4	4 -Moderate	8		Mitigate	Determined reasonable expectation of weather delays for project site and build into schedule and cost	PM	5/11/2017	
Active	26	Threat	Construction	Buried Objects	Buried objects (utilities, paleo, arch, abandoned)		3-Moderate	4 -Moderate	12	4 -Moderate	12		Mitigate	- Establish chain of response - Ensure contract includes compensation for extra costs incurred	PM	5/11/2017	
Active	27	Threat	Construction	Environmental Conditions	Environmental Conditions (e.g. noise, nesting birds, etc.)		3-Moderate	4 -Moderate	12	4 -Moderate	12		Mitigate	- Identify requirements and mitigations in clearance documents and permits - Communicate to all working on job at all levels - Requirements built into schedule and cost	PM	5/11/2017	
Active	28	Threat	Construction	Materials	Availability of special components or materials		2-Low	2 -Low	4	16 - Very High	32		Mitigate	Identify long lead time items & consider early procurement for these items.	PM	5/11/2017	
Active	29	Threat	Construction	Force Majeure	Force Majeure during construction Damage during construction due to wind and seismic		2-Low	4 -Moderate	8	4 -Moderate	8		Mitigate	Design for seismic while under construction; Include Builder's Risk on insurance program; Develop disaster response policies	PM	5/11/2017	
Active	30	Threat	Organizational	Route Adoption	Route adoption into the state highway system		2-Low	2 -Low	4	1 -Very Low	2		Avoid	Maintain management control while under CTC, Caltrans and County oversight	PM	5/11/2017	
Active	31	Threat	Organizational	Agency lead	TCA is assuming to be lead agency for AAA of contract		2-Low	2 -Low	4	1 -Very Low	2		Avoid	Partnering meeting with all parties to verify lead agency for construction	Owner	5/11/2017	
Active	32	Threat	Organizational	FTIP/RT completion dates	FTIP and RTP listings completion date		2-Low	2 -Low	4	1 -Very Low	2		Avoid	- Contractual obligation to be open to traffic by listing date - Identify early action design and construction elements to be performed by the Contractor.	Owner	5/11/2017	
Active	33	Threat	Design	Survey File	Inaccuracies or incomplete information in the survey file could lead to rework of the design.		3-Moderate	4 -Moderate	12	4 -Moderate	12		Mitigate	Check available survey information against project limits to determine if coverage is sufficient. Have survey data independently checked to confirm accuracy.	PM	5/11/2017	
Active	34	Threat	Construction	Buried Objects	Unanticipated buried man-made objects uncovered during construction require removal and disposal resulting in additional costs.		3-Moderate	2 -Low	6	2 -Low	6		Accept	Include a Supplemental Work item to cover this risk.	PM	5/11/2017	
Active	35	Threat	Construction	Unidentified utilities	Construction may impact unidentified utilities		2-Low	4 -Moderate	8	4 -Moderate	8		Mitigate	Include a Supplemental Work item to cover this risk.	PM	5/11/2017	
Active	36	Threat	Construction	Electrical conflicts	Electrical power lines not identified as in conflict with construction		3-Moderate	16 - Very High	48	16 - Very High	48		Mitigate	Include a Supplemental Work item to cover this risk.	PM	5/11/2017	
Active	37	Threat	Construction	Fossils	Unexpected paleontology findings		3-Moderate	2 -Low	6	4 -Moderate	12		Mitigate	Include a Supplemental Work item to cover this risk.	PM	5/11/2017	
Active	38	Threat	Organizational	Funding	Funding unavailable for right of way or construction		2-Low	2 -Low	4	1 -Very Low	2		Mitigate	TCA will work to secure the necessary funding.	Owner	5/11/2017	
Active	39	Threat	R/W	Delay of R/W Acquisition	Parcels and businesses impacted by the project, may have difficulty in processing all the acquisitions, permanent and temporary construction easements, etc. in time to meet the schedule, which could delay start of construction by up to one year.		3-Moderate	4 -Moderate	12	8 -High	24		Mitigate	Determine number of staff required to handle workload based on the total time to complete and the number of days to accomplish the task (per schedule)	R/W Person	1/30/2018	
Active	40	Threat	Construction	Hazardous Materials	Hazardous materials encountered during construction will require an on-site storage area and potential additional costs to dispose		2-Low	4 -Moderate	8	2 -Low	4		Accept	Ensure storage space will be available	PM	5/11/2017	

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LEVEL 2 - RISK REGISTER				Project Name:		South County Traffic Relief Effort		DIST- EA	12-0Q680K	Project Manager	David Speirs						
Risk Identification							Risk Assessment						Risk Response				
Status	ID #	Type	Category	Title	Risk Statement	Current status/assumptions	Probability	Cost Impact	Cost Score	Time Impact	Time Score	Rationale	Strategy	Response Actions	Risk Owner	Updated	
Active	41	Threat	R/W	Delay of R/W Acquisition	Property acquisitions and property owners reluctance to sell and/or opposition to the project, may have to use the condemnation process to acquire R/W, which could delay start of construction by up to two years, increasing construction costs and extend the time for COS.		3-Moderate	8 -High	24	8 -High	24		Mitigate	Perform public outreach, show benefit to the public, show project is for the common good of the public.	R/W Person	1/30/2018	
Active	42	Threat	R/W	Additional R/W	Due to the complex nature of the staging, additional right of way or construction easements may be required to complete the work as contemplated, resulting in additional cost to the project.		2-Low	2 -Low	4	4 -Moderate	8		Mitigate	Re-sequence the work as may be required.	PM	1/30/2018	
Active	43	Threat	Design	Design Exception Approval	As a result of Caltrans not approving design exceptions, redesign of the Project to eliminate the exceptions may occur which would lead to schedule delays, additional right of way acquisition and increased costs.		2-Low	4 -Moderate	8	4 -Moderate	8		Mitigate	Review design exceptions with Caltrans and document in the Project Report	Design Manager	1/30/2018	
Active	44	Threat	Design	Proposed 230KV transmission line	proposed 230 KV overhead transmission line could impact the project costs due to potential for relocation if build prior to this project		2-Low	8 -High	16	4 -Moderate	8		Mitigate	recommend ongoing coordination with SDG&E and interface during PAVED so that we can try to avoid any conflicts as the project alternatives are being developed	Design Manager	1/30/2018	
Active	45	Threat	PM	Acceptance of Toll Facility	Public Opposition to a Toll Facility		3-Moderate	4 -Moderate	12	4 -Moderate	12		Accept	- Increased outreach to define concerns for each identified alternative - Monitoring correspondence with members and elected officials	Owner		
Active	46	Threat	Environmental	Long Range Regional Models	Long Range Transportation Models may depict lower volumes		3-Moderate	2 -Low	6	2 -Low	6		Mitigate	Review of traffic models with agencies for consistency with long term growth in the County	PM		
Active	47	Threat	PM	Consistency with OCTA Measure M	Funding should be identified for the project		2-Low	2 -Low	4	2 -Low	4		Mitigate	ongoing coordination with OCTA to identify the funding allocated and definition of the project	Owner	1/30/2018	

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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT I:
SOUTH COUNTY TRAFFIC RELIEF EFFORT INITIAL SCREENING

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**SOUTH COUNTY TRAFFIC RELIEF
INITIAL SCREENING**

ORANGE COUNTY, CALIFORNIA

LSA

FEHR & PEERS

December 2017

DRAFT

SOUTH COUNTY TRAFFIC RELIEF INITIAL SCREENING

ORANGE COUNTY, CALIFORNIA

Submitted to:

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Project No. TCA1101, Task 18

The logo for LSA, consisting of the letters 'LSA' in a bold, blue, sans-serif font.The logo for Fehr & Peers, featuring the words 'FEHR' and 'PEERS' in a serif font, separated by a stylized green leaf-like graphic.

December 2017

DRAFT

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EXHIBITS

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Table C: Daily Congested Vehicle Miles Traveled in South County 15

LIST OF ABBREVIATIONS AND ACRONYMS

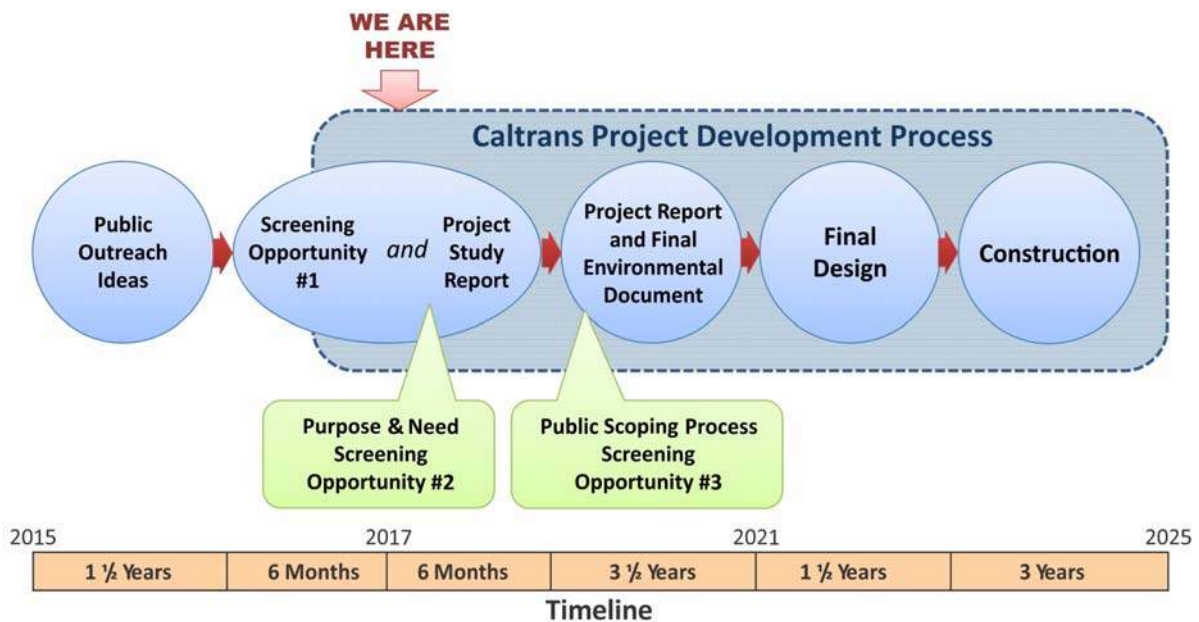
Caltrans	California Department of Transportation
County	Orange County
HOT	high-occupancy toll
HOV	high-occupancy vehicle
I-405	Interstate 405
I-5	Interstate 5
MPAH	Master Plan of Arterial Highways
OCTA	Orange County Transportation Authority
OCTAM	Orange County Transportation Analysis Model
PSR/PDS	Project Study Report/Project Development Support
SCTRIIS	South County Traffic Relief Initial Screening
SOCMWG	South Orange County Mobility Working Group
SR-73	State Route 73
SR-133	State Route 133
SR-241	State Route 241
TCA	Transportation Corridor Agencies
VHD	vehicle hours of delay
VMT	vehicle miles traveled

1.0 INTRODUCTION

The purpose of this South County Traffic Relief Initial Screening (SCTRIS) is to document the initial evaluation of numerous transportation improvement ideas based on their potential ability to provide substantial traffic relief improvements in south Orange County (generally south of Interstate 405 (I-405))(Study Area). While many of the suggested improvements improve mobility in the Study Area, they do not provide substantial improvement. Therefore, this initial screening has been prepared to provide a basis to sort and categorize the improvement ideas that have the potential to achieve substantial benefits, and at the same time identify mobility improvements that could be initiated by other public agencies. This document also notes mobility improvements suggested by the public that are under the purview of other regional transportation agencies.

Starting in January 2016, the Transportation Corridor Agencies (TCA) commenced implementation of a comprehensive community involvement plan to engage elected officials, the Orange County Transportation Authority (OCTA), the California Department of Transportation (Caltrans), business groups, and other interested parties in an effort to identify traffic congestion relief ideas to improve north-south mobility within the Study Area. Between June 2016 and June 2017, three public forums were held to identify traffic congestion relief ideas and to describe the process for development of project alternatives that could provide the needed north-south traffic congestion relief.

The graphic below shows the relationship between the initial screening and the Caltrans Project Development Process. Subsequent to the initial screening, transportation ideas will be evaluated to determine whether they meet Purpose and Need and if they are feasible based on the severity of environmental impacts as well as engineering feasibility, during the Project Study Report (PSR) phase. As depicted in the graphic some work in the PSR phase has been underway focused on data gathering and documentation of existing conditions. Ideas that are screened out in the PSR will not be evaluated in further detail in the environmental document. After public review of the environmental document, the Project Development Team will select a Preferred Alternative, subject to Caltrans approval of the project.



2.0 BACKGROUND

This SCTRIS was prepared to document the initial evaluation of numerous transportation ideas to improve mobility in south Orange County that were identified through public outreach and stakeholder engagement. The mobility problem is described as:

- Excessive northbound and southbound Interstate 5 (I-5) congestion during the morning and evening peak weekday transportation hours, on weekends and whenever there is a collision or other incident that impacts I-5 traffic lanes.
- Difficulty using local arterial streets for accessing and crossing the I-5 (passing over or under) during peak transportation times and periods when there are collisions or other incidents.

TCA implemented a comprehensive community involvement plan with elected officials, business groups, and the general public between January 2016 and June 2017. In addition, the South Orange County Mobility Working Group (SOCMWG), which is made up of south Orange County elected officials who hold a seat on a regional transportation board, was formed and met seven times. SOCMWG defined the mobility problem as follows.

A regional transportation mobility problem exists that:

- *Is most easily seen in I-5 congestion;*
- *Is intermittent;*
- *Is seen in excessive northbound/southbound I-5 congestion weekday a.m. and p.m. peak hours, weekends, or when there is an incident on I-5;*
- *Creates difficulty using local arterials;*
- *Creates safety concerns;*
- *Lacks meaningful transit options as a potential solution; and*
- *Is getting worse with more development*

TCA held three forums to understand the south Orange County communities' priorities as well as receive input regarding regional mobility. The first public forum was held in June 2016. Formal presentations at the forum provided context regarding local, regional, and statewide transportation issues, as well as factors contributing to traffic congestion issues in south Orange County. The public was then asked to identify transportation solutions to address this growing problem. Input from the public and elected officials generated 15 of the ideas evaluated in this initial screening to improve mobility throughout south Orange County and the region. This forum was attended by more than 100 members of the public and online by more than 100 individuals.

The second public forum was held in October 2016. At the forum, more than 200 members of the community reviewed the 15 different transportation ideas, along with both the anticipated benefits and challenges of each of these transportation ideas based on a cursory and preliminary analysis conducted by transportation planners. The public was also provided with a transportation index highlighting how those ideas would negatively or positively affect traffic flow. More than 100 individuals attended online.

The third public forum was held in June 2017. At that forum, more than 600 members of the community attended in person and more than 3,000 people viewed a live stream of the event online. Attendees were provided presentations by transportation agencies (Caltrans, TCA, and OCTA) outlining a process to consider mobility ideas and fully evaluate the ideas through a rigorous technical and environmental process.

As a result of the third public forum and subsequent input, additional ideas were suggested, for a current total of 20 ideas.

3.0 DESCRIPTION OF IDEAS

The initial set of congestion relief ideas was generated from public outreach efforts with stakeholders and elected officials in the Study Area (from the I-405/I-5 interchange to the San Diego County line). The 20 ideas being considered in this initial screening are described below and are shown in Exhibit 1 (Ideas 2, 4, 6, and 8–20) and Exhibit 2 (Ideas 3, 5, and 7).

3.1 IDEA 1: DYNAMIC PRICING OF TCA FACILITIES

This idea proposes setting the toll on TCA facilities at a certain level depending on congestion (i.e., a higher toll would be set during peak periods). Idea 1 is not represented in the exhibits.

3.2 IDEA 2: GREATER TRAIN FREQUENCY

To increase train frequency, it is necessary to construct a second railway track, running from south of the Orange County/San Diego County line to Camino Las Ramblas in Dana Point. North and south of these points, there is an existing double track. Idea 2 would essentially close the double track gap in south Orange County, as shown on Exhibit 1.

3.3 IDEA 3: SYNCHRONIZED LIGHTS ON ARTERIALS

Idea 3 proposes synchronization of traffic lights on arterial highways in south Orange County, as shown on Exhibit 2, to improve mobility during peak periods. Many of these arterials are already synchronized, but require periodic updates.

3.4 IDEA 4: ADD MOBILITY HUBS AT TRAIN STATIONS AND OTHER KEY LOCATIONS

This idea would add mobility hubs, which could include on-demand shuttle services, bicycle parking, pedestrian improvements, electric vehicle charging stations, and mixed-use development, at the existing San Clemente Metrolink Station, San Juan Capistrano Metrolink Station, and Laguna Niguel/Mission Viejo Metrolink Station, and at a new location on Cow Camp Road in Rancho Mission Viejo. Exhibit 1 shows the locations of these mobility hubs.

3.5 IDEA 5: BUILD OUT OF OCTA DISTRICT 5 BIKE FACILITIES

Idea 5 proposes the build out of Orange County District 5 (Aliso Viejo, Dana Point, [portions of] Irvine, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano) bike facilities in OCTA's Commuter Bikeways Strategic Plan (Exhibit 2). This idea also includes legislation to support Neighborhood Electric Vehicles usage of bicycle lanes and mobility hubs to include electric bicycles.

3.6 IDEA 6: WIDEN ORTEGA HIGHWAY TO FOUR LANES IN SAN JUAN CAPISTRANO

This idea proposes widening Ortega Highway from two lanes to four lanes in San Juan Capistrano, as shown on Exhibit 1.

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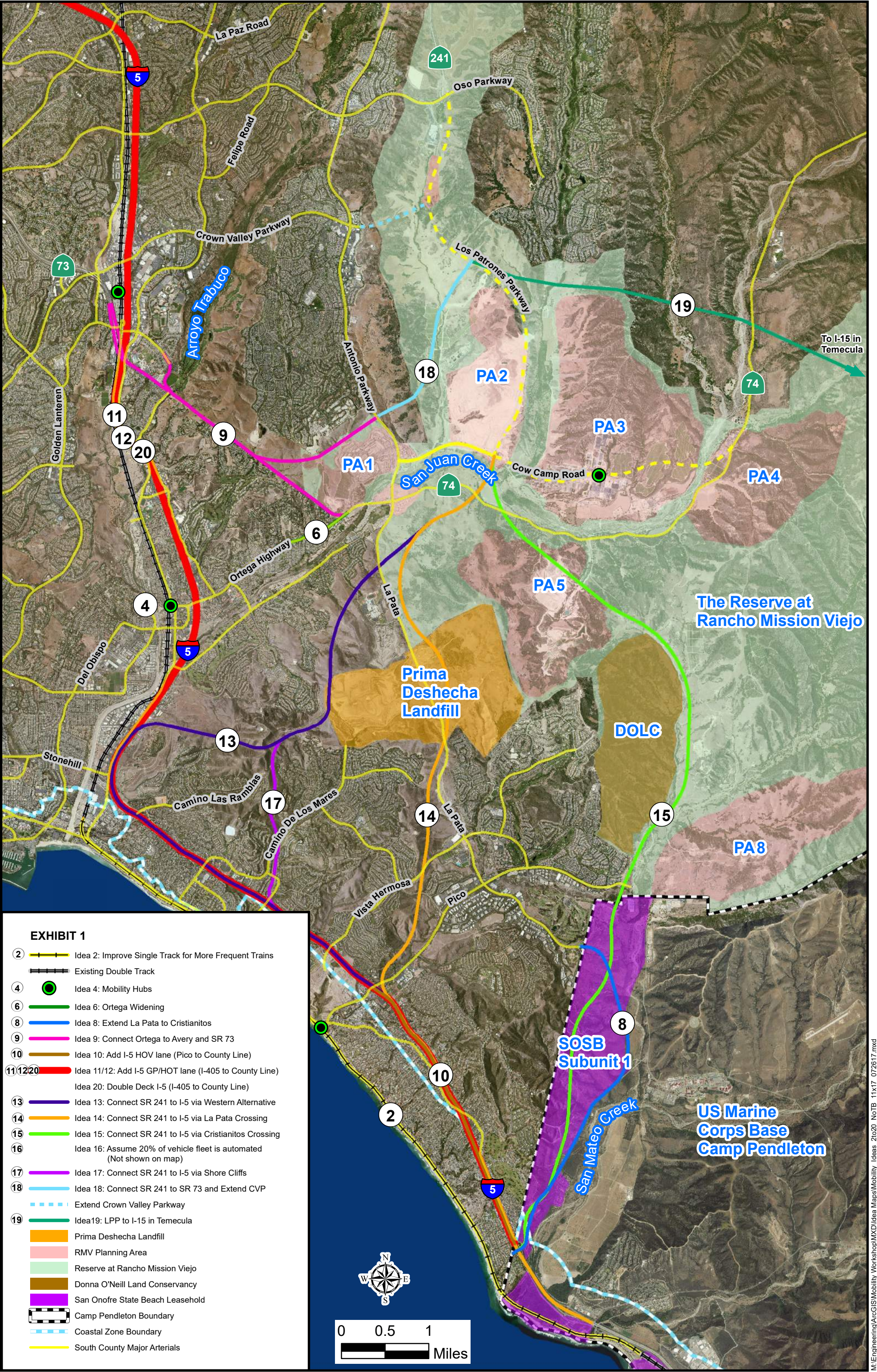
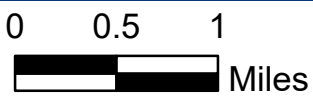


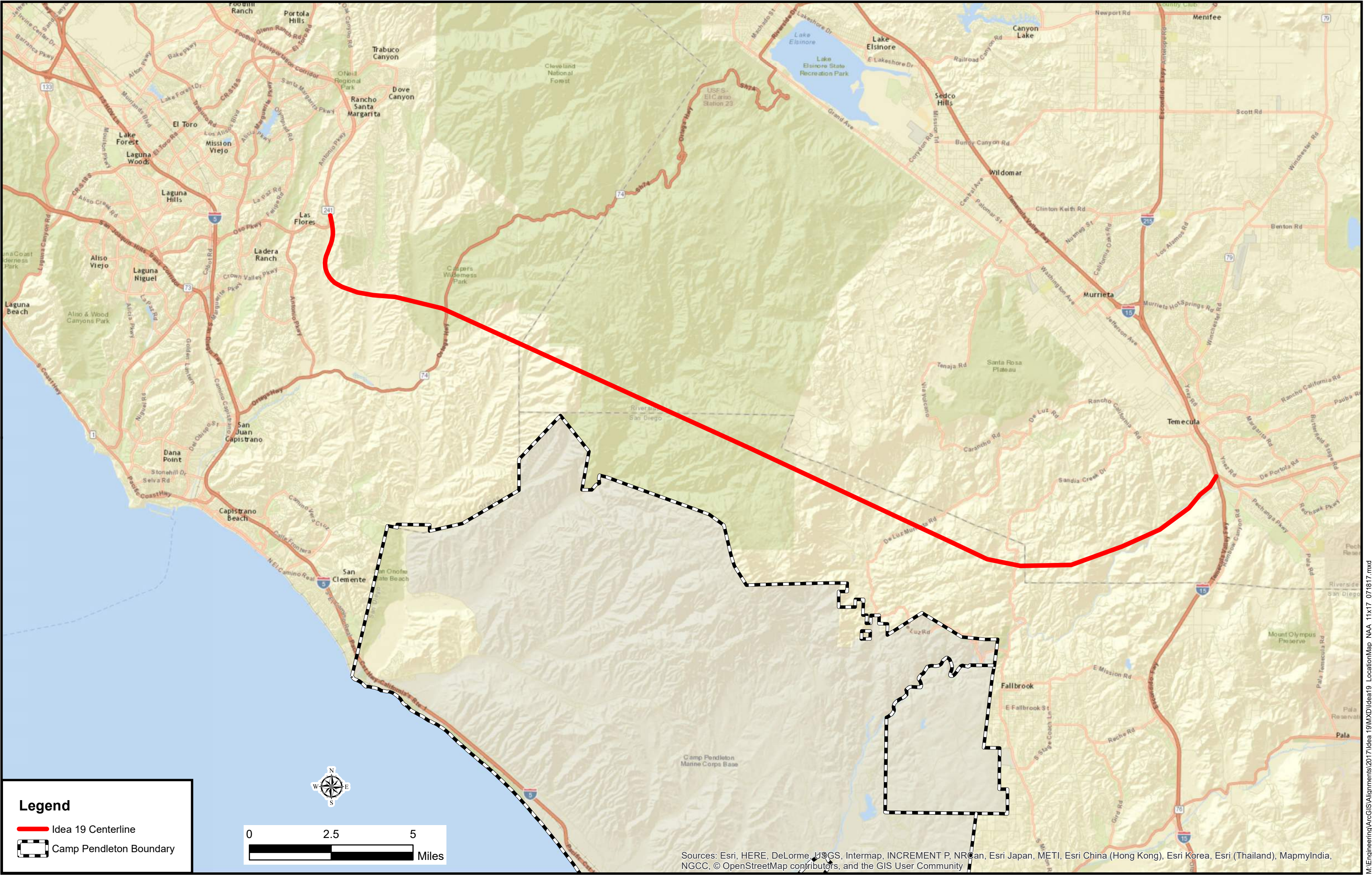
EXHIBIT 1

- ② ——— Idea 2: Improve Single Track for More Frequent Trains
- Existing Double Track
- ④ ● Idea 4: Mobility Hubs
- ⑥ ——— Idea 6: Ortega Widening
- ⑧ ——— Idea 8: Extend La Pata to Cristianitos
- ⑨ ——— Idea 9: Connect Ortega to Avery and SR 73
- ⑩ ——— Idea 10: Add I-5 HOV lane (Pico to County Line)
- ⑪⑫⑬⑭⑮⑯⑰⑱⑲ Idea 11/12: Add I-5 GP/HOT lane (I-405 to County Line)
- Idea 20: Double Deck I-5 (I-405 to County Line)
- ⑬ ——— Idea 13: Connect SR 241 to I-5 via Western Alternative
- ⑭ ——— Idea 14: Connect SR 241 to I-5 via La Pata Crossing
- ⑮ ——— Idea 15: Connect SR 241 to I-5 via Cristianitos Crossing
- ⑯ Idea 16: Assume 20% of vehicle fleet is automated (Not shown on map)
- ⑰ ——— Idea 17: Connect SR 241 to I-5 via Shore Cliffs
- ⑱ ——— Idea 18: Connect SR 241 to SR 73 and Extend CVP
- Extend Crown Valley Parkway
- ⑲ ——— Idea 19: LPP to I-15 in Temecula
- Prima Deshecha Landfill
- RMV Planning Area
- Reserve at Rancho Mission Viejo
- Donna O'Neill Land Conservancy
- San Onofre State Beach Leasehold
- Camp Pendleton Boundary
- Coastal Zone Boundary
- South County Major Arterials



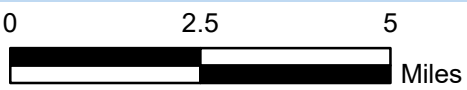
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Legend

- Idea 19 Centerline
- Camp Pendleton Boundary



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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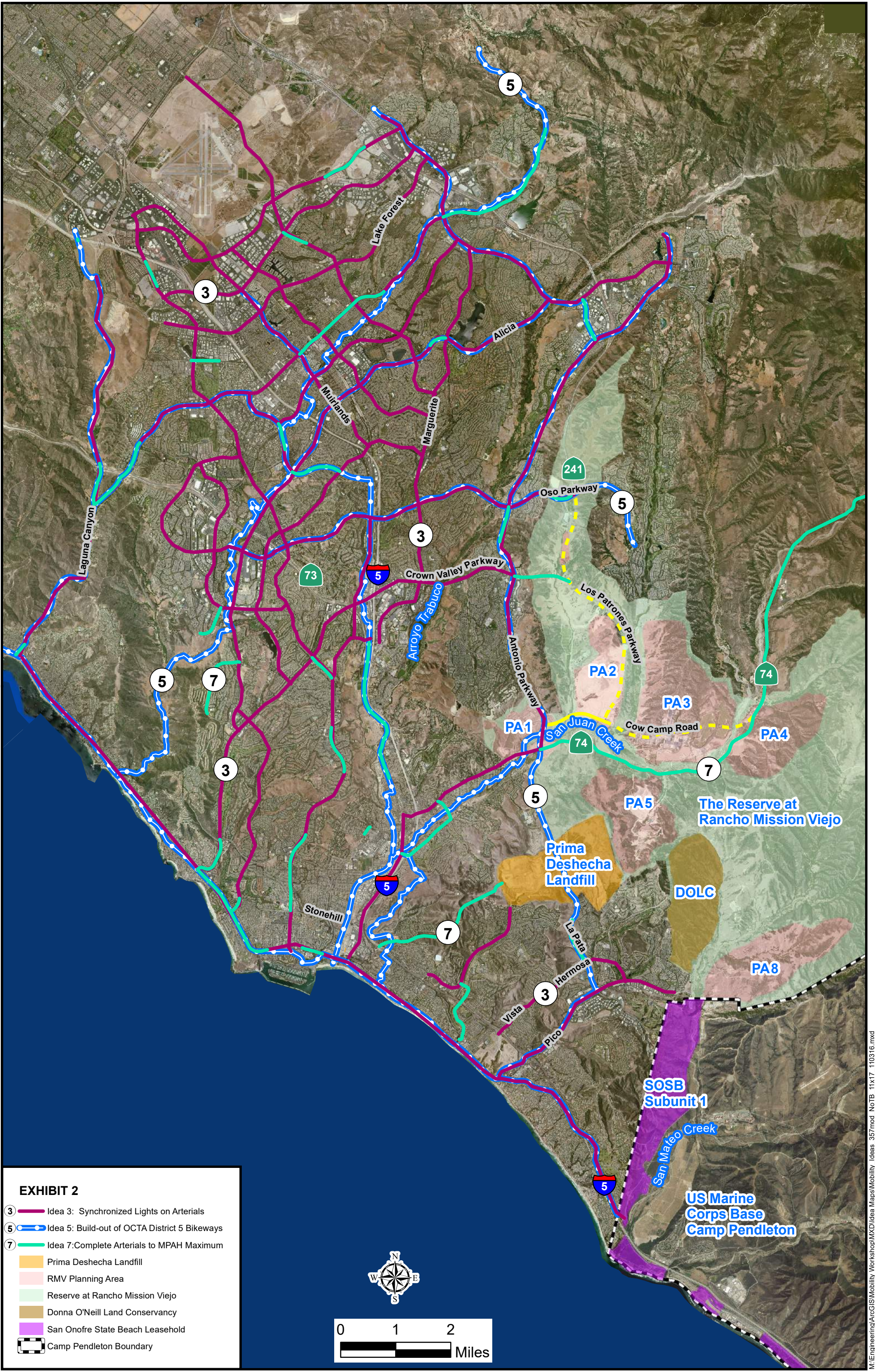
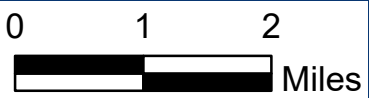


EXHIBIT 2

- ③ Idea 3: Synchronized Lights on Arterials
- ⑤ Idea 5: Build-out of OCTA District 5 Bikeways
- ⑦ Idea 7: Complete Arterials to MPAH Maximum
- Prima Deshecha Landfill
- RMV Planning Area
- Reserve at Rancho Mission Viejo
- Donna O'Neill Land Conservancy
- San Onofre State Beach Leasehold
- Camp Pendleton Boundary



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3.7 IDEA 7: COMPLETE ARTERIALS TO MPAH MAXIMUM

Idea 7 would widen segments of the following arterials to be consistent with the Orange County Master Plan of Arterial Highways (MPAH): Alicia Parkway, Alton Parkway, Antonio Parkway, Avenida Empresa, Avenida La Pata, Avenue Vaquero, Camino Capistrano, Camino Las Ramblas, Crown Valley Parkway, Del Obispo Street, El Toro Road, Highlands Avenue, Irvine Center Drive, La Novia Avenue, Niguel Road, Ortega Highway, Oso Parkway, Paseo de Valencia, Pacific Coast Highway, Ridge Route Drive, San Juan Creek Road, State Route 133 (SR-133)/Broadway Street, SR-133/Laguna Canyon Road, Street of the Golden Lantern, Trabuco Road, and Wood Canyon Drive, as shown on Exhibit 2.

3.8 IDEA 8: EXTEND LA PATA AVENUE TO CRISTIANITOS ROAD

This idea proposes extending La Pata Avenue to Cristianitos Road on Marine Corps Base Camp Pendleton in San Diego County, as shown on Exhibit 1.

3.9 IDEA 9: CONNECT ORTEGA HIGHWAY AND ANTONIO PARKWAY TO AVERY PARKWAY AND SR-73

Idea 9 proposes connecting Ortega Highway and Antonio Parkway to a new highway, which would connect to Avery Parkway and State Route 73 (SR-73), as shown on Exhibit 1.

3.10 IDEA 10: ADD I-5 HIGH-OCCUPANCY VEHICLE LANES FROM AVENIDA PICO TO THE SAN DIEGO COUNTY LINE

This idea proposes the extension of the high-occupancy vehicle (HOV) lane on I-5 in each direction between Avenida Pico and the Orange County/San Diego County line, as shown on Exhibit 1.

3.11 IDEA 11: ADD I-5 GENERAL-PURPOSE LANES FROM I-405 TO THE SAN DIEGO COUNTY LINE

This idea proposes the addition of one general-purpose lane on I-5 in each direction between San Diego County and I-405, as shown on Exhibit 1.

3.12 IDEA 12: ADD I-5 HIGH-OCCUPANCY/TOLL LANE FROM I-405 TO THE SAN DIEGO COUNTY LINE

Idea 12 proposes the addition of one high-occupancy/toll (HOT) lane on I-5 in each direction between San Diego County and I-405, as shown on Exhibit 1.

3.13 IDEA 13: CONNECT SR-241 TO I-5 VIA WESTERN ALIGNMENT (LOCAL CONNECTION AT LA NOVIA AVENUE)

This idea proposes connecting existing State Route 241 (SR-241) to I-5 at La Novia Avenue, as shown on Exhibit 1. Idea 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

3.14 IDEA 14: CONNECT SR-241 TO I-5 VIA LA PATA AVENUE CROSSING (LOCAL CONNECTION AT AVENIDA PICO)

Idea 14 proposes connecting existing SR-241 to I-5 along La Pata Avenue at Avenida Pico, as shown on Exhibit 1. Idea 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

3.15 IDEA 15: CONNECT SR-241 TO I-5 VIA CRISTIANITOS ROAD

This idea proposes connecting existing SR-241 to I-5 at Cristianitos Road, as shown on Exhibit 1. Idea 15 is TCA's previously selected preferred alignment, known as the Green Alignment, which was rejected by the California Coastal Commission and United States Secretary of Commerce in 2008.

3.16 IDEA 16: ASSUME 20 PERCENT OF VEHICLE FLEET IS AUTOMATED

Idea 16 assumes that 20 percent of the vehicles on roadways in south Orange County would be autonomous (i.e., self-driving vehicles).

3.17 IDEA 17: CONNECT SR-241 TO I-5 VIA SHORE CLIFFS (LOCAL CONNECTION AT AVENIDA VAQUERO)

This idea proposes connecting existing SR-241 to I-5 at Avenida Vaquero, as shown on Exhibit 1. Idea 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

3.18 IDEA 18: CONNECT SR-241 TO SR-73, AND EXTEND CROWN VALLEY PARKWAY TO SR-241

Idea 18 proposes a combination of Idea 9 (without a connection to Ortega Highway) as well as a new extension of Crown Valley Parkway to existing SR-241, as shown on Exhibit 1.

3.19 IDEA 19: CONNECT SR-241 TO I-15 IN TEMECULA

This idea proposes a 32-mile extension of SR-241 through the Santa Ana Mountains and the Cleveland National Forest, connecting to Interstate 15 (I-15) near Temecula.

3.20 IDEA 20: DOUBLE DECKING I-5

This idea proposes an elevated four-lane median viaduct on I-5 from the Orange County/San Diego County line to the I-405/I-5 interchange.

4.0 EVALUATION

Due to the wide spectrum of improvements, the ideas were initially sorted into the following categories:

- **Category 1:** Ideas that are already being advanced or implemented by agencies other than TCA
- **Category 2:** Ideas that are ineffective or are premature
- **Category 3:** Ideas that are not feasible due to regulatory or financial constraints
- **Category 4:** Remaining ideas subjected to mobility analysis

4.1 CATEGORY 1: IDEAS THAT ARE ALREADY BEING ADVANCED OR IMPLEMENTED BY OTHER AGENCIES

- **Idea 6** (Widen Ortega Highway to Four Lanes in San Juan Capistrano) is being led by both the County of Orange and Caltrans and supported by OCTA with Measure M2 funding.
- **Idea 8** (Extend La Pata Avenue to Cristianitos Road) is being advanced by the City of San Clemente via a preliminary engineering study.
- **Idea 10** (Add I-5 HOV Lanes from Avenida Pico to the San Diego County Line) is being advanced by OCTA through initiation of a Project Study Report/Project Development Support (PSR/PDS).

4.2 CATEGORY 2: IDEAS THAT ARE INEFFECTIVE OR PREMATURE

- **Idea 1** (Dynamic Pricing of TCA Facilities) involves charging toll rates in response to congestion. This idea would only provide a nominal reduction in vehicle hours of delay (VHD) on I-5 and no benefit to arterial highways.
- **Idea 16** (Assume 20 Percent of Vehicle Fleet is Automated) has the potential to improve mobility on I-5, but the implementation of this idea is beyond the horizon of this initial screening due to evolving technology, the need for government regulation, and uncertain public support.

4.3 CATEGORY 3: IDEAS THAT ARE INFEASIBLE DUE TO REGULATORY OR FINANCIAL CONSTRAINTS

- **Idea 2** (Greater Train Frequency) was previously evaluated by OCTA, the Federal Railroad Administration, and Metrolink and was found to either have unacceptable community impacts or was financially not feasible.
- **Idea 15** (Connect SR-241 to I-5 via Cristianitos Road) is the Green Alignment that was selected as the Preferred Alternative for the South Orange County Transportation Infrastructure Improvement Project (SOCTIIP). In 2008, the California Coastal Commission denied a Coastal Consistency Permit for this alignment. The U.S. Secretary of Commerce denied TCA's appeal of the California Coastal Commission's decision. Because this idea cannot be permitted, it is infeasible.

- **Idea 19** (Connect SR-241 to I-15 in Temecula) does not address the I-5 (north-south) mobility problem, and there are regulatory constraints associated with the Cleveland National Forest.
- **Idea 20** (Double Decking I-5) is similar in function and performance to Idea 12 but at a substantially higher cost (approximately 3 times). In addition, this idea would cost approximately \$6 billion to \$7 billion to construct, which is substantially higher than the Category 4 ideas.

4.4 CATEGORY 4: REMAINING IDEAS SUBJECTED TO MOBILITY ANALYSIS

The remaining ideas (listed below) fall into this category. Ideas 3, 5, and 7 are part of existing programs, but TCA could assist in further advancing these ideas.

- Idea 3 (Synchronized Lights on Arterials)
- Idea 4 (Mobility hubs at Train Stations and other Key Locations)
- Idea 5 (Build Out of OCTA District 5 bike facilities)
- Idea 7 (Complete Arterials to MPAH Maximum)
- Idea 9 (Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR-73)
- Idea 11 (Add I-5 General-Purpose Lanes from I-405 to the San Diego County Line)
- Idea 12 (Add I-5 HOT Lanes from I-405 to the San Diego County Line)
- Idea 13 (Connect SR-241 to I-5 via Western Alignment [Local Connection at La Novia Avenue])
- Idea 14 (Connect SR-241 to I-5 via La Pata Avenue Crossing)
- Idea 17 (Connect SR-241 to I-5 via Shore Cliffs [Local Connection at Avenida Vaquero])
- Idea 18 (Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241)

4.5 TRAFFIC EVALUATION METHODOLOGY

Based on the identified north-south mobility problem, the following three mobility metrics were developed for the traffic evaluation analysis:

- Weekday VHD on the I-5 corridor (between Oso Parkway and the County line)
- Weekday VHD on the following major east-west arterials that provide connections with I-5 in south Orange County:
 - Oso Parkway between Moulton Parkway and SR-241
 - Crown Valley Parkway between Moulton Parkway and Antonio Parkway
 - Ortega Highway between Camino Capistrano and Antonio Parkway
 - Vista Hermosa between Avenida Pico and La Pata Avenue
 - Avenida Pico between El Camino Real and La Pata Avenue
 - New east-west arterial connection between Avery Parkway and Antonio Parkway (only applicable to Ideas 9 and 18)
- Congested vehicle miles of travel on weekdays in south Orange County

Congestion reduction was measured in terms of the change in daily VHD on weekdays for the I-5 corridor and the list of arterial highways described above. Delay represents the extra time motorists spend on the road because they are travelling at less than the free-flow speed due to congestion.

On I-5, motorists often encounter greater delay on weekends (Saturday southbound and Sunday northbound); however, a predictive tool has not been created (by OCTA or Caltrans) to forecast future weekend conditions or test the benefits of ideas. In the next phase of project development (PSR/PDS Phase), TCA intends to collect additional weekend data and create a means to further compare Category 4 ideas.

Congested vehicle miles traveled (VMT) is another indicator of a driver's experience on the system. Congested VMT represents the distance traveled by motorists in conditions of substantial congestion (when the demand exceeds the capacity). Like VHD, this was measured only for weekdays during this phase of the evaluation.

The Orange County Transportation Analysis Model (OCTAM) was used to evaluate the VHD and congested VMT for a majority of the ideas. Ideas 3, 4, and 5 relate to program-level or nonmotorized improvements, and the OCTAM, like many regional models, is not designed to this level of detail; therefore, the VHD and congested VMT evaluation for these three ideas was conducted using a qualitative approach based on professional judgement, local knowledge, and experience from similar projects.

The eight ideas analyzed using OCTAM were based on the TRANPLAN version 3.4.1 (which was the most current traffic model available at the time the evaluation commenced) with the "constrained" network that contains the committed infrastructure improvements identified in OCTA's Long Range Transportation Plan. The OCTAM TRANPLAN model with constrained network has been used since the beginning of the South Orange County Mobility Study in 2015; therefore, the same model was used to maintain consistency. A new version (4.0) of the OCTAM TransCAD model will be used for preparation of the Traffic Engineering Performance Assessment during the PSR/PDS phase.

The OCTAM was used to develop the baseline conditions (Year 2045), and then each of the 11 ideas was coded separately into the OCTAM to evaluate the changes in congested VHD and VMT. The evaluation of the ideas using the OCTAM is based on the same Year 2045 development conditions as assumed in the baseline.

4.6 EVALUATION RESULTS

4.6.1 Vehicle Hours of Delay on I-5

The VHD was evaluated for each of the Category 4 ideas described in Section 4.4 using either the OCTAM or the qualitative approach, and the results shown in Table A reflect Year 2045 daily VHD on the I-5 segment from Oso Parkway to the County line on a typical weekday.

The largest VHD savings on I-5 are expected from four ideas (11, 12, 14, and 17), with delay savings of 4,500 vehicle hours or higher per day. Idea 13 would also result in noticeable delay savings on I-5 of 3,300 hours per day. Each of these ideas involves adding capacity to regional corridors (e.g., I-5 or

Table A: Daily Vehicle Hours of Delay on I-5

Idea	VHD	Change (Compared to Baseline)	VHD Change in % (Compared to Baseline)	Benefit (Rating)
Baseline	12,200	—	—	—
3 Synchronized Lights on Arterials	Qualitative	-50 to -100	—	
4 Mobility Hubs at Train Stations and other Key Locations	Qualitative	-50 to 0	—	
5 Build Out of OCTA District 5 Bike Facilities	Qualitative	-50 to 0	—	
7 Complete Arterials to MPAH Maximum	11,900	-300	-2%	
9 Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR-73	11,500	-700	-6%	
11 Add I-5 General-Purpose Lanes from I-405 to San Diego County Line	7,000	-5,200	-43%	
12 Add I-5 HOT Lanes from I-405 to San Diego County Line	7,300	-4,900	-40%	
13 Connect SR-241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)	8,900	-3,300	-27%	
14 Connect SR-241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)	6,600	-5,600	-46%	
17 Connect SR-241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)	7,700	-4,500	-37%	
18 Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241	11,500	-600	-5%	

= 0 to -500
 = -501 to -1,500
 = -1,501 to -3,000
 = -3,001 to -4,500
 = -4,501 to -6,000

HOT = high-occupancy/toll

I-405 = Interstate 405

I-5 = Interstate 5

MPAH = Master Plan of Arterial Highways

OCTA = Orange County Transportation Authority

SR-241 = State Route 241

SR-73 = State Route 73

VHD = vehicle hours of delay

SR-241) via widening or extending the corridors. The arterial capacity improvements (e.g., Ideas 7, 9, and 18) would generate moderate delay savings on I-5. Other program-level and nonmotorized improvements, including Ideas 3, 4, and 5, would result in minimal delay savings to the I-5 corridor.

4.6.2 Vehicle Hours of Delay on the Arterial Highway System

Table B shows Year 2045 daily VHD on the arterial highway system (including east-west major arterials in South County).

Table B: Daily Vehicle Hours of Delay on Arterial Highway System

Idea	VHD	Change (Compared to Baseline)	VHD Change in % (Compared to Baseline)	Benefit (Rating)
Baseline	3,400	—		
3 Synchronized Lights on Arterials	Qualitative	-30 to -10	—	
4 Mobility Hubs at Train Stations and other Key Locations	Qualitative	-10 to 0	—	
5 Build Out of OCTA District 5 Bike Facilities	Qualitative	-10 to 0	—	
7 Complete Arterials to MPAH Maximum	3,800	+400	12%	
9 Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR-73	2,300	-1,100	-32%	
11 Add I-5 General-Purpose Lanes from I-405 to San Diego County Line	3,500	+100	3%	
12 Add I-5 HOT Lanes from I-405 to San Diego County Line	3,360	-40	-1%	
13 Connect SR-241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)	3,100	-300	-9%	
14 Connect SR-241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)	3,300	-100	-3%	
17 Connect SR-241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)	3,200	-200	-6%	
18 Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241	2,370	-1,040	-31%	

= +500 to -50 = -51 to -100 = -101 to -500 = -501 to -1,000 = -1,001 to -1,500

HOT = high-occupancy/toll

I-405 = Interstate 405

I-5 = Interstate 5

MPAH = Master Plan of Arterial Highways

OCTA = Orange County Transportation Authority

SR-241 = State Route 241

SR-73 = State Route 73

VHD = vehicle hours of delay

With the proposed addition to enhance east-west connectivity, Ideas 9 and 18 would result in greater VHD savings on the arterial highway system (more than 1,000 vehicle hours per day). Ideas 13, 14, and 17 would also result in moderate delay savings on arterials (more than 100 vehicle hours) due to the direct connection between SR-241 and I-5, which would transfer less volume to the arterials between SR-241 and I-5. Ideas 7 and 11 would result in moderate increased delay on arterials because more traffic would use the east-west arterials to connect with I-5. Other program-level and nonmotorized improvement ideas (Ideas 3, 4, and 5) would result in very minimal delay savings to the arterial highway system.

4.6.3 Congested Vehicle Miles Traveled in South Orange County

Similar to VHD, the ideas involving adding capacity to the roadway network via widening and extending regional corridors would result in the highest congestion relief and least congested VMT.

As shown in Table C, where Year 2045 daily congested VMT for each idea are included, Ideas 11, 12, 13, 14, and 17, which enhance I-5 or SR-241, would result in the most reduction in congested VMT (21 percent or higher). The arterial capacity improvements (Ideas 7, 9, and 18) would generate moderate reduction in congested VMT. Other program-level and nonmotorized improvements (Ideas 3, 4, and 5) would result in minimal reduction in congested VMT in south Orange County.

Table C: Daily Congested Vehicle Miles Traveled in South County

Idea	Congested VMT	Change in % (Compared to Baseline)	Benefit (Rating)
Baseline	2,142,400	—	
3 Synchronized Lights on Arterials	Qualitative	-5% to -1%	
4 Mobility Hubs at Train Stations and other Key Locations	Qualitative	-1% to 0	
5 Build Out of OCTA District 5 Bike Facilities	Qualitative	-1% to 0	
7 Complete Arterials to MPAH Maximum	2,014,400	-6%	
9 Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR-73	2,055,300	-4%	
11 Add I-5 General-Purpose Lanes from I-405 to San Diego County Line	1,497,300	-30%	
12 Add I-5 HOT Lanes from I-405 to San Diego County Line	1,703,000	-21%	
13 Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)	1,669,800	-22%	
14 Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)	1,484,400	-31%	
17 Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)	1,577,100	-26%	
18 Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241	2,014,600	-6%	

= 0 to -5%
 = -6% to -10%
 = -11% to -20%
 = -21% to -29%
 = -30% to -40%

HOT = high-occupancy/toll

I-405 = Interstate 405

I-5 = Interstate 5

MPAH = Master Plan of Arterial Highways

OCTA = Orange County Transportation Authority

SR-241 = State Route 241

SR-73 = State Route 73

VMT = vehicle miles traveled

5.0 RECOMMENDATIONS

1. Based on the results of the evaluation methodology, ideas in Category 4 that provide substantial benefits in reducing delay on I-5 or the arterial highway system are recommended to be advanced to the PSR/PDS Phase. This includes the following ideas:
 - **Idea 9:** Connect Ortega Highway and Antonio Park way to Avery Parkway and SR-73
 - **Idea 11:** Add I-5 General-Purpose Lanes from I-405 to San Diego County Line
 - **Idea 12:** Add I-5 HOT Lanes from I-405 to San Diego County Line
 - **Idea 13:** Connect SR-241 to I-5 via the Western Alignment (Local Connection at La Novia Avenue)
 - **Idea 14:** Connect SR-241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)
 - **Idea 17:** Connect SR-241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)
 - **Idea 18:** Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241
2. The remaining ideas in Category 4 are under the jurisdiction of local agencies (cities) or the county. It is proposed that TCA discuss these ideas with the local agencies of jurisdiction and offer to provide assistance to increase the state of readiness for funding applications and preliminary engineering to interested agencies. Those ideas are:
 - **Idea 3:** Synchronized Lights on Arterials
 - **Idea 4:** Mobility hubs at Train Stations and other Key Locations
 - **Idea 5:** Build Out of OCTA District 5 bike facilities
 - **Idea 7:** Complete Arterials to MPAH Maximum
3. Ideas in Categories 2 and 3 are not recommended for further consideration due to lack of effectiveness, control, regulatory constraints, or financial feasibility.

The following chart (Exhibit 3) illustrates the recommended disposition of all 20 ideas for purposes of advancement to the PSR/PDS Phase.

Category 1 - Already Being Advanced or Implemented

- Idea 6.** Widen Ortega Highway to Four Lanes in San Juan Capistrano
- Idea 8.** Extend La Pata Ave to Cristianitos Road
- Idea 10.** Add I-5 HOV Lanes from Avenida Pico to County Line

Category 2 - Ineffective or Premature

- Idea 1.** Dynamic Pricing of TCA Facilities
- Idea 16.** Assume 20% of Vehicle Fleet is Automated

Category 3 - Infeasible due to Regulatory or Financial Constraints

- Idea 2.** Greater Train Frequency
- Idea 15.** Connect SR-241 to I-5 via Cristianitos Road
- Idea 19.** Connect SR-241 to I-15 in Temecula
- Idea 20.** Double Decking I-5

Category 4 - Mobility Benefits/Further Study Needed

- Idea 3.** Synchronized Lights on Arterials
- Idea 4.** Add Mobility Hubs at Train Stations and other Key Locations
- Idea 5.** Build Out of OCTA District 5 Bike Facilities
- Idea 7.** Complete Arterials to MPAH Maximum
- Idea 9.** Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73
- Idea 11.** Add I-5 General Purpose Lanes from I-405 to County Line
- Idea 12.** Add I-5 HOT Lanes from I-405 to County Line
- Idea 13.** Connect SR-241 to I-5 via Western Alignment (La Novia Avenue)
- Idea 14.** Connect SR-241 to I-5 via La Pata Avenue Crossing
- Idea 17.** Connect SR-241 to I-5 via Shore Cliffs (Avenida Vacquero)
- Idea 18.** Connect SR-241 to SR-73 and Extend Crown Valley Parkway to SR-241

-  - TCA offer assistance to local jurisdictions
-  - Ideas advanced to PSR/PDS phase

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ATTACHMENT J:
TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT (TEPA)

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South County Traffic Relief Effort

DRAFT

**Traffic Engineering Performance Assessment
(EA 12-0Q680K)**



Prepared for



August 2018

DRAFT

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Traffic Counts

Technical Calculations (Mainline and Ramps)

Technical Calculations (Ramp Intersection)

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Executive Summary

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This executive summary is intended to provide a brief introduction of the proposed South County Traffic Relief Effort (SCTRE) and a summary of general findings of the Traffic Engineering Performance Assessment (TEPA) in support of the Project Study Report/Project Development Support (PSR-PDS) document.

Introduction

The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with the California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County. Caltrans will provide oversight and Independent Quality Assurance for the Project. It is anticipated that Caltrans would be the lead agency for required National Environmental Policy Act (NEPA) approval, as delegated by the Federal Highway Administration (FHWA), and may be the lead agency for required California Environmental Quality Act (CEQA) approval.

The PSR-PDS stage is intended to identify the project scope, schedule, and support costs necessary to complete required studies and work during the subsequent Project Approval and Environmental Document (PA&ED) phase of the Project.

Purpose & Need

Purpose

The purpose and fundamental objectives of the project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on I-5 during peak commuting hours and weekends
- Provide additional north-south capacity in case of traffic incidents on I-5
- Provide additional north-south capacity in case of emergencies
- Enhance multi-modal mobility opportunities

Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5
- The lack of sufficient north-south capacity impairs evacuation and emergency response

Project Alternatives

During the conceptual analysis and preliminary engineering stage of this Project, many transportation ideas were investigated and summarized in the South County Traffic Relief Initial Screening (Attachment I of the PSR-PDS). Due to limited traffic relief to I-5 or arterial highways accessing I-5, several of the considered transportation ideas were withdrawn from further study. The transportation ideas that showed greater traffic relief benefit, to I-5 or arterial highways, have been advanced for further consideration are discussed below.

The PSR-PDS is not a substitute for the formal environmental analysis which would be conducted in the next phase of project development. Preliminary traffic data, for the purpose of comparing the project alternatives, is included; however, the PSR-PDS would not foreclose the study of any alternatives. As the Project progresses through the project development cycle, viable alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions. The Project intends to incorporate Context Sensitive Solutions that integrate and consider community, aesthetic, multimodal and environmental values with transportation safety, maintenance, and performance goals. Based on the conceptual analysis and preliminary engineering studies, eight build alternatives (see **Figure ES** for alternative alignments) are proposed in addition to a “No-Build” alternative (two scenarios for the No Build Alternative).

- ❖ Alternative 1 No Build Alternative (no HOV lane on I-5 between Pico and Countyline)
- ❖ Alternative 1 No Build Alternative (with HOV lanes on I-5 between Pico and Countyline)
- ❖ Alternative 13 Build Idea 13 (ID 13): Connect SR 241 to I-5 Via Western Alignment (Local Connection at La Novia Avenue)
- ❖ Alternative 17 Build Idea 17 (ID 17): Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)
- ❖ Alternative 14 Build Idea 14 (ID 14): Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)
- ❖ Alternative 11 Build Idea 11 (ID 11): Add I-5 General Purpose Lanes From I-405 to San Diego County
- ❖ Alternative 12 Build Idea 12 (ID 12): Add I-5 High-Occupancy/Toll (HOT) Lane From I-405 to San Diego County
- ❖ Alternative 9 Build Idea 9 (ID 9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73
- ❖ Alternative 18 Build Idea 18 (ID 18): Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241
- ❖ Alternative 21 Build Idea 21 (ID 21): Los Patrones Parkway Extension and I-5 HOT Lanes

The Build Alternatives and Idea Numbers correspond to the ideas studied in the South County Traffic Relief Effort Initial Screening (Attachment I of the PSR-PDS) and Idea 21 as identified in Section 9 of the PSR-PDS. For the purpose of this report, the Alternatives will be referred to using the Alternative Number only.

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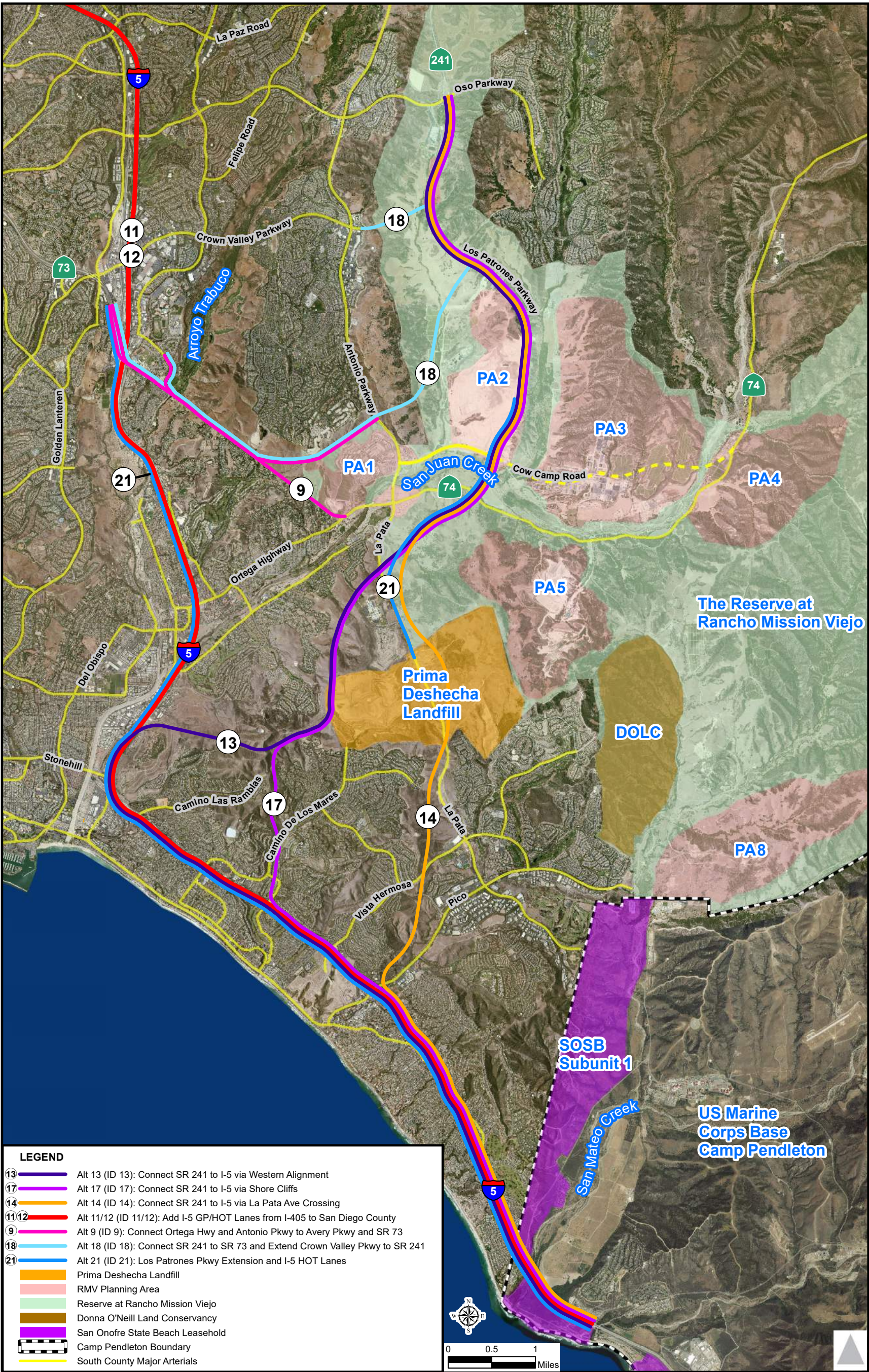


Figure ES
Project Alternatives

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Operations Analysis Findings

The traffic operations analysis was prepared in accordance with Article 5 in Chapter 5 of Appendix S: Preparation Guidelines for Project Study Report/Project Development Support Project Initiation Documents of the Project Development Procedures Manual prepared by Caltrans. As specified in the guidelines, the intent of this TEPA report is to use readily-available information and apply macro-level analysis and evaluation techniques to provide a technical foundation for developing a preliminary purpose and need statement for the proposed project, and to outline the scope and magnitude of more detailed analyses to be conducted as part of subsequent project development efforts.

The traffic operations analysis was conducted for each of the project alternatives including the No Build Alternative under Design Year 2050 conditions. For the purpose of this TEPA, the traffic operations analysis was conducted for I-5 between I-405 and Countyline and SR 241 between Oso Parkway and I-5. The traffic metrics for all the alternatives are presented in **Table ES** with findings summarized below:

- ❖ For all roadways in the South Orange County study area (including I-5), Alternative 11 would result in the greatest daily delay savings (14,360 vehicle hours), followed by substantial delay savings for Alternative 21 (5,470 vehicle hours), Alternative 12 (4,970 vehicle hours), and Alternative 14 (2,350 vehicle hours). Alternatives 17, 9, and 18 would also result in moderate delay savings. Alternative 13 shows the lowest delay savings among all the alternatives. A similar trend is shown for the VHD savings along the I-5 corridor, except that Alternative 18 anticipates substantial delay savings to arterial/local roadways due to additional east-west capacity from SR-73 to Los Patrones Parkway.
- ❖ For the peak hour operations, Alternative 11 shows the most operational benefits to the peak directions of the I-5 corridor (northbound I-5 during the AM peak hour and southbound I-5 during the PM peak hour), with the most locations (77) operating at LOS D or better conditions and improving 56 percent of the deficient locations (LOS E or F) by at least one LOS grade. Alternatives 17, 14, 12, and 21 would also result in substantial benefits to the I-5 corridor, with improved conditions (either improved LOS, reduced vehicle density, or reduced volume/capacity) at 56-93% of study locations and improving more than 20% of the deficient locations by at least one LOS grade. Alternatives 9 and 18 show the least benefits to I-5 during the peak hour.
- ❖ A majority of the build alternatives would provide adequate capacity along SR 241/Los Patrones Parkway with acceptable LOS D or better at all segments between Oso Parkway and I-5, except for Alternatives 14 (at Oso Parkway off-ramp on northbound), 18 (between SR 73 on-ramp and Crown Valley off-ramp on northbound), and 21 (at Oso Parkway off-ramp on northbound), for which the higher demand along SR 241/Los Patrones Parkway would result in LOS E or F conditions during the AM peak hour.

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Table ES – Traffic Metrics

Performance Measure	Project Alternatives									
	Alt 1 No Build (No HOV)	Alt 1 No Build (With HOV)	Alt 13	Alt 17	Alt 14	Alt 11	Alt 12	Alt 9	Alt 18	Alt 21
Daily VHD Change for All Arterials/Local Roadways in Study Area (compared to No Build)	-	-	200	-580	-730	-2760	-1250	-460	-1640	-1400
Daily VHD Change for I-5 (405 to County line) (compared to No Build)	-	-	-340	-1370	-1740	-11480	-3670	-1070	-610	-4330
Daily VHD Change for All Roadways ¹ in Study Area (compared to No Build)	-	-	-200	-1920	-2350	-14360	-4970	-1670	-2290	-5470
I-5 GP Peak Hour: Number of Locations with LOS D or better (NB AM & SB PM Combined)	34	41	47	45	54	77	59	36	33	42
I-5 GP Peak Hour: Number of Locations with LOS F (NB AM & SB PM Combined)	44	45	36	32	30	10	22	45	45	28
I-5 GP Peak Hour: % of Locations with Improved Operations (compared to No Build, NB AM & SB PM Combined)	-	-	86%	87%	93%	87%	85%	44%	47%	56%
I-5 GP Peak Hour: % of Locations Improved from E to D/better or from F to E/better (compared to No Build, NB AM & SB PM Combined)	-	-	18%	23%	30%	56%	42%	7%	2%	25%
Key Arterials: ADT Change % (compared to No Build)	-	-	-0.2%	-3.7%	-3.4%	0.8%	1.3%	2.1%	0.2%	-1.3%
SR-241/LPP Peak Hour: Mainline Locations with LOS D or better (%)	100%	100%	100%	100%	98%	100%	100%	100%	93%	97%
SR-241/LPP Peak Hour: Ramp Intersections with LOS D or better (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Additional Capacity for Emergency Evacuation (compared to No Build)	-	-	✓	✓	✓	✓	✓	✗	✗	✓
Alternate Capacity during Incidents on I-5 ² (compared to No Build)	-	-	✓	✓	✓	Partial	Partial	✗	✗	Partial
Weekend Peak Hour Operations (Two I-5 locations: Califia to Cristianitos; Hermosa to Pico)										
I-5 GP: Peak Hour Volumes Changes % (NB Sunday & SB Saturday Combined) (compared to No Build)	-	-	-19%	-17%	-19%	2%	-18%	-1%	0%	-19%
Weekend Peak Hour Operations (Two I-5 locations: Califia to Cristianitos; Hermosa to Pico)										
I-5 GP: Improve Peak Hour LOS from Deficient E/F to Acceptable D/better ³ (NB Sunday & SB Saturday Combined) (compared to No Build)	-	-	✓	Partial	✓	Partial	✓	✗	✗	✓

1. “All Roadways” includes all roadways south of the I-405/I-5 junction within Orange County, including freeways, toll roads, arterials, and local roadways.
2. “Partial” indicates that added lanes on I-5 may help if the incident is only blocking a portion of I-5, but not if the incident blocks all of I-5.
3. “Partial” indicates that only one of the two study segments would improve to acceptable LOS D or better conditions during the weekend peak hour.
Source: Fehr & Peers, 2018.

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- ❖ All the build alternatives would provide adequate capacity and result in LOS D or better conditions at the ramp terminal intersections along SR 241/Los Patrones Parkway between Oso Parkway and I-5.
- ❖ During emergency evacuations (such as fire, flood, other evacuations), Alternatives 13, 17, 14, 11, 12, and 21 would provide additional north-south capacity (e.g., additional capacity along I-5 and/or via access to SR-241) to I-5. Alternatives 9 and 18 would not provide any additional capacity to I-5 in case of emergency evacuations.
- ❖ During incidents on I-5 that block some of all lanes, Alternatives 13, 17, and 14 would provide alternate north-south capacity (e.g., additional capacity via access to SR-241) to I-5; Alternatives 11, 12, and 21 would provide partial alternate capacity (e.g., additional capacity on I-5); and Alternatives 9 and 18 would not provide any additional capacity to I-5.
- ❖ Under weekend conditions, Alternatives 13, 14, 12, and 21 would substantially improve weekend operations and result in acceptable conditions at the two I-5 segments south of Avenida Vista Hermosa. Alternatives 17 and 11 would also provide noticeable improvements to the weekend operations. Alternatives 9 and 18 would provide negligible benefits to I-5 during the weekend.
- ❖ Overview of all the performance measures indicates that substantial traffic benefits would result from Alternatives 11, 21, 12, and 14. Alternatives 9 and 18 would show the least traffic benefits. Other factors such as funding feasibility, environmental impacts, constructability, and etc. were also considered in alternative comparison analysis and contained in the PSR-PDS document.
- ❖ Since the intent of the TEPA is to use readily-available information and planning-level analysis, both existing traffic counts and design year 2050 traffic forecasts will be refined during the PA&ED phase. More detailed analysis (e.g., simulation) will also be conducted as part of the PA&ED phase to refine project alternatives and maximize their operational benefits.

Transportation Scope for PA&ED

This TEPA also identifies the transportation scope and studies required during the subsequent Project Approval and Environmental Document (PA&ED) phase of the proposed South County Mobility Improvement project. The transportation scope during the PA&ED phase was developed in accordance with Caltrans' requirements on other highway planning projects in Orange County.

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1. Introduction

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The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with the California Department of Transportation (Caltrans) District 12, proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County. Caltrans will provide oversight and Independent Quality Assurance for the Project. It is anticipated that Caltrans would be the lead agency for required National Environmental Policy Act (NEPA) approval, as delegated by the Federal Highway Administration (FHWA), and may be the lead agency for required California Environmental Quality Act (CEQA) approval.

The PSR-PDS stage is intended to identify the project scope, schedule, and support costs necessary to complete required studies and work during the subsequent Project Approval and Environmental Document (PA&ED) phase of the Project.

Project Background

SR 241 is a state highway in Orange County, California, which currently runs from Rancho Santa Margarita to Yorba Linda, connecting with SR 133, SR 261, and SR 91, and travels parallel to I-5. For its entire limits, SR 241 is designated a toll road and is part of the National Highway System (NHS) and California Freeway and Expressway System.

The section of SR 241, connecting SR 91 to I-5 and completing the southern segment of SR 241, has been the subject of regional planning efforts for more than twenty years. The extension would provide an alternate route to I-5 for those traveling from Riverside, Corona, and southeast Orange County to points southward as well as those traveling from San Diego County northward.

This section of SR 241 has been included in the Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) since 1991, and the San Diego Association of Governments (SANDAG) RTP/SCS since 1994. Currently, the final segment of SR 241, between Oso Parkway and I-5, is included in the 2016 RTP/SCS, SCAG's 2017 Federal Transportation Improvement Program (FTIP), the Orange County Transportation Agency's (OCTA) 2014 Long Range Transportation Plan, SANDAG's 2016 Regional Transportation Improvement Program (RTIP), and SANDAG's 2050 RTP/SCS. Both SCAG and SANDAG are in the process of updating their current FTIPs and RTP/SCS's. The Project is being carried over into SCAG's Draft 2019 FTIP, SANDAG's Draft 2018 RTIP, SCAG's 2020 RTP/SCS, and SANDAG's 2019 update to the 2050 RTP/SCS.

In February 2006, via resolutions F2006-1 and F2006-2, the F/ETCA's Board of Directors, as the lead agency under the CEQA, certified the Subsequent Environmental Impact Report (SEIR) for South Orange County Transportation Infrastructure Improvement Project (SOCTIIP) where it selected the A7C-FEC-M (Green Alignment) as its Preferred Alternative.

The SOCTIIP (also referred to as Foothill Transportation Corridor-South and Foothill-South) environmental document was prepared in compliance with the requirements of CEQA. The purpose of the SOCTIIP was to provide improvements to the transportation infrastructure system that would help alleviate future traffic congestion and accommodate the need for mobility, access, goods movement and future traffic demands on I-5 and the arterial network.

The SOCTIIP alternatives presented and evaluated in the SEIR included six corridor alternatives that extended the existing Foothill Transportation Corridor (SR 241) from Oso Parkway to I-5 near the Orange County/San Diego County boundary or at an intermediate point at an intersecting arterial road, one alternative to improve existing and master planned arterial highways and one alternative to widen I-5 from the County boundary north to the interchange with I-405. The six corridor alternatives evaluated in the SEIR represented extensive analysis and refinement to minimize harm to both the natural and built environment. As discussed extensively in the SEIR, an unprecedented number of alternatives were considered for implementation.

SOCTIIP required approvals from federal, state and local agencies which also triggered compliance with the NEPA, as well as CEQA. The environmental document for purposes of NEPA was an Environmental Impact Statement (EIS). FHWA was the lead federal agency in the preparation of the EIS. FHWA was assisted by several federal resource agencies including the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. The F/ETCA and the federal agencies participated in a collaborative process to define project alternatives and evaluate their environmental impacts, and to identify a least environmentally damaging practicable alternative. After a six-year collaborative process, the state and federal agency participants identified the A7C-FEC-M Alternative ("Green Alignment") as the preliminary least environmentally damaging practical alternative.

Shortly after the F/ETCA Board certified the SEIR in 2006, three lawsuits were filed in state court. Two lawsuits, entitled California State Parks Foundation et al. v. Foothill/Eastern Transportation Corridor Agency et al., San Diego County Superior Court Case No. GIN051194, and People of the State of California et al. v. Foothill/Eastern Transportation Corridor Agency et al., San Diego County Superior Court Case No. GIN051371, alleged that the certification of the SOCTIIP SEIR did not comply with CEQA. A third lawsuit entitled Native American Heritage Commission v. Foothill/Eastern Transportation Corridor Agency et al, San Diego County Superior Court Case No. GIN051370, alleged that the construction and development of SOCTIIP would violate certain provisions in the Public Resources Code related to Native American cultural resources.

In 2008, the California Coastal Commission (CCC) reviewed the Green Alignment for consistency with the Coastal Zone Management Act. The CCC objected to the F/ETCA's consistency certification, and the F/ETCA appealed the objection to the U.S. Secretary of Commerce. In December 2008, the Secretary of Commerce sustained the CCC's objection, thereby precluding construction of the Green Alignment. In light of the Secretary of Commerce's decision, and pursuant to a tolling agreement, the three litigation matters filed in 2006 were dismissed without prejudice.

In 2013, via resolution 2013F-005, the F/ETCA approved an addendum to the SOCTIIP SEIR for a five-mile extension of SR 241 to Cow Camp Road, known as the Tesoro Extension. Upon the F/ETCA Board's approval, the three lawsuits originally filed in 2006 were reinitiated pursuant to the terms of the tolling agreement, and two additional lawsuits were filed in state court, both alleging that approval of the addendum did not comply with CEQA. The two additional lawsuits are entitled California State Parks Foundation et al. v. Foothill/Eastern Transportation Corridor Agency et al., San Diego County Superior Court Case No. 37-2013-00049797-CU-WM-NC, and People of the State of California, ex rel. Attorney General Kamala D. Harris v.

Foothill/Eastern Transportation Corridor Agency et al., San Diego Superior Court Case No. 37-2013-000500001-CU-WM-NC.

In June 2013, the San Diego Region of the California Regional Water Quality Control Board (Regional Board) denied F/ETCA's application for waste discharge requirements for the Tesoro Extension. The F/ETCA subsequently petitioned the Regional Board's denial to the State Water Resources Control Board (State Board). In light of the Regional Board's denial and F/ETCA's subsequent petition to the State Board, the parties to the 2006 and 2013 litigation matters agreed to stay all litigation.

In 2014, the State Board remanded the matter back to the Regional Board for additional findings. The Regional Board adopted additional findings and reaffirmed its denial of the F/ETCA application. The F/ETCA petitioned the State Board, but the State Board declined to review the F/ETCA petition.

In 2015, F/ETCA commissioned an in-depth Community Ascertainment Study designed to dig deep into the local community conducting numerous one-on-one interviews with a variety of interested parties in South Orange County cities. The study found that there was widespread agreement that an I-5 mobility problem exists, but recommendations varied greatly as to how to address the issue. As a result, F/ETCA, in collaboration with other regional transportation agencies, embarked on a thorough public process to gather detailed information as to the types of transportation solutions desired. This process included multiple mobility workshops with environmental leaders as well as separate workshops with locally elected officials. In 2016, F/ETCA expanded these efforts to include public forums, three of which have been conducted to date.

On November 10, 2016, F/ETCA approved a settlement agreement resolving the five lawsuits challenging F/ETCA's approvals for the 2006 SOCTIIP SEIR and 2013 Tesoro Extension. Under the terms of that settlement agreement, F/ETCA was required to rescind the certification of the 2006 SEIR, the 2006 Approvals, the approval of the 2013 Addendum, and the 2013 Approvals. The F/ETCA rescinded these approvals at its December 8, 2016 Board of Directors meeting.

In addition to resolving the prior lawsuits, the 2016 environmental settlement agreement established a framework by which an alignment for the SR 241 Extension Project can be identified, evaluated, and potentially advanced in a manner that is consistent with applicable laws, as well as meets the transportation needs of F/ETCA.

As the Project sponsor, F/ETCA, in cooperation with Caltrans is proactively seeking project improvements that serve South Orange County's (South County) increased and projected mobility needs. Opportunities to incorporate Multimodal Alternatives, Context Sensitive Solutions, and Complete Streets concepts are outlined in this PSR-PDS and supporting attachments. As the Project progresses through the project development cycle, viable concepts and alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions.

Purpose and Need

Purpose

The purpose and fundamental objectives of the project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on I-5 during peak commuting hours and weekends
- Provide additional north-south capacity in case of traffic incidents on I-5
- Provide additional north-south capacity in case of emergencies
- Enhance multi-modal mobility opportunities

Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5
- The lack of sufficient north-south capacity impairs evacuation and emergency response

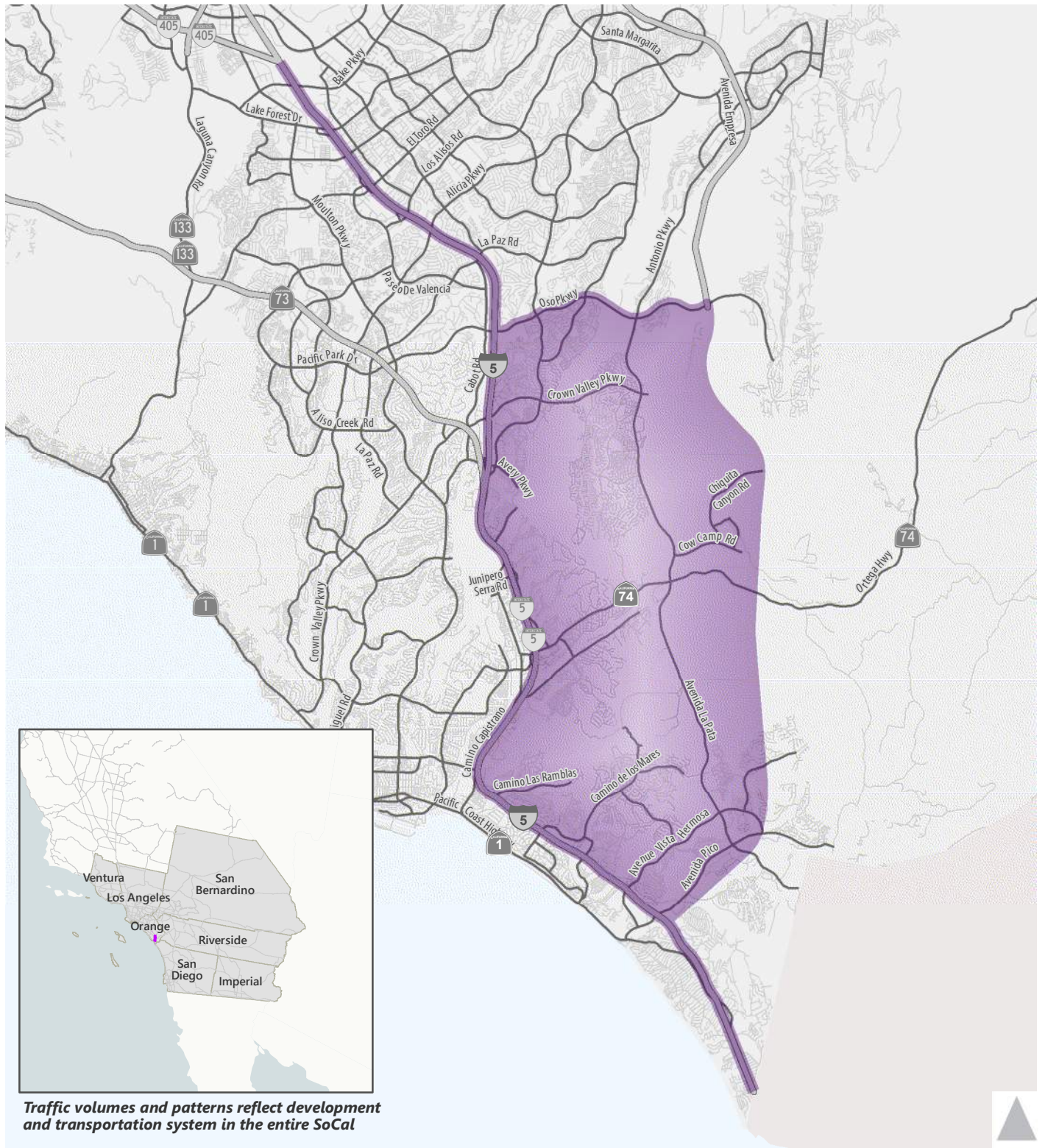
Study Area

Figure 1 illustrates the study area for TEPA. The project study limits include SR 241/Los Patrones Parkway (LPP) from Oso Parkway to I-5 in Orange County and I-5 from I-405 to the OC/SD Countyline.

For the purpose of the TEPA, the following intersections and freeway mainline and ramps were evaluated at a macroscopic/planning level during the AM and PM peak hours on a typical weekday under existing (2017) and Design Year 2050 conditions.

<u>I-5:</u>	All the mainline segments and ramp junctions between I-405 and OC/SD Countyline
<u>SR 241/LPP:</u>	All the mainline segments, ramp junctions, and ramp terminal intersections between Oso Parkway and I-5

Arterial roadway segments at selected locations were evaluated to understand daily traffic demand changes during a typical weekday. Arterial intersections are not included for evaluation in the TEPA but will be included with detailed analysis during the PA&ED phase. In addition, weekend analysis was conducted at five mainline segments along I-5 during the Saturday (southbound) and Sunday (northbound) peak hours during existing (2017) and Design year 2050 conditions.



 Areas Studied for Performance

Figure 1

Influence Area

The study area and facilities were submitted to and concurred by Caltrans at the beginning of the PSR-PDS stage.

Study Scenarios

For the purpose of this project, ten project alternatives including two No Build alternatives were analyzed under Design Year 2050 conditions. The descriptions of the ten project alternatives are provided in Chapter 4. The study scenarios for traffic operations analysis include the following:

- ❖ Existing Conditions (2017)
- ❖ Design Year (2050) Alternative 1 – No Build (No HOV on I-5 between Avenida Pico and Countyline)
- ❖ Design Year (2050) Alternative 1 – No Build (With HOV on I-5 between Avenida Pico and Countyline)
- ❖ Design Year (2050) Alternative 13
- ❖ Design Year (2050) Alternative 17
- ❖ Design Year (2050) Alternative 14
- ❖ Design Year (2050) Alternative 11
- ❖ Design Year (2050) Alternative 12
- ❖ Design Year (2050) Alternative 9
- ❖ Design Year (2050) Alternative 18
- ❖ Design Year (2050) Alternative 21

Report Outline

The remainder of this report contains the following chapters.

Chapter 2 – Traffic Analysis Methodology

Chapter 3 – Existing (2017) Conditions

Chapter 4 – Project Alternatives

Chapter 5 – Design Year (2050) Conditions

Chapter 6 – Conclusions

Chapter 7 – Transportation Scope for the PA&ED

Following this introduction, Chapter 2 summarizes the traffic operations analysis and travel demand forecasting methodologies applied for this traffic report. Chapter 3 describes traffic operational characteristics of existing conditions. Chapter 4 describes each of the project alternatives and their proposed improvements. Chapter 5 presents the Design Year 2050 traffic analysis results for each of the project alternatives. Chapter 6 concludes the comparison results of the project alternatives. Finally, the scope of work for the more detailed transportation studies to be conducted at the PA&ED phase are presented in Chapter 7.



2. Traffic Analysis Methodology

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This chapter describes the methodologies used to develop traffic demand forecasts and analyze traffic operations as well as the evaluation criteria used to determine acceptable traffic operations conditions.

The TEPA analysis has been performed in accordance with Article 5 of Appendix S: Preparation Guidelines for Project Study Report/Project Development Support Project Initiation Documents of the Project Development Procedures Manual prepared by Caltrans. As specified in the guidelines, the intent of this TEPA report is to use readily-available information and apply macro-level analysis and evaluation techniques to provide a technical foundation for developing a preliminary purpose and need statement for the proposed project, and to outline the scope and magnitude of the more detailed analyses to be conducted as part of subsequent project development efforts.

Traffic Demand Forecasting Methodology

For the purpose of this project, the Orange County Transportation Analysis Model (OCTAM) version 4.0 with constrained network was used to develop the Design Year 2050 traffic forecasts, which is the same model used for the I-5 Avenida Pico to SD County Line PSR-PDS Project led by Orange County Transportation Authority (OCTA). Based on the raw model volumes from the Base Year (2012) and Future Year (2040) models, the ADT and peak hour traffic volumes were developed using the difference method contained in the National Cooperation Highway Research Program (NCHRP) Report 255: Highway Traffic Data for Urbanized Area Project Planning and Design (Transportation Research Board, December 1982). Since the current OCTAM future model reflects Year 2040 conditions, the Design Year 2050 were developed by applying the 10-year growth to the 2040 forecasts using a calculated annual growth rate between existing and the 2040 traffic forecasts.

For the I-5 mainline segments, the Design Year 2050 traffic demand was developed using the methodologies described above for the entering locations – at Cristianitos Road in the northbound direction and at I-405 in the southbound direction. Then the traffic forecasts at the two locations were balanced downstream using the forecasted on- and off-ramp volumes to develop the traffic demand volumes for other study freeway mainline segments.

For the Los Patrones Parkway/SR 241 mainline segments, the Design Year 2050 traffic demand was developed at the Oso Parkway interchange, and then the traffic forecasts at this location were balanced either downstream or upstream using the forecasted on- and off-ramp volumes to develop the traffic volumes for other study freeway mainline segments along Los Patrones Parkway/SR 241.

Since the OCTAM model does not have a weekend module, the weekend ADT and peak hour traffic forecasts were developed based on a combination of historical weekend growth, historical weekday growth, and future weekday growth estimated from OCTAM. The weekend forecasting approach consisting of the following six steps was discussed and concurred by Caltrans at the beginning of the PSR-PDS phase.

- Step 1 Collect weekend traffic counts at five mainline segments along I-5
- Step 2 Estimate existing weekend peak hour demand by developing and adding the queue counts to existing traffic counts collected on the field
- Step 3 Obtain the historical (2006 through 2017) annual traffic growth rate along I-5 from PeMS database, under both weekday and weekend conditions
- Step 4 Develop future year weekday traffic growth rate along I-5 using OCTAM
- Step 5 Develop future year weekend traffic growth rate by applying the ratio of historical weekend and weekday growth rate from Step 3 to the future year weekday growth rate from Step 4
- Step 6 Develop future year weekend traffic demand by applying the future year weekend growth rate from Step 5 to the existing weekend demand from Step 2

Operations Analysis Methodology

This TEPA focuses on planning level mainline, ramp, and arterial operations. Freeway mainline and ramps were evaluated using Highway Capacity Software (HCS) equivalent spreadsheet, while the intersections were analyzed using the Synchro traffic operations software. A more detailed assessment of system components (e.g., potential simulation analysis) will be addressed in the subsequent PA&ED phase of project development.

The level of service (LOS) was calculated for each study facility to evaluate traffic operations. LOS is a quantitative measure of traffic operating conditions whereby a letter rating, from A (the best) to F (the worst), is assigned. These ratings represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. **Table 1** describes the LOS thresholds for freeway sections identified in the HCM.

Table 1 – Freeway Mainline and Ramp Junction/Weave Section LOS Thresholds

Level of Service	Description	Density (vplpm) ¹	
		Mainline (Basic)	Ramp / Weave
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	≤ 11	≤ 10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 11 to 18	> 10 to 20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 18 to 26	> 20 to 28
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 26 to 35	> 28 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35 to 45	> 35 to 45 ²
F	Represents a breakdown in flow.	> 45	> 45 ²

Notes: 1. Density is reported in vehicles per lane per mile.
2. The maximum density for ramp junctions and weaving sections under LOS E is not defined in the HCM. The maximum density for basic segments of 45 vplpm was assumed to apply to ramp junctions and weaving sections.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition)

The peak-hour density calculations provided in this report are consistent with the definitions from the HCM, which defines four freeway section types: merge, diverge, weave, and basic. Merge and diverge sections, which refer to the freeway ramp junctions, are defined as the section of the freeway 1,500 feet downstream of an on-ramp and upstream of an off-ramp, respectively. The density is measured over the two adjacent freeway through-lanes plus any auxiliary lanes. A weaving section occurs between a successive on-ramp and off-ramp pair connected by an auxiliary lane, and the maximum weaving distance between the ramps is no longer a fixed distance but determined by the weaving/total volumes and number of weaving lanes in the HCM 6th Edition. Basic freeway sections include all other freeway sections that are not included in a merge, diverge, or weaving section. The densities at weaving and basic sections are measured across all mixed-flow freeway lanes.

In addition to freeway LOS thresholds, descriptions of the level of service (LOS) letter grades for signalized and unsignalized intersections are provided in **Table 2**.

Table 2 – Intersection LOS Thresholds

Level of Service	Description	Signalized Delay (Seconds)	Unsignalized Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0	>10.0 to 15.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 35.0	>15.0 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0	>25.0 to 35.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0	>35.0 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0	>50.0

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).

In addition to the LOS evaluation, the following three systemwide mobility metrics were also developed to evaluate traffic benefits of project alternatives for the PSR-PDS study:

- Vehicle hours of delay (VHD) on the I-5 corridor (between I-405 and the County Line)
- VHD on all the arterial roadways in South Orange County
- VHD on all roadway facilities (including freeway and arterials) in South Orange County

Congestion reduction was measured in terms of the change in daily vehicle hours of delay (VHD) on weekdays for the study roadway facilities described above. Delay represents the extra time motorists spend on the road because they are travelling at less than the free-flow speed due to congestion. The VHD data was calculated using the OCTAM version 4.0 model (constrained network).

Analysis Evaluation Criteria

The analysis evaluation criteria described below were used to determine acceptable traffic operating conditions and are based on the level of service policies identified by Caltrans (jurisdiction for freeway mainline/ramp/ramp terminal intersection) and the County of Orange (jurisdiction for Los Patrones Parkway).

The Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) states "Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" (see Appendix "C-3") on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS". For the purpose of this study, LOS D is assumed to be the criteria for I-5 and SR 241 mainline segments, on- and off-ramps, and ramp terminal intersections.

Also, in the County of Orange General Plan, Chapter IV: Goal 5, Policy 5.5 states, "Require as condition of approval that necessary improvements to arterial highway facilities, to which a project contributes measurable traffic, be constructed and completed within a specified time period or ADT/peak hour milestone to attain a Level of Service "D" at the intersections under the sole control of the County."

Therefore, LOS D is considered as the criteria for acceptable operations for the purpose of this project.

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3. Existing (2017) Conditions

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This chapter describes the collection and development of existing traffic volumes, existing traffic operations on mainline and ramp locations, and an accident review.

Existing Traffic Volumes

Existing traffic volumes were collected in 2017 from various sources, including Caltrans, OCTA, Caltrans' PeMS (Freeway Performance Measurement System), and field data. The intersection turning movement counts (see Appendix) were collected from the field in February or November 2017 when schools are in session.

I-5 mainline traffic volumes (i.e., AM/PM peak hour traffic volumes and ADT) were collected from PeMS and Caltrans. The I-5 study segments between Avenida Pico and San Juan Creek Road have been under construction since 2013 as part of the South County I-5 Improvement Project led by OCTA; as a result, traffic patterns have experienced various changes during the course of construction for last four years. Although the TEPA is intended to use readily available information, extensive review and multi-source cross checks of traffic data were conducted for the purpose of this project to ensure quality of existing traffic data.

In order to capture the I-5 freeway traffic data that better reflects the typical traffic patterns and conservative (e.g., highest volumes among all years) conditions, the following additional efforts were made when developing the existing traffic volumes along the I-5 corridor.

- Multi-year (2012 through 2017) I-5 mainline traffic data were obtained from PeMS to understand the traffic patterns and demand changes along the corridor;
- Multi-weekday I-5 mainline traffic data were obtained from PeMS for extensive review prior to use for this traffic volume report;
- Coordination with OCTA on existing traffic data collected for the I-5 Avenida Pico to SD County Line PSR-PDS project to address ramp closure impacts; and
- Manual adjustments to several ramp locations to account for ramp closure impacts, based on review of field data, counts from OCTA, historical PeMS data, and information provided by Caltrans.

January/February weekday (e.g., Tuesday, Wednesday, and Thursday when schools in session) daily traffic volumes were collected from PeMS at two selected I-5 segments (northbound I-5 near Avenida Magdalena and southbound I-5 near Oso Parkway) from Year 2012 through 2017 to understand how traffic patterns and demand change along I-5 prior to and during the on-going construction along the corridor.

Charts 1 and 2 below compare the average daily traffic volumes (including both general purpose and HOV volumes) by year (2012 to 2017) along northbound and southbound I-5 at the selected two freeway mainline segments, respectively. As shown, the daily traffic volumes at both I-5 segments have been generally increasing and reached the highest volumes in 2017 (approximately 6,000 to 7,000 vehicles more than 2012 ADT) for both northbound and southbound directions, despite the on-going construction. Therefore, the 2017 PeMS data was determined to use to develop the existing traffic volumes for I-5 mainline and HOV segments.

Chart 1
Northbound I-5 ADT at Avenida Magdalena
(PeMS)

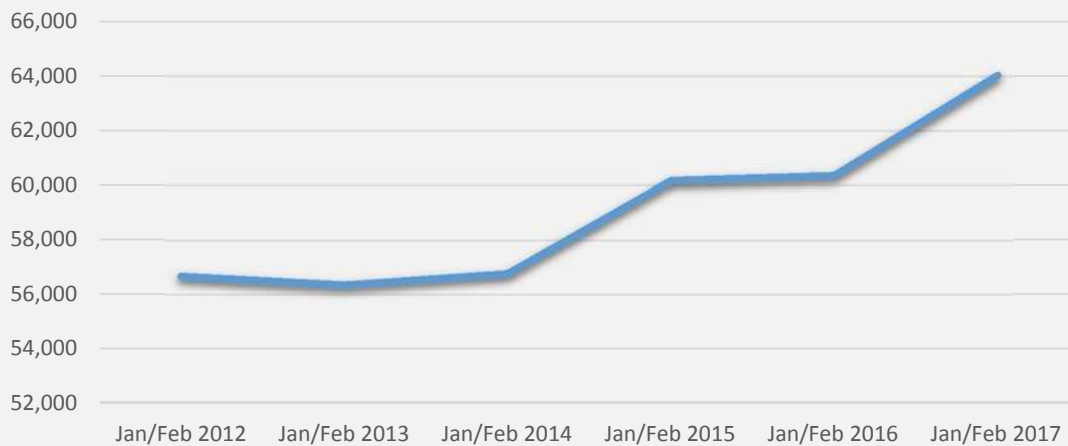
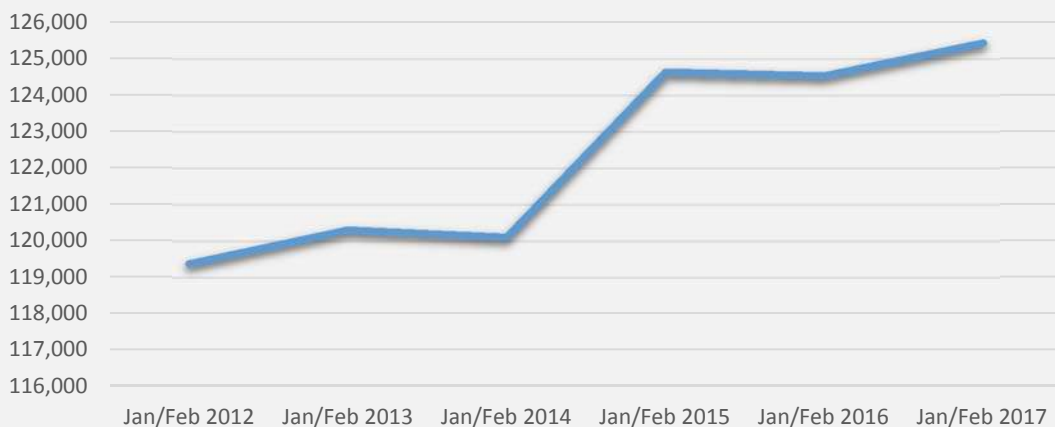


Chart 2
Southbound I-5 ADT at Oso Parkway
(PeMS)



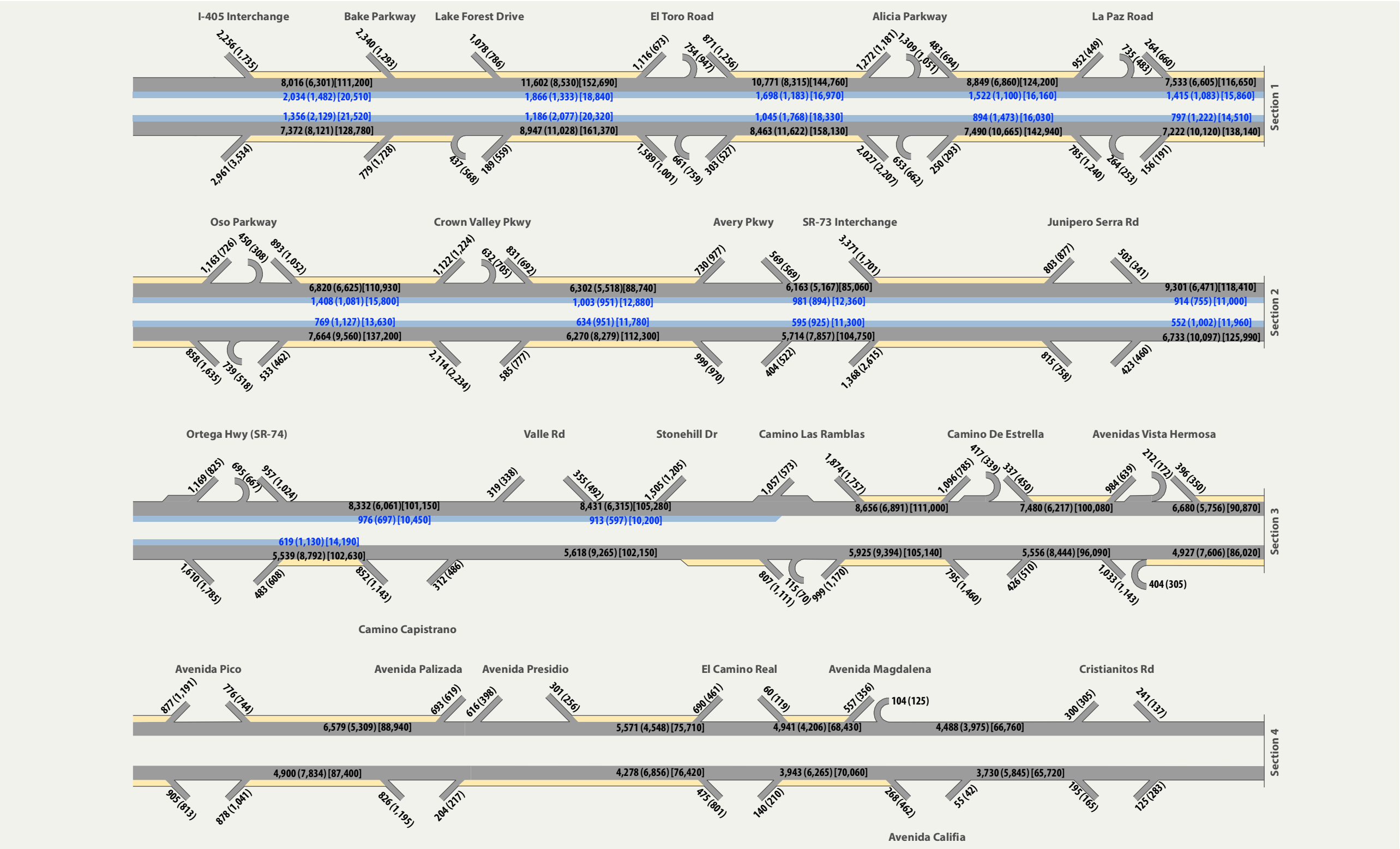
In addition, two local on-ramps to northbound I-5 (Avenida Magdalena on-ramp and the loop on-ramp from eastbound Pacific Coast Highway) were closed in February 2017 during the field data collection. The Avenida Magdalena on-ramp was re-opened in March; however, the northbound on- and off-ramp at El Camino Real was then closed. The loop on-ramp from eastbound Pacific Coast Highway to northbound I-5 has been closed since January 2017 and won't open until June 2017. In order to capture the I-5 ramp volumes that better reflects the typical traffic patterns without closure of ramp accesses, manual adjustments were made to the February 2017 traffic volumes at the closed and adjacent ramps, based on review of field data, March 2017 traffic counts from OCTA, historical PeMS data, and information provided by Caltrans.

In many cases traffic counts refer to the constrained traffic volumes that get through transportation facilities such as freeways and arterials. Under over-saturated conditions, traffic demand would not be adequately accommodated by roadways, and the part of the traffic demand that could get through is typically referred as constrained volumes or traffic counts. In order to determine the existing traffic demand along I-5, the traffic counts at locations at the entry points of the study corridor were used to identify the traffic demand for both directions of I-5. In another word, the freeway traffic counts on northbound I-5 near Cristianitos Road were used as entering traffic demand for the northbound direction, and the freeway counts on southbound I-5 near Lake Forest Drive were used as entering traffic demand for the southbound direction. The freeway traffic demand at the remaining segments was calculated by balancing downstream using the on- and off-ramp volumes. **Figure 2** shows the existing (2017) peak hour and daily traffic volumes for freeway mainline segments and ramps.

The weekend traffic counts were collected on the field in late September/early October at five segments along I-5. Given the multi-hour traffic congestion observed during the weekend conditions, the collected peak hour traffic counts are considered as constrained volumes and do not reflect the true demand due to unserved traffic demand in the queue. Therefore, the peak hour weekend traffic demand was developed by estimating the unserved traffic demand based on the vehicle queue profile and adding the unserved demand to the existing counts. The peak hour traffic counts (constrained volumes) and estimated peak hour demand volumes are shown in **Table 3** at the five locations under Saturday peak hour for southbound I-5 and Sunday peak hour for northbound I-5.

In addition, daily traffic volumes were also obtained at key arterial segments from OCTA 2017 ADT map. The ADT volumes and the year when the ADT were collected are summarized in **Table 4**.

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- General Purpose Lanes
- HOV Lane
- Auxillary Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume

Existing Conditions Mainline and Ramp Volumes - (I-5)

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Table 3 – Existing (2017) Weekend Peak Hour Traffic Demand Volumes

Location	Northbound (Sunday)		Southbound (Saturday)	
	Counts	Demand	Counts	Demand
I-5: Cristianitos Road – Avenida Califa	5,480	7,560	5,620	6,970
I-5: Avenida Pico – Avenida Vista Hermosa	6,140	8,090	6,410	7,760
I-5: Stonehill Drive – Camino Capistrano	7,850	9,800	7,220	8,570
I-5: Crown Valley Parkway – Oso Parkway	9,420	11,370	8,820	8,820
I-5: El Toro Road – Lake Forest Drive	10,850	12,800	10,740	10,740

Source: Fehr & Peers, 2017.

Table 4 – Existing ADT on Arterial Segments

Arterial Segments	ADT	ADT Year
1. Avenida Pico east of I-5	42,000	2012
2. Avenida Pico west of Avenida La Pata	17,000	2012
3. Avenida Vista Hermosa east of I-5	26,000	2010
4. Avenida Vista Hermosa west of Avenida La Pata	21,000	2013
5. Camino De Los Mares east of I-5	26,000	2013
6. Camino Las Ramblas east of I-5	11,000	2012
7. Ortega Highway east of I-5	49,000	2012
8. Ortega Highway west of Antonio Parkway	27,000	2012
9. Ortega Highway east of Antonio Parkway	36,000	2011
10. SR 73 east of I-5	-	-
11. SR 73 west of SR 241	-	-
12. Avery Parkway east of I-5	29,000	2016
13. Crown Valley Parkway east of I-5	61,000	2016
14. Crown Valley Parkway west of Antonio Parkway	20,000	2017
15. Crown Valley Parkway west of SR 241	-	-
16. Oso Parkway east of I-5	58,000	2016
17. Oso Parkway west of Antonio Parkway	43,000	2017
18. Oso Parkway west of SR 241	28,000	2017
19. Avenida La Pata north of Avenida Vista Hermosa	5,000	2010
20. Antonio Parkway north of Ortega Highway	28,000	2017
21. Antonio Parkway north of Crown Valley Parkway	32,000	2017
22. Antonio Parkway north of Oso Parkway	37,000	2017

Source: OCTA 2017 ADT Map.

In addition to the traffic volumes, key parameters for transportation analysis such as heavy vehicle percentages and peak hour factors (PHF) were also obtained from various sources, including Caltrans census data, PeMS database, and field counts.

Traffic Operations Analysis

Existing traffic volumes shown on Figure 2 were used to conduct traffic operations analysis for the I-5 study corridor including freeway mainline and ramp junctions. Lane geometrics (including number of lanes, grade, segment lengths, acceleration lane and deceleration lane distances, etc.) were obtained from multiple sources (field, google maps, and design plans). The weekday AM peak hour I-5 density, volume/capacity (v/c) ratio, and LOS results (see technical calculations in Appendix) are presented in **Tables 5A and 5B** for northbound and southbound, respectively. The weekday PM peak hour results are shown in **Tables 6A and 6B**. The LOS was determined based on the density in accordance with the HCM 6th Edition methodology. However, the v/c ratio was also reported to understand the v/c changes for locations operating with LOS F, as the value of density is not reported for LOS F operations.

During the AM peak hour, majority of the northbound I-5 study locations north of Avenida Vista Hermosa operate at LOS E or F conditions, including locations from Avenida Vista Hermosa slip on-ramp to Camino De Estrella off-ramp, from Camino De Estrella slip on-ramp to Camino Las Ramblas off-ramp, from Stonehill Drive on-Ramp to Ortega Highway off-Ramp, from Ortega Highway slip on-ramp to Junipero Serra Road off-ramp, from Oso Parkway slip on-ramp to La Paz Road off-ramp, and from Alicia Parkway off-ramp to Lake Forest Drive off-ramp. South of Avenida Vista Hermosa, northbound I-5 operate at acceptable LOS D or better. In the southbound direction, all the study locations operate acceptably at LOS D or better conditions, with the only exception at the mainline segment from the Oso Parkway on-ramp to the Crown Valley Parkway off-ramp.

During the PM peak hour, all the northbound I-5 study locations operate acceptably with LOS D or better except for the Lake Forest Drive off-ramp. In the southbound direction, substantial traffic congestion experience from the current bottleneck at Alicia Parkway and result in substantial vehicle queues to extend back all the way to I-405 and all the southbound I-5 segments between Alicia Parkway and I-405 operates at LOS E or F conditions. The bottleneck at Alicia Parkway meters traffic travel to downstream locations, therefore, majority of the southbound I-5 locations south of Alicia Parkway operate at acceptable conditions. However, multiple ramps and several mainline segments south of Alicia Parkway still operate at deficient LOS E or F conditions, including La Paz Road, Oso Parkway, Crown Valley Parkway, Camino Capistrano, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, and Avenida Palizada.

Table 5A – Existing Conditions (2017) <u>Northbound</u> I-5 Operations – AM Peak Hour					
	Location	Type	V/C	Density	LOS
1	South of Cristianitos Rd	Basic	0.56	19.6	C
2	Cristianitos Rd Off-Ramp	Diverge	0.56	24.1	C
3	Cristianitos Rd On-Ramp	Merge	0.51	22.0	C
4	Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.56	19.9	C
5	Avenida Magdalena Off-Ramp	Diverge	0.54	23.5	C
6	Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.50	19.0	B
7	El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.57	22.7	C
8	Avenida Presidio On-Ramp	Merge	0.72	29.1	D
9	Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.74	27.1	D
10	Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.69	29.2	D
11	Avenida Pico On-Ramp	Merge	0.67	24.2	C
12	Avenida Vista Hermosa Off-Ramp	Diverge	0.69	29.1	D
13	Avenida Vista Hermosa Loop On-Ramp	Merge	0.71	30.0	D
14	Avenida Vista Hermosa Slip On-Ramp	Merge	0.92	35.6	E
15	Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.94	39.5	E
16	Camino De Estrella Off-Ramp	Diverge	0.89	37.0	E
17	Camino De Estrella Loop On-Ramp	Merge	0.81	32.9	D
18	Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	0.94	40.7	E
19	Camino Las Ramblas On-Ramp	Merge	0.84	33.7	D
20	Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.83	31.7	D
21	Stonehill Dr On-Ramp	Merge	1.04	-	F
22	Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	1.00	-	F
23	Camino Capistrano Off-Ramp	Diverge	1.00	-	F
24	Camino Capistrano/Valle Rd On-Ramp	Merge	0.89	-	F
25	Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	0.99	43.8	E
26	Ortega Highway Off-Ramp	Diverge	1.06	-	F
27	Ortega Highway Loop On-Ramp	Merge	0.89	34.9	D
28	Ortega Highway Slip On-Ramp	Merge	0.85	31.9	D
29	Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	0.88	35.2	E
30	Junipero Serra Rd Off-Ramp	Diverge	0.90	37.3	E
31	Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.83	32.2	D
32	SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.74	27.1	D
33	Avery Parkway Off-Ramp	Diverge	0.78	32.0	D
34	Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.71	28.0	C
35	Crown Valley Parkway Loop On-Ramp	Merge	0.68	27.8	C
36	Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.72	26.0	D
37	Oso Parkway Loop On-Ramp	Merge	0.72	29.9	D
38	Oso Parkway Slip On-Ramp	Merge	0.89	35.6	E
39	Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.88	35.4	E
40	La Paz Road Off Ramp	Diverge	0.88	35.3	E
41	La Paz Road Loop On Ramp	Merge	0.89	32.9	D
42	La Paz Road Slip On Ramp	Merge	0.85	33.0	D
43	Alicia Parkway Off Ramp	Diverge	0.86	-	F
44	Alicia Parkway Loop On Ramp	Merge	0.76	-	F
45	Alicia Parkway Slip On Ramp	Merge	0.82	-	F
46	Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.85	-	F
47	El Toro Road Off Ramp	Diverge	0.85	-	F
48	El Toro Road Loop On Ramp	Merge	0.93	-	F
49	El Toro Road Slip On Ramp	Merge	0.93	-	F
50	Lake Forest Drive Off Ramp	Diverge	1.19	-	F
51	Bake Parkway/Truck Bypass Off Ramp	Diverge	0.83	32.1	D
52	Bake Parkway to I-405 Off Ramp	Basic	0.78	29.0	D
Notes: Bold font indicates unacceptable LOS E or F conditions.					
Source: Fehr & Peers, 2018					

Table 5B – Existing Conditions (2017) <u>Southbound</u> I-5 Operations – AM Peak Hour					
	Location	Type	V/C	Density	LOS
1	I-405 On Ramp to Bake Pkwy	Basic	0.68	24.4	C
2	Bake Parkway/Truck Bypass On Ramp	Merge	0.62	22.2	C
3	Lake Forest Drive Loop On Ramp	Merge	0.53	20.8	C
4	Lake Forest Drive Slip On Ramp	Merge	0.48	19.3	B
5	Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.69	24.7	C
6	El Toro Road Off Ramp	Diverge	0.75	31.5	D
7	El Toro Road Loop On Ramp	Merge	0.65	24.9	C
8	El Toro Road Slip On Ramp	Merge	0.63	25.9	C
9	El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	0.78	29.1	D
10	Alicia Parkway Off Ramp	Diverge	0.78	29.1	D
11	Alicia Parkway Loop On Ramp	Merge	0.66	23.6	C
12	Alicia Parkway Slip On Ramp	Merge	0.54	21.4	C
13	La Paz Road Off Ramp	Diverge	0.69	24.9	C
14	La Paz Road Loop On Ramp	Merge	0.80	30.4	D
15	La Paz Road Slip On Ramp	Merge	0.70	26.2	C
16	La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.83	32.0	D
17	Oso Parkway Off-Ramp	Diverge	0.74	19.5	B
18	Oso Parkway Loop On-Ramp	Merge	0.80	31.2	D
19	Oso Parkway Slip On-Ramp	Merge	0.91	31.8	D
20	Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	0.91	37.3	E
21	Crown Valley Parkway Off-Ramp	Diverge	0.91	37.3	E
22	Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.79	35.4	E
23	Avery Parkway On-Ramp	Merge	0.63	25.3	C
24	Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	0.69	24.7	C
25	SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	0.69	24.7	C
26	Junipero Springs Road On-Ramp	Merge	0.56	20.0	B
27	Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	0.65	23.1	C
28	Ortega Highway Off-Ramp	Diverge	0.64	22.8	C
29	Ortega Highway On-Ramp	Merge	0.62	24.1	C
30	Camino Capistrano Off-Ramp	Diverge	0.64	14.8	B
31	Camino Capistrano On-Ramp	Merge	0.60	24.5	C
32	Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	0.68	24.4	C
33	Camino Las Ramblas Off-Ramp	Diverge	0.58	13.2	B
34	Camino Las Ramblas Loop On-Ramp	Merge	0.48	16.9	B
35	Camino Las Ramblas Slip On-Ramp	Merge	0.63	24.9	C
36	Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.57	20.3	C
37	Camino De Estrella Off-Ramp	Diverge	0.52	10.6	B
38	Camino De Estrella On-Ramp	Merge	0.64	19.8	B
39	Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	0.71	25.6	C
40	Avenida Vista Hermosa Off-Ramp	Diverge	0.61	14.7	B
41	Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.52	19.5	B
42	Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	0.76	26.2	C
43	Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	0.52	18.3	C
44	Avenida Presidio On-Ramp	Weave	0.41	14.6	B
45	El Camino Real Off-Ramp	Weave	0.41	14.6	B
46	El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.39	14.0	B
47	Avenida Califia On-Ramp	Merge	0.40	16.2	B
48	Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.47	16.8	B
49	Cristianitos Rd Off-Ramp	Diverge	0.48	20.7	C
50	Cristianitos Rd On-Ramp	Merge	0.40	17.1	B
51	South of Cristianitos Rd	Basic	0.47	16.5	B
Notes:	Bold font indicates unacceptable LOS E or F conditions.				
Source:	Fehr & Peers, 2018				

Table 6A – Existing Conditions (2017) <u>Northbound</u> I-5 Operations – PM Peak Hour					
	Location	Type	V/C	Density	LOS
1	South of Cristianitos Rd	Basic	0.48	16.9	B
2	Cristianitos Rd Off-Ramp	Diverge	0.47	20.8	C
3	Cristianitos Rd On-Ramp	Merge	0.45	20.1	C
4	Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.50	17.6	B
5	Avenida Magdalena Off-Ramp	Diverge	0.49	21.3	C
6	Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.43	15.6	B
7	El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.46	17.5	B
8	Avenida Presidio On-Ramp	Merge	0.54	22.8	C
9	Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.59	20.8	C
10	Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.62	22.6	C
11	Avenida Pico On-Ramp	Merge	0.57	20.0	C
12	Avenida Vista Hermosa Off-Ramp	Diverge	0.63	26.6	C
13	Avenida Vista Hermosa Loop On-Ramp	Merge	0.60	26.3	C
14	Avenida Vista Hermosa Slip On-Ramp	Merge	0.73	29.0	D
15	Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.78	29.2	D
16	Camino De Estrella Off-Ramp	Diverge	0.76	32.2	D
17	Camino De Estrella Loop On-Ramp	Merge	0.65	27.3	C
18	Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	0.80	29.1	D
19	Camino Las Ramblas On-Ramp	Merge	0.58	24.9	C
20	Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.61	21.6	C
21	Stonehill Dr On-Ramp	Merge	0.78	28.1	D
22	Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	0.75	27.8	D
23	Camino Capistrano Off-Ramp	Diverge	0.77	32.1	D
24	Camino Capistrano/Valle Rd On-Ramp	Merge	0.65	27.3	C
25	Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	0.72	26.1	D
26	Ortega Highway Off-Ramp	Diverge	0.82	34.3	D
27	Ortega Highway Loop On-Ramp	Merge	0.65	26.5	C
28	Ortega Highway Slip On-Ramp	Merge	0.62	23.8	C
29	Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	0.61	21.7	C
30	Junipero Serra Rd Off-Ramp	Diverge	0.62	26.7	C
31	Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.58	20.5	C
32	SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.63	22.3	C
33	Avery Parkway Off-Ramp	Diverge	0.67	28.0	D
34	Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.76	24.5	C
35	Crown Valley Parkway Loop On-Ramp	Merge	0.63	25.9	C
36	Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.72	29.1	D
37	Oso Parkway Loop On-Ramp	Merge	0.62	26.2	C
38	Oso Parkway Slip On-Ramp	Merge	0.69	24.9	C
39	Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.75	30.5	D
40	La Paz Road Off Ramp	Diverge	0.83	33.4	D
41	La Paz Road Loop On Ramp	Merge	0.69	26.1	C
42	La Paz Road Slip On Ramp	Merge	0.65	23.2	C
43	Alicia Parkway Off Ramp	Diverge	0.71	29.1	D
44	Alicia Parkway Loop On Ramp	Merge	0.57	20.0	C
45	Alicia Parkway Slip On Ramp	Merge	0.67	25.1	C
46	Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.66	23.5	C
47	El Toro Road Off Ramp	Diverge	0.66	23.5	C
48	El Toro Road Loop On Ramp	Merge	0.71	26.9	C
49	El Toro Road Slip On Ramp	Merge	0.68	24.6	C
50	Lake Forest Drive Off Ramp	Diverge	0.87	35.1	E
51	Bake Parkway/Truck Bypass Off Ramp	Diverge	0.61	21.7	C
52	Bake Parkway to I-405 Off Ramp	Basic	0.61	21.7	C
Notes: Bold font indicates unacceptable LOS E or F conditions.					
Source: Fehr & Peers, 2018					

Table 6B – Existing Conditions (2017) <u>Southbound</u> I-5 Operations – PM Peak Hour					
	Location	Type	V/C	Density	LOS
1	I-405 On Ramp to Bake Pkwy	Basic	0.75	27.5	F*
2	Bake Parkway/Truck Bypass On Ramp	Merge	0.75	27.8	F*
3	Lake Forest Drive Loop On Ramp	Merge	0.63	24.2	F*
4	Lake Forest Drive Slip On Ramp	Merge	0.68	26.5	F*
5	Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.85	32.9	F*
6	El Toro Road Off Ramp	Diverge	0.96	39.2	E
7	El Toro Road Loop On Ramp	Merge	0.91	34.1	F*
8	El Toro Road Slip On Ramp	Merge	0.98	-	F
9	El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	1.07	-	F
10	Alicia Parkway Off Ramp	Diverge	1.07	-	F
11	Alicia Parkway Loop On Ramp	Merge	0.81	-	F
12	Alicia Parkway Slip On Ramp	Merge	0.68	-	F
13	La Paz Road Off Ramp	Diverge	0.86	33.8	D
14	La Paz Road Loop On Ramp	Merge	0.96	41.6	E
15	La Paz Road Slip On Ramp	Merge	0.85	31.7	D
16	La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	1.01	-	F
17	Oso Parkway Off-Ramp	Diverge	1.03	-	F
18	Oso Parkway Loop On-Ramp	Merge	0.83	32.3	D
19	Oso Parkway Slip On-Ramp	Merge	0.97	33.3	D
20	Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	0.98	43.1	E
21	Crown Valley Parkway Off-Ramp	Diverge	0.98	43.1	E
22	Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.70	30.8	D
23	Avery Parkway On-Ramp	Merge	0.73	28.8	D
24	Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	0.79	29.5	D
25	SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	0.79	29.5	D
26	Junipero Springs Road On-Ramp	Merge	0.72	25.7	C
27	Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	0.84	32.8	D
28	Ortega Highway Off-Ramp	Diverge	0.83	32.0	D
29	Ortega Highway On-Ramp	Merge	0.83	31.6	D
30	Camino Capistrano Off-Ramp	Diverge	1.00	-	F
31	Camino Capistrano On-Ramp	Merge	0.86	33.7	D
32	Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	0.96	41.2	E
33	Camino Las Ramblas Off-Ramp	Diverge	0.84	22.9	C
34	Camino Las Ramblas Loop On-Ramp	Merge	0.67	23.9	C
35	Camino Las Ramblas Slip On-Ramp	Merge	0.79	30.7	D
36	Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.78	29.2	D
37	Camino De Estrella Off-Ramp	Diverge	0.71	17.5	B
38	Camino De Estrella On-Ramp	Merge	0.81	26.1	C
39	Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	0.91	37.0	E
40	Avenida Vista Hermosa Off-Ramp	Diverge	0.78	21.2	C
41	Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.67	26.5	C
42	Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.04	-	F
43	Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	0.68	24.3	C
44	Avenida Presidio On-Ramp	Weave	0.52	19.1	B
45	El Camino Real Off-Ramp	Weave	0.52	19.1	B
46	El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.48	18.0	B
47	Avenida Califia On-Ramp	Merge	0.48	19.2	B
48	Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.58	20.4	C
49	Cristianitos Rd Off-Ramp	Diverge	0.57	24.1	C
50	Cristianitos Rd On-Ramp	Merge	0.52	21.5	C
51	South of Cristianitos Rd	Basic	0.59	21.0	C
Notes:	Bold font indicates unacceptable LOS E or F conditions. *Southbound I-5 between El Toro and I-405 has congested speed of less than 35 miles per hour during the PM peak hour due to queue spillback from Alicia Parkway; therefore, those locations operate at LOS F conditions.				
Source:	Fehr & Peers, 2018				

In addition, the I-5 study corridor south of SR 73 shows unique traffic pattern characteristics during the weekend conditions. Severe recurring congestion is currently experienced on Sunday mid-day to late afternoon along northbound I-5 from north of Avenida Vista Hermosa to the Countyline and beyond. The congestion currently starts at north of Avenida Vista Hermosa around 10:30 AM and continues for approximately 6 hours until 4:30 PM, resulting in substantial vehicle queues of 8-9 miles spillback to the Countyline and beyond. The two northbound I-5 segments between Cristianitos Road and Avenida Calafia and between Avenida Pico and Avenida Vista Hermosa operate at LOS E or F conditions during the Sunday peak hour. In addition, if the unserved demand along northbound I-5 would travel to downstream locations, northbound I-5 between Crown Valley Parkway and Oso Parkway, would also operate unacceptably at LOS E during the Sunday peak hour.

Southbound I-5 also experiences substantial congestion on Saturdays from Camino De Estrella to Ortega Highway and beyond, resulting in vehicle queues along southbound I-5 for approximately 5 hours and 6 miles on Saturdays and LOS E conditions between Stonehill Drive and Camino Capistrano during the Saturday peak hour. If the unserved demand along southbound I-5 would travel to downstream locations, southbound I-5 between Avenida Pico and Avenida Vista Hermosa would also operate unacceptably at LOS E during the Saturday peak hour.

The weekend peak hour (Saturday for southbound I-5 and Sunday for northbound I-5) results are summarized in **Table 7**.

Table 7 – Existing (2017) Weekend I-5 Operations Analysis

Mainline Segment	Northbound (Sunday)			Southbound (Saturday)		
	v/c	Density	LOS	v/c	Density	LOS
I-5: Cristianitos Road – Avenida Calafia	0.99	43.6	E	0.87	34.6	D
I-5: Avenida Pico – Avenida Vista Hermosa	1.08	-	F	0.97	42.3	E
I-5: Stonehill Drive – Camino Capistrano	0.86	33.9	D	0.97	42.6	E
I-5: Crown Valley Parkway – Oso Parkway	0.98	43.1	E	0.85	33.1	D
I-5: El Toro Road – Lake Forest Drive	0.79	29.5	D	0.68	24.3	C

1 Density was reported in number of vehicles per hour per lane.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).

More detailed traffic operations analysis (e.g., simulation) will be performed under the PA&ED phase and will evaluate how the operational deficiencies at upstream or downstream locations would affect operations and LOS at adjacent facilities and the entire study corridor.

Collision Data Review

Accident data was reviewed for I-5 mainline segments and ramps within the project limit (I-405 to Countyline). For the purpose of this project, a three-year accident history was provided by Caltrans for January 2012 through December 2014. **Table 8** shows the number of total accidents, fatalities, and injuries for both freeway mainline and ramps, as well as the actual three-year accident rates with a comparison to the statewide average accident rates on similar facilities.

A total of 4,068 accidents with 11 fatalities and 1,370 injuries occurred in the study area between January 2012 and December 2014. A majority of the accidents (i.e., 84 percent) occurred on the I-5 mainline, while the remaining 16 percent at the on- and off-ramps. Accident rates at 55 out of 133 analyzed locations are higher than the statewide average for similar facilities. Among the 55 locations, the following 22 locations had accident rates as high as twice of the statewide average rates (either fatalities accident rate, total fatalities and injuries accident rate, or total accident rate).

- Southbound I-5 between on ramp from I-405 and on ramp from Bake Parkway (about 200% higher for fatalities accident rate)
- Southbound I-5 between westbound on ramp from Lake Forest Drive to off ramp to El Toro Road (about 130% higher for fatalities accident rate, about 60% higher for total fatalities and injuries accident rate, and about 30% higher for total accident rate)
- Southbound I-5 off ramp to El Toro Road (about 170% higher for total fatalities and injuries accident rate and about 50% higher for total accident rate)
- Southbound I-5 westbound on ramp from El Toro Road (about 190% higher for total fatalities and injuries accident rate and about 240% higher for total accident rate)
- Southbound I-5 between westbound on ramp from El Toro Road and off ramp to Alicia Parkway (about 200% higher for fatalities accident rate)
- Southbound I-5 on-ramp from eastbound Oso Parkway (about 740% higher for total fatalities and injuries accident rate and about 460% higher for total accident rate)
- Southbound I-5 on-ramp from Crown Valley Parkway (about 220% higher for total fatalities and injuries accident rate and about 80% higher for total accident rate)
- Southbound I-5 on-ramp from Avery Parkway (about 160% higher for total fatalities and injuries accident rate and about 30% higher for total accident rate)
- Northbound I-5 off-ramp to El Camino Real (about 720% higher for total fatalities and injuries accident rate and about 330% higher for total accident rate)
- Northbound I-5 on-ramp from El Camino Real (about 290% higher for total fatalities and injuries accident rate and about 170% higher for total accident rate)
- Northbound I-5 between on-ramp from Avenida Presidio and on-ramp from Avenida Palizada (about 110% higher for total fatalities and injuries accident rate and about 30% higher for total accident rate)
- Northbound I-5 between on ramp from Avenida Palizada and on ramp from Avenida Pico (about 160% higher for total fatalities and injuries accident rate and about 80% higher for total accident rate)

- Northbound I-5 between on ramp from Avenida Pico and on ramp from Avendio Vista Hermosa (about 120% higher for total fatalities and injuries accident rate and about 60% higher for total accident rate)
- Northbound I-5 between on ramp from Avenida Vista Hermosa and on ramp from Camino De Estrella (about 150% higher for fatalities accident rate and about 10% higher for total fatalities and injuries accident rate)
- Northbound I-5 between eastbound on ramp from Camino De Estrella and on ramp from Camino Las Ramblas (about 230% higher for fatalities accident rate and about 10% higher for total fatalities and injuries accident rate)
- Northbound I-5 off-ramp to Camino Las Ramblas (about 270% higher for total fatalities and injuries accident rate and about 160% higher for total accident rate)
- Northbound I-5 on-ramp from Camino Las Ramblas (about 380% higher for total fatalities and injuries accident rate and about 230% higher for total accident rate)
- Northbound I-5 off-ramp to Avery Parkway (about 130% higher for total fatalities and injuries accident rate and about 90% higher for total accident rate)
- Northbound I-5 off-ramp to Crown Valley Parkway (about 180% higher for total fatalities and injuries accident rate and about 130% higher for total accident rate)
- Northbound I-5 westbound on-ramp from La Paz Road (about 240% higher for total accident rate)
- Northbound I-5 off-ramp to Alicia Parkway (about 120% higher for total fatalities and injuries accident rate and about 100% higher for total accident rate)
- Northbound I-5 eastbound on-ramp from Alicia Parkway (about 260% higher for total fatalities and injuries accident rate and about 160% higher for total accident rate)

Table 9A summarizes the number of accidents by accident type for those occurred on I-5. As shown, approximately 57% the accidents were rear-end collisions on the I-5, and other key accident types were sideswipe (20%) and hit-object (16%). Rear-end collisions are typically related to traffic congestion. The numbers of collisions in each accident type were similar between the northbound and southbound of the I-5 study corridor.

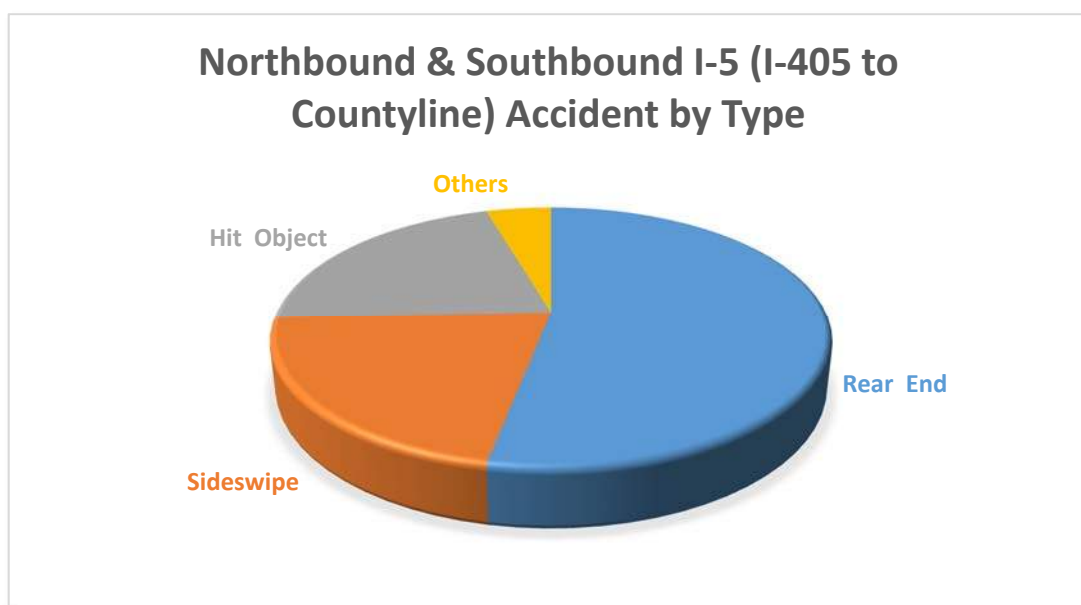


Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014)

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal		Fatal	Fatal	
							+			+
						Injury	Total		Injury	Total
Southbound I-5 between On Ramp from I-405 and On Ramp from Bake Parkway	021.259-020.500	42	1	12	<u>0.009</u>	0.11	0.36	0.003	0.3	0.97
Southbound I-5 On Ramp from I-405	20.93	0	0	0	0.000	0	0	0.002	0.11	0.32
Southbound I-5 On Ramp from Bake Parkway/Truck Bypass	20.193	1	0	0	0.000	0	0.06	0.002	0.13	0.39
Southbound I-5 between On Ramp from Bake Parkway/Truck Bypass and Eastbound On Ramp from Lake Forest Drive	020.499-019.200	145	0	42	0.000	0.18	0.64	0.003	0.32	1.04
Southbound I-5 Eastbound On Ramp from Lake Forest Drive	20.009	5	0	1	0.000	0.07	0.34	0.003	0.23	0.71
Southbound I-5 Westbound On Ramp from Lake Forest Drive	19.798	1	0	1	0.000	0.06	0.06	0.003	0.19	0.56
Southbound I-5 between Westbound On Ramp from Lake Forest Drive to Off Ramp to El Toro Road	019.199-018.400	217	1	79	<u>0.007</u>	<u>0.53</u>	<u>1.43</u>	0.003	0.34	1.11
Southbound I-5 Off Ramp to El Toro Road	18.913	19	0	10	0.000	<u>0.61</u>	<u>1.17</u>	0.002	0.23	0.78
Southbound I-5 Eastbound On Ramp from El Toro Road	18.786	7	0	1	0.000	0.09	<u>0.61</u>	0.001	0.17	0.48
Southbound I-5 Westbound On Ramp from El Toro Road	18.537	17	0	5	0.000	<u>0.55</u>	<u>1.88</u>	0.003	0.19	0.56
Southbound I-5 between Westbound On Ramp from El Toro Road and Off Ramp to Alicia Parkway	018.398-017.800	40	1	11	<u>0.009</u>	0.11	0.37	0.003	0.18	0.57
Southbound I-5 between Off Ramp to Alicia Parkway and Westbound On Ramp from Alicia Parkway	017.798-017.100	98	0	33	0.000	0.27	0.8	0.003	0.31	1.08
Southbound I-5 Off Ramp to Alicia Parkway	17.634	24	0	8	0.000	<u>0.39</u>	<u>1.16</u>	0.004	0.32	0.92
Southbound I-5 Eastbound On Ramp from Alicia Parkway	17.487	2	0	1	0.000	0.1	0.21	0.003	0.23	0.71
Southbound I-5 Westbound On Ramp from Alicia Parkway	17.255	3	0	3	0.000	<u>0.37</u>	0.37	0.003	0.19	0.56
Southbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to La Paz Road	017.099-016.000	78	0	22	0.000	0.12	0.41	0.003	0.35	1.16
Southbound I-5 Off Ramp to La Paz Road	16.717	8	0	2	0.000	0.25	<u>0.98</u>	0.004	0.32	0.92
Southbound I-5 Eastbound On Ramp from La Paz Road	16.571	2	0	0	0.000	0	0.14	0.003	0.23	0.71
Southbound I-5 Westbound On Ramp from La Paz Road	16.386	0	0	0	0.000	0	0	0.003	0.19	0.56

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal		Fatal	Fatal	
							+			+
						Injury	Total		Injury	Total
Southbound I-5 between Westbound On Ramp from La Paz Road and Off Ramp to Oso Parkway	015.99-015.170	61	0	24	0.000	0.17	0.43	0.003	0.35	1.16
Southbound I-5 Off Ramp to Oso Parkway	15.474	18	0	5	0.000	0.24	0.85	0.003	0.35	1.01
Southbound I-5 On Ramp from Westbound Oso Parkway	15.315	7	0	1	0.000	0.13	<u>0.9</u>	0.002	0.21	0.73
Southbound I-5 On Ramp from Eastbound Oso Parkway	15.028	21	0	10	0.000	<u>1.52</u>	<u>3.18</u>	0.003	0.18	0.57
Southbound I-5 between Oso Parkway Off Ramp and Crown Valley Parkway On Ramp	015.216-013.776	148	1	39	0.004	0.17	0.62	0.005	0.36	1.19
Southbound I-5 Off Ramp to Crown Valley Parkway	13.9	34	0	8	0.000	0.23	0.97	0.003	0.35	1.01
Southbound I-5 between On Ramp from Crown Valley Parkway and On Ramp from Avery Parkway	013.776-012.943	74	0	35	0.000	<u>0.3</u>	0.63	0.003	0.29	0.97
Southbound I-5 On Ramp from Crown Valley Parkway	13.609	13	0	8	0.000	<u>0.71</u>	<u>1.16</u>	0.002	0.22	0.63
Southbound I-5 Off Ramp to Avery Parkway	13.104	15	0	4	0.000	0.31	<u>1.18</u>	0.003	0.35	1.01
Southbound I-5 between On Ramp from Avery Parkway and On Ramp from Junipero Serra	012.943-010.909	124	1	35	0.003	0.12	0.4	0.003	0.29	1
Southbound I-5 On Ramp from Avery Parkway	12.831	6	0	4	0.000	<u>0.56</u>	<u>0.83</u>	0.002	0.22	0.63
Southbound I-5 On Ramp from SR-73	10.267	6	1	0	0.000	0.11	0.33	0.003	0.35	1.01
Southbound I-5 Off Ramp to Junipero Serra Road	11.136	3	0	1	0.000	0.11	0.33	0.003	0.35	1.01
Southbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Ortega Highway	10.909-009.604	165	0	56	0.000	0.28	0.83	0.003	0.29	0.99
Southbound I-5 On Ramp from Junipero Serra Road	10.762	0	0	0	0.000	0	0	0.002	0.22	0.63
Southbound I-5 Off Ramp to Ortega Highway	9.722	22	0	4	0.000	0.18	1	0.003	0.35	1.01
Southbound I-5 between On Ramp from Ortega Highway and On Ramp from Camino Capistrano	009.604-008.794	65	0	14	0.000	0.12	0.57	0.004	0.31	1.01
Southbound I-5 On Ramp from Ortega Highway	9.428	3	0	1	0.000	0.11	0.32	0.002	0.22	0.63
Southbound I-5 Off Ramp to Camino Capistrano	8.756	6	0	2	0.000	0.12	0.36	0.003	0.24	0.84

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
Southbound I-5 between On Ramp from Camino Capistrano and On Ramp from Camino Las Ramblas	008.794-006.687	122	0	31	0.000	0.11	0.43	0.004	0.32	1.03
Southbound I-5 On Ramp from Camino Capistrano	8.631	4	0	1	0.000	<u>0.16</u>	<u>0.65</u>	0.001	0.13	0.46
Southbound I-5 Off Ramp to Camino Las Ramblas	6.972	4	0	1	0.000	0.07	0.26	0.001	0.25	0.76
Southbound I-5 between On Ramp from Camino Las Ramblas and On Ramp from Camino De Estrella	006.686-005.801	98	0	34	0.000	<u>0.33</u>	<u>0.96</u>	0.003	0.26	0.87
Southbound I-5 Eastbound On Ramp from Camino Las Ramblas	6.818	0	0	0	0.000	0	0	0.004	0.21	0.72
Southbound I-5 Westbound On Ramp from Camino Las Ramblas	6.67	0	0	0	0.000	0	0	0.003	0.11	0.32
Southbound I-5 Off Ramp to Camino De Estrella	5.97	13	0	4	0.000	0.2	0.66	0.003	0.35	1.01
Southbound I-5 between On Ramp from Camino De Estrella and On Ramp from Avenida Vista Hermosa	005.801-004.077	79	0	33	0.000	0.16	0.39	0.004	0.31	1
Southbound I-5 On Ramp from Camino De Estrella	5.587	3	0	1	0.000	0.14	0.42	0.002	0.22	0.63
Southbound I-5 Off Ramp to Avenida Vista Hermosa	4.25	9	0	2	0.000	0.15	0.67	0.003	0.35	1.01
Southbound I-5 between On Ramp from Avenida Vista Hermosa and On Ramp from Avenida Pico	004.077-003.393	27	0	8	0.000	0.11	0.36	0.004	0.28	0.91
Southbound I-5 On Ramp from Avenida Vista Hermosa	4.101	0	0	0	0.000	0	0	0.003	0.24	0.72
Southbound I-5 Off Ramp to Avenida Pico	3.612	12	0	6	0.000	0.34	0.68	0.003	0.35	1.01
Southbound I-5 between On Ramp from Avenida Pico and On Ramp from Avendio Palizada	003.393-002.663	26	0	9	0.000	0.12	0.35	0.003	0.24	0.8
Southbound I-5 On Ramp from Avenida Pico	3.225	9	0	1	0.000	0.09	<u>0.84</u>	0.002	0.22	0.63
Southbound I-5 Off Ramp to Avenida Palizada	2.841	7	0	2	0.000	0.12	0.43	0.003	0.35	1.01
Southbound I-5 between Off Ramp to Avenida Palizada and On Ramp from Avenida Presidio	002.663-002.306	6	0	2	0.000	0.06	0.19	0.003	0.24	0.77
Southbound I-5 On Ramp from Avenida Presidio	2.142	0	0	0	0.000	0	0	0.002	0.22	0.63
Southbound I-5 between On Ramp from Avenida Presidio and On-Ramp from El Camino Real	002.306-001.627	25	1	7	0.000	0.13	0.42	0.003	0.25	0.79

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
Southbound I-5 Off Ramp to El Camino Real	1.912	8	0	5	0.000	<u>0.49</u>	0.78	0.003	0.35	1.01
Southbound I-5 between On Ramp from El Camino Real and On Ramp from Avenida Califa	001.627-001.131	29	0	11	0.000	<u>0.28</u>	0.73	0.003	0.23	0.74
Southbound I-5 On Ramp from El Camino Real	1.488	0	0	0	0.000	0	0	0.002	0.22	0.63
Southbound I-5 Off Ramp to Avenida Califa	1.002	5	0	2	0.000	<u>0.34</u>	<u>0.85</u>	0.003	0.24	0.84
Southbound I-5 between On Ramp to Avenida Califa and Orange/San Diego County Line	001.131-000.000	22	0	8	0.000	0.09	0.25	0.003	0.23	0.75
Southbound I-5 On Ramp from Avenida Califa	0.897	0	0	0	0.000	0	0	0.001	0.13	0.46
Total Southbound I-5 between I-405 and Orange/San Diego County Line	021.259-000.000	2008	7	650	0.001	0.20	0.57	0.003	0.26	0.80
Northbound I-5 between Orange/San Diego County Line and On Ramp from Avenida Magdalena	000.000-001.131	57	0	24	0.000	<u>0.28</u>	0.66	0.003	0.23	0.75
Northbound I-5 Off Ramp to Avenida Magdalena	1.134	2	0	0	0.000	0	<u>0.89</u>	0.003	0.24	0.84
Northbound I-5 between On Ramp from Avenida Magdalena and On Ramp from El Camino Real	001.131-01.626	20	0	6	0.000	0.15	0.5	0.003	0.23	0.74
Northbound I-5 On Ramp from Avenida Magdalena	1.257	0	0	0	0.000	0	0	0.002	0.22	0.63
Northbound I-5 Off Ramp to El Camino Real	1.536	6	0	4	0.000	<u>2.86</u>	<u>4.29</u>	0.003	0.35	1.01
Northbound I-5 between On Ramp from El Camino Real and On Ramp from Avenida Presidio	001.627-002.305	53	0	24	0.000	<u>0.4</u>	<u>0.89</u>	0.003	0.25	0.79
Northbound I-5 On Ramp from El Camino Real	1.843	14	0	7	0.000	<u>0.85</u>	<u>1.71</u>	0.002	0.22	0.63
Northbound I-5 Off Ramp to Avenida Presidio	2.199	3	0	1	0.000	<u>0.36</u>	<u>1.09</u>	0.003	0.35	1.01
Northbound I-5 between On Ramp from Avenida Presidio and On Ramp from Avenida Palizada	002.306-002.662	31	0	16	0.000	<u>0.51</u>	<u>0.98</u>	0.003	0.24	0.77
Northbound I-5 On Ramp from Avenida Presidio	2.466	2	0	2	0.000	<u>0.27</u>	0.27	0.002	0.22	0.63
Northbound I-5 between On Ramp from Avenida Palizada and On Ramp from Avenida Pico	002.663-003.392	109	0	47	0.000	<u>0.63</u>	<u>1.46</u>	0.003	0.24	0.8
Northbound I-5 On Ramp from Avenida Palizada	2.798	2	0	0	0.000	0	0.17	0.002	0.22	0.63

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
Northbound I-5 Off Ramp to Avenida Pico	3.271	15	0	4	0.000	<u>0.4</u>	<u>1.5</u>	0.003	0.35	1.01
Northbound I-5 On Ramp from Avenida Pico and On Ramp from Avendio Vista Hermosa	003.393- 004.076	112	0	46	0.000	<u>0.61</u>	<u>1.48</u>	0.004	0.28	0.91
Northbound I-5 On Ramp from Avenida Pico	3.556	17	0	5	0.000	<u>0.29</u>	<u>0.99</u>	0.002	0.22	0.63
Northbound I-5 Off Ramp to Avenida Vista Hermosa	3.896	3	0	2	0.000	<u>0.63</u>	0.94	0.003	0.35	1.01
Northbound I-5 On Ramp from Avenida Vista Hermosa and On Ramp from Camino De Estrella	004.077- 005.800	179	2	67	<u>0.010</u>	<u>0.34</u>	0.89	0.004	0.31	1
Northbound I-5 Eastbound On Ramp from Avenida Vista Hermosa	4.045	0	0	0	0.000	0	0	0.002	0.21	0.73
Northbound I-5 Westbound On Ramp from Avenida Vista Hermosa	4.248	5	0	0	0.000	0	0.34	0.003	0.18	0.57
Northbound I-5 Off Ramp to Camino De Estrella	5.629	4	0	2	0.000	0.31	0.61	0.003	0.35	1.01
Northbound I-5 between Eastbound On Ramp from Camino De Estrella and On Ramp from Camino Las Ramblas	005.801- 006.686	79	1	28	<u>0.010</u>	<u>0.29</u>	0.78	0.003	0.26	0.87
Northbound I-5 Westbound On Ramp from Camino De Estrella	5.932	6	0	0	0.000	0	0.45	0.003	0.18	0.57
Northbound I-5 Eastbound On Ramp from Camino De Estrella	5.761	2	0	2	0.000	<u>0.35</u>	0.35	0.002	0.21	0.73
Northbound I-5 Off Ramp to Camino Las Ramblas/Route 1	6.359	0	0	0	0.000	0	0	0.002	0.08	0.25
Northbound I-5 Off Segment to Route 1 Segment	6.512	2	0	1	0.000	0.06	0.12	0.004	0.16	0.49
Northbound I-5 Off Ramp to Camino Las Ramblas Segment	6.511	4	0	2	0.000	<u>1.3</u>	<u>2.61</u>	0.003	0.35	1.01
Northbound I-5 between On Ramp from Camino Las Ramblas and On Ramp from Camino Capistrano	006.687- 008.794	110	1	37	0.004	0.13	0.39	0.004	0.32	1.03
Northbound I-5 On Segment from Route 1	6.807	3	0	0	0.000	0	0.48	0.002	0.21	0.73
Northbound I-5 On Segment from Camino Las Ramblas	6.808	3	0	0	0.000	0	<u>0.77</u>	0.003	0.18	0.57
Northbound I-5 On Ramp from Camino Las Ramblas	7.116	6	0	3	0.000	<u>0.29</u>	<u>0.59</u>	0.001	0.06	0.18
Northbound I-5 On Ramp from Stonehill Drive	7.535	2	0	0	0.000	0	0.11	0.002	0.22	0.63
Northbound I-5 Off Ramp to Camino Capistrano	8.417	7	0	0	0.000	0	<u>0.96</u>	0.003	0.24	0.84
Northbound I-5 between On Ramp from Camino Capistrano and On Ramp from Ortega Highway	008.795- 009.603	42	0	18	0.000	0.16	0.37	0.004	0.31	1.01
Northbound I-5 On Ramp from Camino Capistrano	8.691	1	0	1	0.000	<u>0.2</u>	0.2	0.001	0.13	0.46

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
Northbound I-5 Off Ramp to Ortega Highway	9.449	8	0	3	0.000	<u>0.28</u>	0.73	0.001	0.25	0.76
Northbound I-5 between On Ramp from Ortega Highway and On Ramp from Junipero Serra Road	009.603-010.909	41	0	12	0.000	0.06	0.21	0.003	0.29	0.99
Northbound I-5 On Ramp from Ortega Highway	9.744	4	0	0	0.000	0	0.2	0.001	0.18	0.54
Northbound I-5 Off Ramp to Junipero Serra Road	10.749	2	0	1	0.000	0.22	0.45	0.003	0.35	1.01
Northbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Avery Parkway	10.910-012.942	141	0	41	0.000	0.13	0.46	0.003	0.29	1
Northbound I-5 On Ramp from Junipero Serra Road	11.069	5	0	0	0.000	0	0.56	0.002	0.22	0.63
Northbound I-5 Off Ramp to SR-73		0	0	0	0.000	0	0	0	0	0
Northbound I-5 Off Ramp to Avery Parkway	12.82	14	0	6	0.000	<u>0.8</u>	<u>1.87</u>	0.003	0.35	1.01
Northbound I-5 between On Ramp from Avery Parkway and On Ramp from Crown Valley Parkway	012.943-013.775	71	0	24	0.000	0.21	0.61	0.003	0.29	0.97
Northbound I-5 On Ramp from Avery Parkway	13.109	9	0	2	0.000	0.2	<u>0.89</u>	0.002	0.22	0.63
Northbound I-5 Off Ramp to Crown Valley Parkway	13.572	21	0	9	0.000	<u>0.99</u>	<u>2.31</u>	0.003	0.35	1.01
Northbound I-5 between On-Ramp from Crown Valley Parkway and Eastbound On Ramp from Oso Parkway	013.776-015.216	166	0	54	0.000	0.23	0.7	0.0005	0.36	1.19
Northbound I-5 Eastbound On Ramp from Crown Valley Parkway	13.718	7	0	3	0.000	0.22	0.52	0.003	0.24	0.72
Northbound I-5 Westbound On Ramp from Crown Valley Parkway	13.934	11	0	3	0.000	0.13	0.48	0.002	0.22	0.63
Northbound I-5 Off Ramp to Oso Parkway	14.945	11	0	4	0.000	0.31	0.87	0.003	0.35	1.01
Northbound I-5 Eastbound On Ramp from Oso Parkway	15.156	4	0	2	0.000	<u>0.29</u>	0.59	0.002	0.21	0.73
Northbound I-5 between Eastbound On Ramp from Oso Parkway and Westbound On Ramp from Oso Parkway	015.170-015.999	85	0	27	0.000	0.19	0.59	0.003	0.35	1.16
Northbound I-5 Westbound On Ramp from Oso Parkway	15.45	4	0	0	0.000	0	0.29	0.003	0.18	0.57
Northbound I-5 between Westbound On Ramp from Oso Parkway and Westbound On Ramp from La Paz Road	016.000-017.099	59	0	23	0.000	0.12	0.31	0.003	0.35	1.16
Northbound I-5 Off Ramp to La Paz Road	16.373	9	0	2	0.000	0.24	<u>1.08</u>	0.004	0.32	0.92

Table 8 – I-5 Collision Rate Summary (January 2012 through December 2014) - Continued

Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal		Fatal	Fatal	
							+			+
						Injury	Total		Injury	Total
Northbound I-5 Eastbound On Ramp from La Paz Road	16.665	6	0	1	0.000	0.07	0.41	0.003	0.23	0.71
Northbound I-5 Westbound On Ramp from La Paz Road	16.738	5	0	0	0.000	0	<u>1.9</u>	0.003	0.19	0.56
Northbound I-5 between Westbound On Ramp from La Paz Road and Westbound On Ramp from Alicia Parkway	017.100-017.798	80	0	23	0.000	0.19	0.65	0.003	0.31	1.08
Northbound I-5 Off Ramp to Alicia Parkway	17.297	13	0	5	0.000	<u>0.69</u>	<u>1.8</u>	0.004	0.32	0.92
Northbound I-5 Eastbound On Ramp from Alicia Parkway	17.464	20	0	9	0.000	<u>0.83</u>	<u>1.85</u>	0.003	0.23	0.71
Northbound I-5 Westbound On Ramp from Alicia Parkway	17.65	6	0	4	0.000	<u>0.23</u>	0.34	0.003	0.19	0.56
Northbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to El Toro Road	017.800-018.398	72	0	22	0.000	0.2	0.66	0.003	0.32	1.11
Northbound I-5 between Off Ramp to El Toro Road and Westbound On Ramp from El Toro Road	018.400-019.199	66	0	18	0.000	0.12	0.43	0.003	0.35	1.11
Northbound I-5 Off Ramp to El Toro Road	18.49	21	0	8	0.000	<u>0.48</u>	<u>1.25</u>	0.004	0.32	0.92
Northbound I-5 Eastbound On Ramp from El Toro Road	18.631	20	0	5	0.000	0.21	<u>0.85</u>	0.003	0.23	0.71
Northbound I-5 Westbound On Ramp from El Toro Road	18.813	18	0	6	0.000	<u>0.35</u>	<u>1.05</u>	0.003	0.19	0.56
Northbound I-5 between Westbound On Ramp from El Toro Road and Off Ramp to Bake Parkway/Truck Bypass	019.200-020.499	94	0	34	0.000	0.15	0.41	0.003	0.32	1.04
Northbound I-5 Off Ramp to Lake Forest Drive	19.499	11	0	3	0.000	0.21	0.77	0.004	0.32	0.92
Northbound I-5 Off Ramp to Bake Parkway/Truck Bypass	19.734	0	0	0	0.000	0	0	0.003	0.15	0.45
Northbound I-5 between Off Ramp to Bake Parkway/ Truck Bypass and Off Ramp to I-405	020.500-021.259	47	0	13	0.000	0.11	0.41	0.003	0.3	0.97
Northbound I-5 Off Ramp to I-405	20.93	8	0	4	0.000	0.07	0.15	0.003	0.15	0.45
Total Northbound I-5 between Orange/San Diego County Line and I-405	000.000-021.259	2060	4	720	0.001	<u>0.29</u>	0.78	0.003	0.25	0.78
Notes: For mainline sections, the accident rate is the number of accidents per million vehicle-miles. For ramps, the accident rate is the number of accidents per million vehicles. Bold & underline indicates an actual accident rate that is higher than the average accident rate. Source: Caltrans District 12 TASAS Table B, 2018.										

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014)

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Southbound I-5 between On Ramp from I-405 and On Ramp from Bake Parkway Post Mile 021.259-020.500	42	24 57%	10 24%	6 14%	2 5%
Southbound I-5 On Ramp from I-405 Post Mile 21.182	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 On Ramp from Bake Parkway/Truck Bypass Post Mile 20.193	1	0 0%	0 0%	0 0%	1 100%
Southbound I-5 between On Ramp from Bake Parkway/Truck Bypass and Eastbound On Ramp from Lake Forest Drive Post Mile 020.499-019.200	145	104 72%	30 21%	9 6%	2 1%
Southbound I-5 Eastbound On Ramp from Lake Forest Drive Post Mile 20.009	5	4 80%	0 0%	1 20%	0 0%
Southbound I-5 Westbound On Ramp from Lake Forest Drive Post Mile 19.798	1	1 100%	0 0%	0 0%	0 0%
Southbound I-5 between Westbound On Ramp from Lake Forest Drive to Off Ramp to El Toro Road Post Mile 019.199-018.400	217	184 85%	21 10%	9 4%	3 1%
Southbound I-5 Off Ramp to El Toro Road Post Mile 18.913	19	10 53%	5 26%	2 11%	2 11%
Southbound I-5 Eastbound On Ramp from El Toro Road Post Mile 18.786	7	2 29%	1 14%	4 57%	0 0%
Southbound I-5 Westbound On Ramp from El Toro Road Post Mile 18.537	17	9 53%	3 18%	0 0%	5 29%
Southbound I-5 between Westbound On Ramp from El Toro Road and Off Ramp to Alicia Parkway Post Mile 018.398-017.800	40	24 60%	12 30%	2 5%	2 5%
Southbound I-5 between Off Ramp to Alicia Parkway and Westbound On Ramp from Alicia Parkway Post Mile 017.798-017.100	98	72 73%	16 16%	7 7%	3 3%
Southbound I-5 Off Ramp to Alicia Parkway Post Mile 17.634	24	13 54%	3 13%	3 13%	5 21%
Southbound I-5 Eastbound On Ramp Alicia Parkway Post Mile 17.487	2	0 0%	2 100%	0 0%	0 0%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Southbound I-5 Westbound On Ramp Alicia Parkway Post Mile 17.255	3	3 100%	0 0%	0 0%	0 0%
Southbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to La Paz Road Post Mile 017.099-016.000	78	39 50%	21 27%	14 18%	4 5%
Southbound I-5 Off Ramp to La Paz Road Post Mile 16.717	8	0 0%	1 13%	4 50%	3 38%
Southbound I-5 Eastbound On Ramp from La Paz Road Post Mile 16.571	2	0 0%	2 100%	0 0%	0 0%
Southbound I-5 Westbound On Ramp from La Paz Road Post Mile 16.386	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 between Oso Parkway Off Ramp and Crown Valley Parkway On Ramp Post Mile 016.000-015.170	61	32 52%	13 21%	12 20%	4 7%
Southbound I-5 Off Ramp to Oso Parkway Post Mile 15.474	18	6 33%	3 17%	4 22%	5 28%
Southbound I-5 On Ramp from Westbound Oso Parkway Post Mile 015.026	7	3 43%	3 43%	1 14%	0 0%
Southbound I-5 On Ramp from Eastbound Oso Parkway Post Mile 015.315	21	17 81%	1 5%	1 5%	2 10%
Southbound I-5 between Oso Parkway Off Ramp and Crown Valley Parkway On Ramp Post Mile 013.776 - 015.216	148	105 71%	22 15%	19 13%	2 1%
Southbound I-5 Off Ramp to Crown Valley Parkway Post Mile 013.900	34	24 71%	6 18%	1 3%	3 9%
Southbound I-5 between Southbound On Ramp from Crown Valley Parkway and Southbound On Ramp from Avery Parkway Post Mile 013.776 - 012.943	74	46 62%	14 19%	11 15%	3 4%
Southbound I-5 On Ramp from Crown Valley Parkway Post Mile 013.609	13	8 62%	0 0%	0 0%	5 38%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Southbound I-5 Off Ramp to Avery Parkway Post Mile 013.104	15	5 33%	4 27%	1 7%	5 33%
Southbound I-5 between On Ramp from Avery Parkway and On Ramp from Junipero Serra Post Mile 012.943 - 010.910	124	42 34%	42 34%	28 23%	12 10%
Southbound I-5 from Avery Parkway Post Mile 012.831	6	4 67%	0 0%	0 0%	2 33%
Southbound I-5 On-Ramp from SR-73 Post Mile	6	1 17%	0 0%	5 83%	0 0%
Southbound I-5 Off Ramp to Junipero Serra Road Post Mile 011.136	3	2 67%	0 0%	0 0%	1 33%
Southbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Ortega Highway Post Mile 010.910 - 009.604	165	108 65%	26 16%	24 15%	7 4%
Southbound I-5 On Ramp from Junipero Serra Road Post Mile 010.762	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Ortega Highway Post Mile 009.722	22	11 50%	8 36%	0 0%	3 14%
Southbound I-5 between On Ramp from Ortega Highway and On Ramp from Camino Capistrano Post Mile 009.604 -008.795	65	32 49%	16 25%	14 22%	3 5%
Southbound I-5 On Ramp from Ortega Highway Post Mile 009.428	3	0 0%	0 0%	3 100%	0 0%
Southbound I-5 Off Ramp to Camino Capistrano Post Mile 008.756	6	1 17%	1 17%	4 67%	0 0%
Southbound I-5 between On Ramp from Camino Capistrano and On Ramp from Camino Las Ramblas Post Miles 008.794-006.687	122	64 52%	21 17%	33 27%	4 3%
Southbound I-5 On Ramp from Camino Capistrano Post Miles 008.631	4	0 0%	2 50%	1 25%	1 25%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Southbound I-5 Off Ramp to Camino Las Ramblas Post Mile 006.972	4	3 75%	0 0%	1 25%	0 0%
Southbound I-5 between On Ramp from Camino Las Ramblas and On Ramp from Camino De Estrella Post Mile 006.687-005.801	98	49 50%	25 26%	18 18%	6 6%
Southbound I-5 Eastbound On Ramp from Camino Las Ramblas Post Mile 006.818	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Westbound On Ramp from Camino Las Ramblas Post Mile 006.670	0	0 0%	0 17%	0 50%	0 33%
Southbound I-5 Off Ramp to Camino De Estrella Post Mile 005.970	13	4 31%	4 31%	1 8%	4 31%
Southbound I-5 between On Ramp from Camino De Estrella and On Ramp from Avenida Vista Hermosa Post Mile 005.801-004.077	79	40 51%	14 18%	21 27%	4 5%
Southbound I-5 On Ramp from Camino De Estrella Post Mile 005.587	3	1 33%	2 67%	0 0%	0 0%
Southbound I-5 Off Ramp to Avenida Vista Hermosa Post Mile 004.250	9	1 11%	3 33%	4 44%	1 11%
Southbound I-5 On Ramp from Avenida Vista Hermosa and On Ramp from Avenida Pico Post Mile 004.077-003.393	27	5 19%	8 30%	12 44%	2 7%
Southbound I-5 On Ramp from Avenida Vista Hermosa Post Mile 004.101	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Avenida Pico Post Mile 003.612	12	6 50%	3 25%	1 8%	2 17%
Southbound I-5 On Ramp from Avenida Pico and On Ramp from Avendio Palizada Post Mile 003.393-002.663	26	12 46%	6 23%	7 27%	1 4%
Southbound I-5 On Ramp from Avenida Pico Post Mile 003.225	9	2 22%	4 44%	1 11%	2 22%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Southbound I-5 Off Ramp to Avenida Palizada Post Mile 002.841	7	3 43%	3 43%	0 0%	1 14%
Southbound I-5 between On Ramp from Avenida Palizada and On Ramp from Avenida Presidio Post Mile 002.663-002.306	6	2 33%	2 33%	2 33%	0 0%
Southbound I-5 On Ramp from Avenida Presidio Post Mile 002.142	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 between On Ramp from Avenida Presidio and On-Ramp from El Camino Real Post Mile 002.306-001.627	25	6 24%	8 32%	11 44%	0 0%
Southbound I-5 Off Ramp to El Camino Real Post Mile 001.912	8	2 25%	0 0%	3 38%	3 38%
Southbound I-5 On Ramp from El Camino Real and On Ramp from Avenida Calafia Post Mile 001.627-001.131	29	5 17%	10 34%	14 48%	0 0%
Southbound I-5 On Ramp from El Camino Real Post Mile 001.488	0	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Avenida Califa Post Mile 001.002	5	1 20%	0 0%	4 80%	0 0%
Southbound I-5 On Ramp to Avenida Calafia and Mainline to Orange County Line Post Mile 001.131-000.000	22	6 27%	7 32%	6 27%	3 14%
Southbound I-5 On Ramp from Avenida Calafia Post Mile 000.897	0	0 0%	0 0%	0 0%	0 0%
Total Southbound I-5 between I-405 and Orange/San Diego County Line Post Mile 021.259-000.000	2008	1148 57%	408 20%	329 16%	123 6%
Northbound I-5 between Orange County Line and On Ramp from Avenida Magdalena Post Mile 000.000-001.131	57	39 68%	9 16%	9 16%	0 0%
Northbound I-5 Off Ramp to Avenida Magdalena Post Mile 001.134	2	0 0%	0 0%	2 100%	0 0%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Northbound I-5 between On Ramp from Avenida Magdalena and On Ramp from El Camino Real Post Mile 000.000-001.131	20	15 75%	2 10%	2 10%	1 5%
Northbound I-5 On Ramp from Avenida Magdalena Post Mile 001.257	0	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp to El Camino Real Post Mile 001.539	6	2 33%	0 0%	1 17%	3 50%
Northbound I-5 between On Ramp from El Camino Real and On Ramp from Avenida Presidio Post Mile 001.627-002.306	53	43 81%	3 6%	6 11%	1 2%
Northbound I-5 On Ramp from El Camino Real Post Mile 001.843	14	0 0%	0 0%	2 14%	12 86%
Northbound I-5 Off Ramp to Avenida Presidio Post mile 002.199	3	1 33%	0 0%	2 67%	0 0%
Northbound I-5 between On Ramp from Avenida Presidio and On Ramp from Avenida Palizada Post Mile 002.306-002.663	31	20 65%	4 13%	5 16%	2 6%
Northbound I-5 from Avenida Presidio Post Mile 002.466	2	2 100%	0 0%	0 0%	0 0%
Northbound I-5 between On Ramp from Avenida Palizada and On Ramp from Avenida Pico Post Mile 002.663-003.393	109	73 67%	20 18%	13 12%	3 3%
Northbound I-5 On Ramp from Avenida Palizada Post Mile 002.798	2	0 0%	1 50%	1 50%	0 0%
Northbound I-5 Off Ramp to Avenida Pico Post Mile 003.271	15	5 33%	3 20%	1 7%	6 40%
Northbound I-5 On Ramp from Avenida Pico and On Ramp from Avendio Vista Hermosa Post Mile 003.393-004.077	112	84 75%	20 18%	4 4%	4 4%
Northbound I-5 On Ramp from Avenida Pico Post Mile 003.556	17	7 41%	1 6%	4 24%	5 29%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Northbound I-5 Off Ramp to Avenida Vista Hermosa Post Mile 003.896	3	1 33%	0 0%	0 0%	2 67%
Northbound I-5 On Ramp from Avenida Vista Hermosa and On Ramp from Camino De Estrella Post Mile 004.077-005.801	179	107 60%	40 22%	23 13%	9 5%
Northbound I-5 Eastbound On Ramp from Avenida Vista Hermosa Post Mile 004.045	0	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Westbound On Ramp from Avenida Vista Hermosa Post mile 004.248	5	0 0%	2 40%	3 60%	0 0%
Northbound I-5 Off Ramp to Camino De Estrella Post Mile 005.629	4	2 50%	1 25%	0 0%	1 25%
Northbound I-5 between Eastbound On Ramp from Camino De Estrella and On Ramp from Camino Las Ramblas Post Mile 005.801-006.687	79	43 54%	13 16%	16 20%	7 9%
Northbound I-5 Eastbound On Ramp from Camino De Estrella Post mile 005.932	6	0 0%	5 83%	0 0%	1 17%
Northbound I-5 Westbound On Ramp from Camino De Estrella Post mile 005.761	2	2 100%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp Camino Las Ramblas Segment Post Mile 006.359	0	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp Route 1 Segment Post Mile 006.512	2	1 50%	1 50%	0 0%	0 0%
Northbound I-5 Off Ramp Camino Las Ramblas Segment Post Mile 006.511	4	2 50%	1 25%	0 0%	1 25%
Northbound I-5 On Ramp from Camino Las Ramblas and On Ramp from Camino Capistrano Post Mile 006.687-008.795	110	47 43%	27 25%	28 25%	8 7%
Northbound I-5 On from Ramp Route 1 Segment Post Mile 006.807	3	0 0%	0 0%	3 100%	0 0%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Northbound I-5 On Ramp from Camino Las Ramblas Segment Post Mile 006.808	3	1 33%	1 33%	1 33%	0 0%
Northbound I-5 On Ramp from Camino Las Ramblas Post Mile 007.116	6	0 0%	1 17%	3 50%	2 33%
Northbound I-5 On Ramp from Stonehill Drive Post Mile 007.535	2	1 50%	0 0%	1 50%	0 0%
Northbound I-5 Off Ramp to Camino Capistrano Post Mile 008.417	7	3 43%	0 0%	4 57%	0 0%
Northbound I-5 between On Ramp from Camino Capistrano and On Ramp from Ortega Highway Post Mile 008.795-009.604	42	19 45%	9 21%	11 26%	3 7%
Northbound I-5 On Ramp from Camino Capistrano Post Mile 008.691	1	1 100%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp to Ortega Highway Post Mile 009.449	8	6 75%	1 13%	1 13%	0 0%
Northbound I-5 between On Ramp from Ortega Highway and On Ramp from Junipero Serra Road Post Mile 009.604-010.910	41	18 44%	9 22%	11 27%	3 7%
Northbound I-5 Eastbound On Ramp from Ortega Highway Post Mile 009.744	4	1 25%	1 25%	2 50%	0 0%
Northbound I-5 Off Ramp to Junipero Serra Road Post Mile 010.749	2	0 0%	0 0%	0 0%	2 100%
Northbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Avery Parkway Post Mile 010.910-012.942	141	64 45%	32 23%	39 28%	6 4%
Northbound I-5 On Ramp from Junipero Serra Road Post Mile 011.06	5	3 60%	1 20%	0 0%	1 20%
Northbound I-5 Off Ramp to SR-73 Post Mile	0	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp to Avery Parkway Post Mile 012.820	14	5 36%	1 7%	0 0%	8 57%
Northbound I-5 between On Ramp from Avery Parkway and On Ramp from Crown Valley Parkway Post Mile 012.943-013.776	71	53 75%	7 10%	10 14%	1 1%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Northbound I-5 On Ramp from Avery Parkway Post Mile 013.109	9	3 33%	1 11%	3 33%	2 22%
Northbound I-5 Off Ramp to Crown Valley Parkway Post Mile 013.572	21	10 48%	0 0%	5 24%	6 29%
Northbound I-5 between On-Ramp from Crown Valley Parkway and On Ramp from Oso Parkway Post Mile 013.776-015.217	166	124 75%	23 14%	15 9%	4 2%
Northbound I-5 Eastbound On Ramp from Crown Valley Parkway Post Mile 013.718	7	3 43%	3 43%	0 0%	1 14%
Northbound I-5 Westbound On Ramp from Crown Valley Parkway Post Mile 013.934	11	5 45%	2 18%	3 27%	1 9%
Northbound I-5 Off Ramp to Oso Parkway Post Mark 014.945	11	6 55%	2 18%	2 18%	1 9%
Northbound I-5 Eastbound On Ramp from Oso Parkway Post Mile 015.156	4	3 75%	0 0%	1 25%	0 0%
Northbound I-5 between Eastbound On Ramp from Oso Parkway and Westbound On Ramp from Oso Parkway Post Mark 015.170-015.999	85	65 76%	16 19%	3 4%	1 1%
Northbound I-5 Westbound On Ramp from Oso Parkway Post Mile 015.450	4	2 50%	1 25%	1 25%	0 0%
Northbound I-5 between Westbound On Ramp from Oso Parkway and Westbound On Ramp from La Paz Road Post Mile 016.000-017.099	59	33 56%	14 24%	7 12%	5 8%
Northbound I-5 Off Ramp to La Paz Road Post Mile 16.373	9	1 11%	4 44%	3 33%	1 11%
Northbound I-5 Eastbound On Ramp from La Paz Road Post Mile 16.665	6	2 33%	2 33%	1 17%	1 17%
Northbound I-5 Westbound On Ramp from La Paz Road Post Mile 16.738	5	3 60%	1 20%	0 0%	1 20%
Northbound I-5 between Westbound On Ramp from La Paz Road and Westbound On Ramp from Alicia Parkway Post Mile 017.100-017.798	80	49 61%	14 18%	12 15%	5 6%
Northbound I-5 Off Ramp to Alicia Parkway Post Mile 17.297	13	8 62%	2 15%	0 0%	3 23%

Table 9A – I-5 Collision Type Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Rear End	Side-swipe	Hit Object	Others ¹
Northbound I-5 Eastbound On Ramp from Alicia Parkway Post Mile 17.464	20	8 40%	5 25%	4 20%	3 15%
Northbound I-5 Westbound On Ramp from Alicia Parkway Post Mile 17.65	6	2 33%	1 17%	1 17%	2 33%
Northbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to El Toro Road Post Mile 017.800-018.398	72	43 60%	16 22%	12 17%	1 1%
Northbound I-5 between Off Ramp to El Toro Road and Westbound On Ramp from El Toro Road Post Mile 018.400-019.199	66	28 42%	22 33%	12 18%	4 6%
Northbound I-5 Off Ramp to El Toro Road Post Mile 18.49	21	10 48%	5 24%	3 14%	3 14%
Northbound I-5 Eastbound On Ramp from El Toro Road Post Mile 18.631	20	10 50%	9 45%	0 0%	1 5%
Northbound I-5 Westbound On Ramp from El Toro Road Post Mile 18.813	18	11 61%	6 33%	1 6%	0 0%
Northbound I-5 between Westbound On Ramp from El Toro Road and I-5 Off Ramp to Bake Parkway/Truck Bypass Post Mile 019.200-020.499	94	43 46%	27 29%	17 18%	7 7%
Northbound I-5 Off Ramp to Lake Forest Drive Post Mile 19.499	11	2 18%	1 9%	1 9%	7 64%
Northbound I-5 Off Ramp to Bake Parkway/Truck Bypass Post Mile 19.734	0	0 0%	0 0%	0 0%	0 0%
Northbound I-5 between Off Ramp to Bake Parkway/ Truck Bypass and Off Ramp to I-405 Post Mile 020.500-021.259	47	21 45%	12 26%	12 26%	2 4%
Northbound I-5 Off Ramp to I-405 Post Mile 20.93	8	3 38%	0 0%	5 63%	0 0%
Total Northbound I-5 between Orange/San Diego County Line and I-405 (Post Mile 000.000-021.259)	2060	1169 57%	405 20%	332 16%	154 7%
Notes: ¹ Other accident types include head-on, broadside, overturn, auto-pedestrian, and other collisions.					
Source: Caltrans District 12 TASAS, 2018					

Accidents by day of week were also evaluated and summarized in **Table 9B**. Approximately 47% (or 1,912 accidents) of all the accidents occurred on Fridays through Sundays (3 of 7 days in a week) combining both northbound and southbound I-5 between I-405 and the Orange/San Diego Countyline, which is 7% higher than typical three weekdays (Tuesdays through Thursdays). Fridays and Saturdays showed the highest share of accidents on both northbound and southbound I-5, and the total accidents (combining both I-5 directions) occurred on Fridays and Saturdays were 19% and 18% of all the accidents, respectively. Northbound I-5 experienced 55% and 31% more accidents than southbound I-5 under Sundays and Mondays, respectively; while southbound I-5 showed 25% and 23% more accidents than the northbound direction under Fridays and Saturdays, respectively. Under the typical weekdays (Tuesdays through Thursdays), the accidents between northbound and southbound I-5 were similar (with variation of less than 15%).

In addition, the I-5 study corridor south of SR 73 shows unique traffic pattern characteristics during the weekend conditions. Accidents by day of week were also evaluated for the I-5 corridor south of SR-73 to the Orange/San Diego Countyline. This southern segment of I-5 experienced over 53% (1,001 out of 1,880 accidents) of all the accidents occurred on Fridays through Sundays combining both northbound and southbound I-5, which is 18% higher than typical three weekdays (Tuesdays through Thursdays). Saturdays showed the highest share of accidents of 20% (combining both I-5 directions), followed by Fridays (19%) and Sundays (15%). Under the typical weekdays (Tuesdays through Thursdays), the accidents were substantially lower with 11-13% of the total accidents.

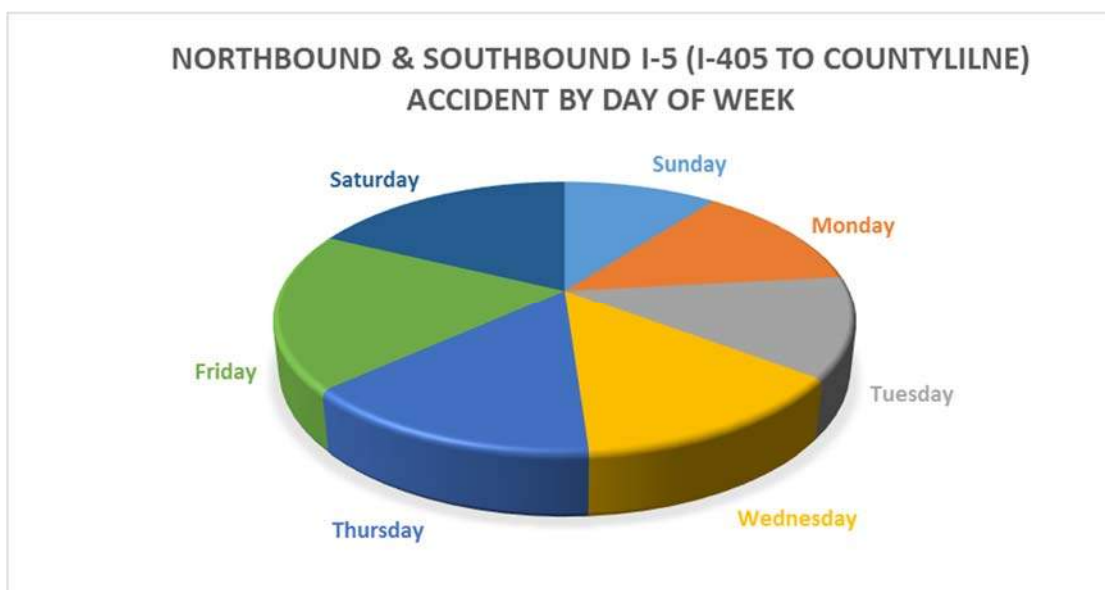


Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014)

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Southbound I-5 between On Ramp from I-405 and On Ramp from Bake Parkway Post Mile 021.259-020.500	42	2 5%	5 12%	6 14%	5 12%	4 10%	10 24%	10 24%
Southbound I-5 On Ramp from I-405 Post Mile 21.182	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 On Ramp from Bake Parkway/Truck Bypass Post Mile 20.193	1	0 0%	0 0%	0 0%	0 0%	0 0%	1 100%	0 0%
Southbound I-5 between On Ramp from Bake Parkway/Truck Bypass and Eastbound On Ramp from Lake Forest Drive Post Mile 020.499-019.200	145	6 4%	10 7%	12 8%	20 14%	20 14%	42 29%	35 24%
Southbound I-5 Eastbound On Ramp from Lake Forest Drive Post Mile 20.009	5	0 0%	2 40%	0 0%	2 40%	0 0%	1 20%	0 0%
Southbound I-5 Westbound On Ramp from Lake Forest Drive Post Mile 19.798	1	0 0%	1 100%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 between Westbound On Ramp from Lake Forest Drive to Off Ramp to El Toro Road Post Mile 019.199-018.400	217	10 5%	21 10%	22 10%	28 13%	28 13%	57 26%	51 24%
Southbound I-5 Off Ramp to El Toro Road Post Mile 18.913	19	4 21%	3 16%	1 5%	2 11%	3 16%	2 11%	4 21%
Southbound I-5 Eastbound On Ramp from El Toro Road Post Mile 18.786	7	1 14%	2 29%	0 0%	0 0%	0 0%	3 43%	1 14%
Southbound I-5 Westbound On Ramp from El Toro Road Post Mile 18.537	17	0 0%	0 0%	3 18%	8 47%	2 12%	4 24%	0 0%
Southbound I-5 between Westbound On Ramp from El Toro Road and Off Ramp to Alicia Parkway Post Mile 018.398-017.800	40	0 0%	4 10%	7 18%	10 25%	6 15%	8 20%	5 13%
Southbound I-5 between Off Ramp to Alicia Parkway and Westbound On Ramp from Alicia Parkway Post Mile 017.798-017.100	98	3 3%	7 7%	20 20%	13 13%	18 18%	17 17%	20 20%
Southbound I-5 Off Ramp to Alicia Parkway Post Mile 17.634	24	0 0%	9 38%	2 8%	5 21%	5 21%	1 4%	2 8%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Southbound I-5 Eastbound On Ramp Alicia Parkway Post Mile 17.487	2	0 0%	0 0%	1 50%	1 50%	0 0%	0 0%	0 0%
Southbound I-5 Westbound On Ramp Alicia Parkway Post Mile 17.255	3	0 0%	0 0%	0 0%	3 100%	0 0%	0 0%	0 0%
Southbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to La Paz Road Post Mile 017.099-016.000	78	6 8%	10 13%	11 14%	6 8%	13 17%	22 28%	10 13%
Southbound I-5 Off Ramp to La Paz Road Post Mile 16.717	8	0 0%	0 0%	2 25%	0 0%	2 25%	2 25%	2 25%
Southbound I-5 Eastbound On Ramp from La Paz Road Post Mile 16.571	2	1 50%	0 0%	0 0%	0 0%	1 50%	0 0%	0 0%
Southbound I-5 Westbound On Ramp from La Paz Road Post Mile 16.386	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 between Oso Parkway Off Ramp and Crown Valley Parkway On Ramp Post Mile 016.000-015.170	61	3 5%	7 11%	6 10%	7 11%	8 13%	15 25%	15 25%
Southbound I-5 Off Ramp to Oso Parkway Post Mile 15.474	18	0 0%	2 11%	1 6%	5 28%	4 22%	2 11%	4 22%
Southbound I-5 On Ramp from Westbound Oso Parkway Post Mile 015.315	7	1 14%	2 29%	1 14%	1 14%	1 14%	0 0%	1 14%
Southbound I-5 On Ramp from Eastbound Oso Parkway Post Mile 015.028	21	0 0%	3 14%	7 33%	4 19%	4 19%	2 10%	1 5%
Southbound I-5 between Oso Parkway Off Ramp and Crown Valley Parkway On Ramp Post Mile 013.776 - 015.216	148	11 7%	17 11%	18 12%	29 20%	22 15%	25 17%	26 18%
Southbound I-5 Off Ramp to Crown Valley Parkway Post Mile 013.900	34	1 3%	3 9%	3 9%	13 38%	6 18%	5 15%	3 9%
Southbound I-5 between Southbound On Ramp from Crown Valley Parkway and Southbound On Ramp from Avery Parkway Post Mile 013.776 - 012.943	74	5 7%	14 19%	13 18%	9 12%	12 16%	11 15%	10 14%
Southbound I-5 On Ramp from Crown Valley Parkway Post Mile 013.609	13	2 15%	4 31%	1 8%	1 8%	2 15%	2 15%	1 8%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Southbound I-5 Off Ramp to Avery Parkway Post Mile 013.104	15	0 0%	1 7%	0 0%	6 40%	1 7%	4 27%	3 20%
Southbound I-5 between On Ramp from Avery Parkway and On Ramp from Junipero Serra Post Mile 012.943 - 010.910	124	14 11%	12 10%	12 10%	17 14%	15 12%	23 19%	31 25%
Southbound I-5 from Avery Parkway Post Mile 012.831	6	1 17%	2 33%	2 33%	1 17%	0 0%	0 0%	0 0%
Southbound I-5 On-Ramp from SR-73 Post Mile	6	1 17%	1 17%	1 17%	1 17%	0 0%	0 0%	2 33%
Southbound I-5 Off Ramp to Junipero Serra Road Post Mile 011.136	3	0 0%	0 0%	0 0%	0 0%	1 33%	0 0%	2 67%
Southbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Ortega Highway Post Mile 010.910 - 009.604	165	13 8%	17 10%	21 13%	23 14%	21 13%	34 21%	36 22%
Southbound I-5 On Ramp from Junipero Serra Road Post Mile 010.762	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Ortega Highway Post Mile 009.722	22	4 18%	5 23%	2 9%	1 5%	0 0%	7 32%	3 14%
Southbound I-5 between On Ramp from Ortega Highway and On Ramp from Camino Capistrano Post Mile 009.604 -008.795	65	6 9%	8 12%	4 6%	4 6%	12 18%	16 25%	15 23%
Southbound I-5 On Ramp from Ortega Highway Post Mile 009.428	3	1 33%	0 0%	0 0%	1 33%	0 0%	0 0%	1 33%
Southbound I-5 Off Ramp to Camino Capistrano Post Mile 008.756	6	0 0%	0 0%	1 17%	2 33%	1 17%	2 33%	0 0%
Southbound I-5 between On Ramp from Camino Capistrano and On Ramp from Camino Las Ramblas Post Miles 008.794-006.687	122	11 9%	14 11%	5 4%	15 12%	12 10%	29 24%	36 30%
Southbound I-5 On Ramp from Camino Capistrano Post Miles 008.631	4	0 0%	1 25%	0 0%	3 75%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Camino Las Ramblas Post Mile 006.972	4	0 0%	2 50%	0 0%	0 0%	1 25%	1 25%	0 0%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Southbound I-5 between On Ramp from Camino Las Ramblas and On Ramp from Camino De Estrella Post Mile 006.687-005.801	98	14 14%	9 9%	11 11%	11 11%	11 11%	20 20%	22 22%
Southbound I-5 Eastbound On Ramp from Camino Las Ramblas Post Mile 006.818	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Westbound On Ramp from Camino Las Ramblas Post Mile 006.670	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Camino De Estrella Post Mile 005.970	13	3 23%	1 8%	2 15%	1 8%	3 23%	3 23%	0 0%
Southbound I-5 between On Ramp from Camino De Estrella and On Ramp from Avenida Vista Hermosa Post Mile 005.801-004.077	79	8 10%	9 11%	10 13%	5 6%	6 8%	22 28%	19 24%
Southbound I-5 On Ramp from Camino De Estrella Post Mile 005.587	3	0 0%	0 0%	1 33%	0 0%	1 33%	1 33%	0 0%
Southbound I-5 Off Ramp to Avenida Vista Hermosa Post Mile 004.250	9	4 44%	2 22%	1 11%	0 0%	0 0%	1 11%	1 11%
Southbound I-5 On Ramp from Avenida Vista Hermosa and On Ramp from Avenida Pico Post Mile 004.077-003.393	27	4 15%	5 19%	3 11%	4 15%	5 19%	6 22%	0 0%
Southbound I-5 On Ramp from Avenida Vista Hermosa Post Mile 004.101	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Avenida Pico Post Mile 003.612	12	0 0%	4 33%	3 25%	2 17%	1 8%	2 17%	0 0%
Southbound I-5 On Ramp from Avenida Pico and On Ramp from Avendio Palizada Post Mile 003.393-002.663	26	0 0%	2 8%	4 15%	2 8%	6 23%	6 23%	6 23%
Southbound I-5 On Ramp from Avenida Pico Post Mile 003.225	9	3 33%	1 11%	0 0%	1 11%	2 22%	1 11%	1 11%
Southbound I-5 Off Ramp to Avenida Palizada Post Mile 002.841	7	1 14%	1 14%	2 29%	0 0%	2 29%	0 0%	1 14%
Southbound I-5 between On Ramp from Avenida Palizada and On Ramp from Avenida Presidio Post Mile 002.663-002.306	6	1 17%	0 0%	1 17%	0 0%	2 33%	0 0%	2 33%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Southbound I-5 On Ramp from Avenida Presidio Post Mile 002.142	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 between On Ramp from Avenida Presidio and On-Ramp from El Camino Real Post Mile 002.306-001.627	25	4 16%	1 4%	1 4%	6 24%	2 8%	6 24%	5 20%
Southbound I-5 Off Ramp to El Camino Real Post Mile 001.912	8	2 25%	0 0%	1 13%	1 13%	0 0%	2 25%	2 25%
Southbound I-5 On Ramp from El Camino Real and On Ramp from Avenida Califa Post Mile 001.627-001.131	29	6 21%	3 10%	2 7%	3 10%	5 17%	5 17%	5 17%
Southbound I-5 On Ramp from El Camino Real Post Mile 001.488	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Southbound I-5 Off Ramp to Avenida Califa Post Mile 001.002	5	2 40%	1 20%	0 0%	1 20%	0 0%	0 0%	1 20%
Southbound I-5 On Ramp to Avenida Califa and Mainline to Orange County Line Post Mile 001.131-000.000	22	5 23%	0 0%	3 14%	2 9%	3 14%	6 27%	3 14%
Southbound I-5 On Ramp from Avenida Califa Post Mile 000.897	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Total Southbound I-5 between On Ramp from Oso Parkway and Mainline to Orange County Line Post Mile 015.216-000.000	2008	164 8%	228 11%	230 11%	285 14%	274 14%	429 21%	398 20%
Northbound I-5 between Orange County Line and On Ramp from Avenida Magdalena Post Mile 000.000-001.131	57	16 28%	2 4%	4 7%	4 7%	4 7%	9 16%	18 32%
Northbound I-5 Off Ramp to Avenida Magdalena Post Mile 001.134	2	1 50%	0 0%	0 0%	0 0%	1 50%	0 0%	0 0%
Northbound I-5 between On Ramp from Avenida Magdalena and On Ramp from El Camino Real Post Mile 001.131-001.627	20	6 30%	7 35%	0 0%	0 0%	1 5%	2 10%	4 20%
Northbound I-5 On Ramp from Avenida Magdalena Post Mile 001.257	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp to El Camino Real Post Mile 001.539	6	3 50%	1 17%	0 0%	0 0%	0 0%	1 17%	1 17%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Northbound I-5 between On Ramp from El Camino Real and On Ramp from Avenida Presidio Post Mile 001.627-002.306	53	14 26%	5 9%	2 4%	4 8%	3 6%	9 17%	16 30%
Northbound I-5 On Ramp from El Camino Real Post Mile 001.843	14	4 29%	2 14%	0 0%	1 7%	2 14%	4 29%	1 7%
Northbound I-5 Off Ramp to Avenida Presidio Post mile 002.199	3	1 33%	0 0%	0 0%	0 0%	1 33%	0 0%	1 33%
Northbound I-5 between On Ramp from Avenida Presidio and On Ramp from Avenida Palizada Post Mile 002.306-002.663	31	5 16%	4 13%	1 3%	1 3%	2 6%	9 29%	9 29%
Northbound I-5 from Avenida Presidio Post Mile 002.466	2	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	2 100%
Northbound I-5 between On Ramp from Avenida Palizada and On Ramp from Avenida Pico Post Mile 002.663-003.393	109	21 19%	8 7%	12 11%	10 9%	9 8%	26 24%	23 21%
Northbound I-5 On Ramp from Avenida Palizada Post Mile 002.798	2	1 50%	0 0%	0 0%	0 0%	0 0%	1 50%	0 0%
Northbound I-5 Off Ramp to Avenida Pico Post Mile 003.271	15	4 27%	1 7%	3 20%	2 13%	3 20%	0 0%	2 13%
Northbound I-5 On Ramp from Avenida Pico and On Ramp from Avendio Vista Hermosa Post Mile 003.393-004.077	112	27 24%	12 11%	11 10%	11 10%	11 10%	16 14%	24 21%
Northbound I-5 On Ramp from Avenida Pico Post Mile 003.556	17	2 12%	3 18%	1 6%	0 0%	4 24%	4 24%	3 18%
Northbound I-5 Off Ramp to Avenida Vista Hermosa Post Mile 003.896	3	1 33%	0 0%	1 33%	1 33%	0 0%	0 0%	0 0%
Northbound I-5 On Ramp from Avenida Vista Hermosa and On Ramp from Camino De Estrella Post Mile 004.077-005.801	179	24 13%	26 15%	19 11%	21 12%	18 10%	29 16%	42 23%
Northbound I-5 Eastbound On Ramp from Avenida Vista Hermosa Post Mile 004.045	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Westbound On Ramp from Avenida Vista Hermosa Post mile 004.248	5	0 0%	1 20%	1 20%	2 40%	0 0%	1 20%	0 0%
Northbound I-5 Off Ramp to Camino De Estrella Post Mile 005.629	4	1 25%	1 25%	1 25%	0 0%	0 0%	0 0%	1 25%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Northbound I-5 between Eastbound On Ramp from Camino De Estrella and On Ramp from Camino Las Ramblas Post Mile 005.801-006.687	79	10 13%	9 11%	13 16%	10 13%	15 19%	13 16%	9 11%
Northbound I-5 Eastbound On Ramp from Camino De Estrella Post mile 005.932	6	0 0%	0 0%	1 17%	1 17%	2 33%	1 17%	1 17%
Northbound I-5 Westbound On Ramp from Camino De Estrella Post mile 005.761	2	0 0%	1 50%	1 50%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp Camino Las Ramblas/Route 1 Post Mile 006.359	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp Route 1 Segment Post Mile 006.512	2	0 0%	0 0%	0 0%	0 0%	2 100%	0 0%	0 0%
Northbound I-5 Off Ramp Camino Las Ramblas Segment Post Mile 006.511	4	1 25%	0 0%	0 0%	0 0%	0 0%	2 50%	1 25%
Northbound I-5 On Ramp from Camino Las Ramblas and On Ramp from Camino Capistrano Post Mile 006.687-008.795	110	10 9%	14 13%	22 20%	17 15%	18 16%	18 16%	11 10%
Northbound I-5 On from Ramp Route 1 Segment Post Mile 006.807	3	1 33%	1 33%	0 0%	1 33%	0 0%	0 0%	0 0%
Northbound I-5 On Ramp from Camino Las Ramblas Segment Post Mile 006.808	3	1 33%	0 0%	0 0%	1 33%	1 33%	0 0%	0 0%
Northbound I-5 On Ramp from Camino Las Ramblas Post Mile 007.116	6	0 0%	1 17%	1 17%	2 33%	2 33%	0 0%	0 0%
Northbound I-5 On Ramp from Stonehill Drive Post Mile 007.535	2	0 0%	1 50%	0 0%	0 0%	1 50%	0 0%	0 0%
Northbound I-5 Off Ramp to Camino Capistrano Post Mile 008.417	7	0 0%	1 14%	0 0%	1 14%	2 29%	1 14%	2 29%
Northbound I-5 between On Ramp from Camino Capistrano and On Ramp from Ortega Highway Post Mile 008.795-009.604	42	6 14%	5 12%	7 17%	4 10%	6 14%	8 19%	6 14%
Northbound I-5 On Ramp from Camino Capistrano Post Mile 008.691	1	0 0%	0 0%	0 0%	0 0%	0 0%	1 100%	0 0%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Northbound I-5 Off Ramp to Ortega Highway Post Mile 009.449	8	1 13%	2 25%	2 25%	1 13%	0 0%	2 25%	0 0%
Northbound I-5 between On Ramp from Ortega Highway and On Ramp from Junipero Serra Road Post Mile 009.604-010.910	41	4 10%	8 20%	4 10%	3 7%	9 22%	5 12%	8 20%
Northbound I-5 On Ramp from Ortega Highway Post Mile 009.744	4	0 0%	0 0%	0 0%	0 0%	0 0%	1 25%	3 75%
Northbound I-5 Off Ramp to Junipero Serra Road Post Mile 010.749	2	0 0%	1 50%	0 0%	1 50%	0 0%	0 0%	0 0%
Northbound I-5 between On Ramp from Junipero Serra Road and On Ramp from Avery Parkway Post Mile 010.910-012.942	141	16 11%	16 11%	23 16%	22 16%	22 16%	27 19%	15 11%
Northbound I-5 On Ramp from Junipero Serra Road Post Mile 011.06	5	0 0%	0 0%	2 40%	2 40%	0 0%	0 0%	1 20%
Northbound I-5 Off Ramp to SR-73 Post Mile	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 Off Ramp to Avery Parkway Post Mile 012.820	14	2 14%	0 0%	2 14%	2 14%	2 14%	3 21%	3 21%
Northbound I-5 between On Ramp from Avery Parkway and On Ramp from Crown Valley Parkway Post Mile 012.943-013.776	71	3 4%	16 23%	5 7%	15 21%	11 15%	10 14%	11 15%
Northbound I-5 On Ramp from Avery Parkway Post Mile 013.109	9	1 11%	1 11%	0 0%	1 11%	4 44%	0 0%	2 22%
Northbound I-5 Off Ramp to Crown Valley Parkway Post Mile 013.572	21	4 19%	4 19%	2 10%	2 10%	4 19%	3 14%	2 10%
Northbound I-5 between On-Ramp from Crown Valley Parkway and On Ramp from Oso Parkway Post Mile 013.776-015.217	166	11 7%	24 14%	26 16%	33 20%	35 21%	28 17%	9 5%
Northbound I-5 Eastbound On Ramp from Crown Valley Parkway Post Mile 013.718	7	0 0%	1 14%	1 14%	2 29%	1 14%	1 14%	1 14%
Northbound I-5 Westbound On Ramp from Crown Valley Parkway Post Mile 013.934	11	0 0%	2 18%	0 0%	4 36%	3 27%	1 9%	1 9%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Northbound I-5 Off Ramp to Oso Parkway Post Mark 014.945	11	0 0%	5 45%	0 0%	2 18%	2 18%	0 0%	2 18%
Northbound I-5 Eastbound On Ramp from Oso Parkway Post Mile 015.156	4	1 25%	1 25%	0 0%	0 0%	1 25%	0 0%	1 25%
Northbound I-5 between Eastbound On Ramp from Oso Parkway and Westbound On Ramp from Oso Parkway Post Mark 015.170-015.999	85	5 6%	13 15%	13 15%	13 15%	17 20%	15 18%	9 11%
Northbound I-5 Westbound On Ramp from Oso Parkway Post Mile 015.450	4	0 0%	1 25%	2 50%	0 0%	0 0%	0 0%	1 25%
Northbound I-5 between Westbound On Ramp from Oso Parkway and Westbound On Ramp from La Paz Road Post Mile 016.000-017.099	59	4 7%	11 19%	11 19%	9 15%	13 22%	4 7%	7 12%
Northbound I-5 Off Ramp to La Paz Road Post Mile 16.373	9	2 22%	2 22%	1 11%	0 0%	1 11%	1 11%	2 22%
Northbound I-5 Eastbound On Ramp from La Paz Road Post Mile 16.555	6	1 17%	2 33%	0 0%	0 0%	1 17%	1 17%	1 17%
Northbound I-5 Westbound On Ramp from La Paz Road Post Mile 16.738	5	0 0%	1 20%	0 0%	1 20%	1 20%	1 20%	1 20%
Northbound I-5 between Westbound On Ramp from La Paz Road and Westbound On Ramp from Alicia Parkway Post Mile 017.100-017.798	80	4 5%	14 18%	12 15%	18 23%	15 19%	14 18%	3 4%
Northbound I-5 Off Ramp to Alicia Parkway Post Mile 17.297	13	1 8%	0 0%	2 15%	2 15%	3 23%	3 23%	2 15%
Northbound I-5 Eastbound On Ramp from Alicia Parkway Post Mile 17.464	20	3 15%	0 0%	4 20%	2 10%	3 15%	4 20%	4 20%
Northbound I-5 Westbound On Ramp from Alicia Parkway Post Mile 17.65	6	0 0%	2 33%	0 0%	0 0%	2 33%	2 33%	0 0%
Northbound I-5 between Westbound On Ramp from Alicia Parkway and Off Ramp to El Toro Road Post Mile 017.800-018.398	72	3 4%	13 18%	9 13%	15 21%	9 13%	16 22%	7 10%

Table 9B – I-5 Collision Day of Week Summary (January 2012 through December 2014) – Continued

Location	Total Accidents	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Northbound I-5 between Off Ramp to El Toro Road and Westbound On Ramp from El Toro Road Post Mile 018.400-019.199	66	5 8%	11 17%	7 11%	4 6%	15 23%	13 20%	11 17%
Northbound I-5 Off Ramp to El Toro Road Post Mile 18.49	21	2 10%	4 19%	3 14%	4 19%	2 10%	1 5%	5 24%
Northbound I-5 Eastbound On Ramp from El Toro Road Post Mile 18.631	20	1 5%	3 15%	5 25%	3 15%	4 20%	4 20%	0 0%
Northbound I-5 Westbound On Ramp from El Toro Road Post Mile 18.813	18	1 6%	2 11%	4 22%	2 11%	3 17%	2 11%	4 22%
Northbound I-5 between Westbound On Ramp from El Toro Road and I-5 Off Ramp to Bake Parkway/Truck Bypass Post Mile 019.200-020.499	94	9 10%	17 18%	12 13%	7 7%	11 12%	17 18%	21 22%
Northbound I-5 Off Ramp to Lake Forest Drive Post Mile 19.499	11	2 18%	1 9%	2 18%	3 27%	0 0%	2 18%	1 9%
Northbound I-5 Off Ramp to Bake Parkway/Truck Bypass Post Mile 19.734	0	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Northbound I-5 between Off Ramp to Bake Parkway/ Truck Bypass and Off Ramp to I-405 Post Mile 020.500-021.259	47	7 15%	11 23%	7 15%	1 2%	8 17%	6 13%	7 15%
Northbound I-5 Off Ramp to I-405 Post Mile 20.93	8	1 13%	3 38%	0 0%	0 0%	1 13%	2 25%	1 13%
Total Northbound I-5 between Orange County Line and Off Ramp from to I-405 (Post Mile 000.000-021.259)	2060	254 12%	298 14%	262 13%	268 13%	311 15%	344 17%	323 16%

Source: Caltrans District 12 TASAS, 2018

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4. Project Alternatives

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During the conceptual analysis and preliminary engineering stage of this Project, many transportation ideas were investigated and summarized in the South County Traffic Relief Initial Screening (Attachment I of the PSR-PDS). Due to limited traffic relief to I-5 or arterial highways accessing I-5, several of the considered transportation ideas were withdrawn from further study. The transportation ideas that showed greater traffic relief benefit, to I-5 or arterial highways, have been advanced for further consideration are discussed below.

The PSR-PDS is not a substitute for the formal environmental analysis which would be conducted in the next phase of project development. Preliminary traffic data, for the purpose of comparing the project alternatives, is included; however, the PSR-PDS would not foreclose the study of any alternatives. As the Project progresses through the project development cycle, viable alternatives will continue to be evaluated and refined based on input from the community, stakeholders, and local jurisdictions. The Project intends to incorporate Context Sensitive Solutions that integrate and consider community, aesthetic, multimodal and environmental values with transportation safety, maintenance, and performance goals. Based on the conceptual analysis and preliminary engineering studies, eight build alternatives (see **Figure 3** for alternative alignments) are proposed in addition to a “No-Build” alternative.

- ❖ Alternative 1 No Build Alternative (no HOV lane on I-5 between Pico and Countyline)
- ❖ Alternative 1 No Build Alternative (with HOV lanes on I-5 between Pico and Countyline)
- ❖ Alternative 13 Build Idea 13 (ID 13): Connect SR 241 to I-5 Via Western Alignment (Local Connection at La Novia Avenue)
- ❖ Alternative 17 Build Idea 17 (ID 17): Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)
- ❖ Alternative 14 Build Idea 14 (ID 14): Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)
- ❖ Alternative 11 Build Idea 11 (ID 11): Add I-5 General Purpose Lanes From I-405 to San Diego County
- ❖ Alternative 12 Build Idea 12 (ID 12): Add I-5 High-Occupancy/Toll (HOT) Lane From I-405 to San Diego County
- ❖ Alternative 9 Build Idea 9 (ID 9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73
- ❖ Alternative 18 Build Idea 18 (ID 18): Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241
- ❖ Alternative 21 Build Idea 21 (ID 21): Los Patrones Parkway Extension and I-5 HOT Lanes

The Build Alternatives and Idea Numbers correspond to the ideas studied in the South County Traffic Relief Effort Initial Screening (Attachment I of the PSR-PDS) and Idea 21 as identified in Section 9 of the PSR-PDS. For the purpose of this report, the Alternatives will be referred to using the Alternative Number only.

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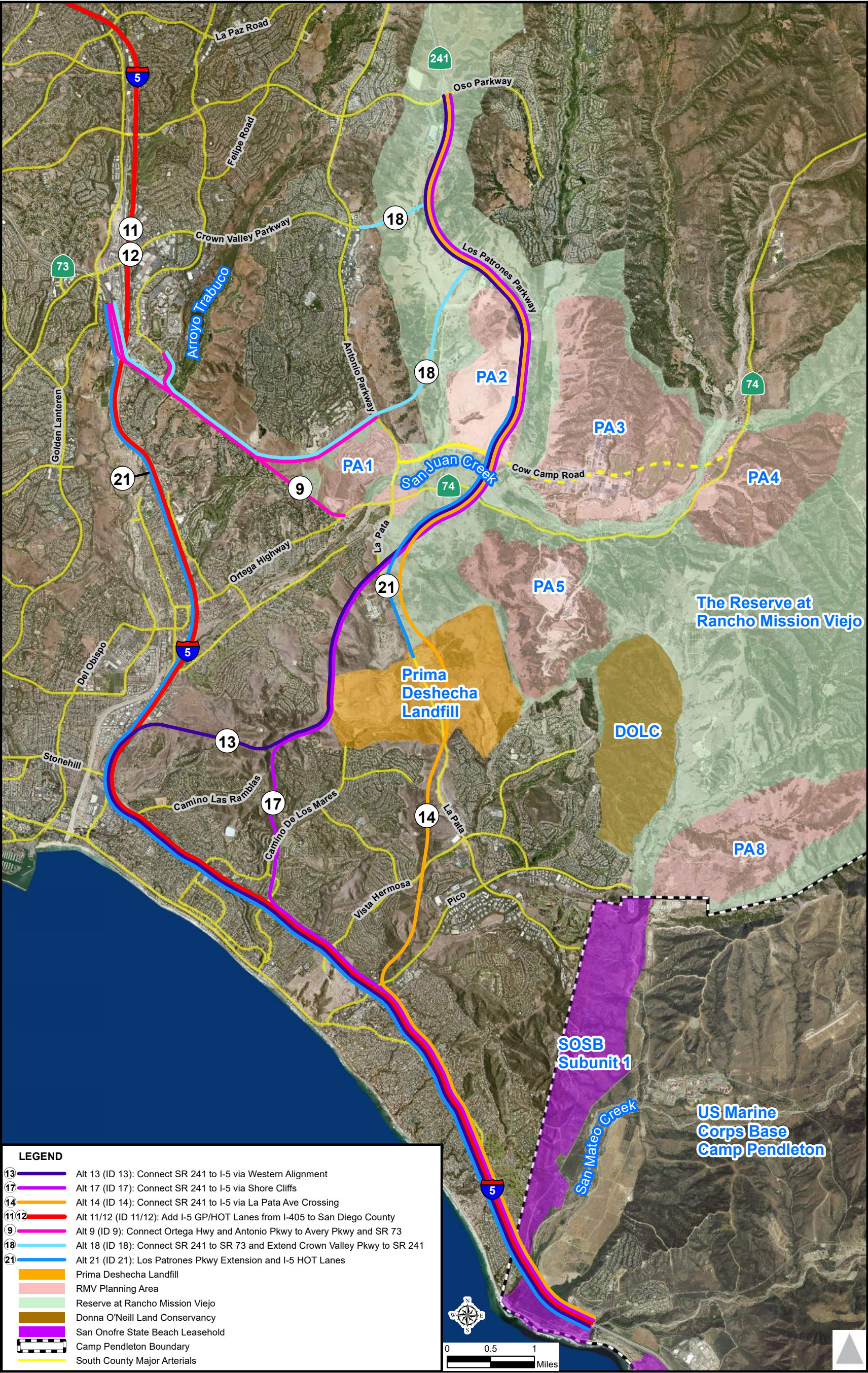


Figure 3
Project Alternatives

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Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 13: Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 13 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet Highway Design Manual (HDM) standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange on SR 241 at Camino Las Ramblas, including northbound and southbound connections;
- Add a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (between Avenida California and Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (South of Cow Camp Road to Avenida La Pata as well as between San Juan Hills High School to Camino Del Rio).

I-5 Improvements

- Modify ten existing interchanges along I-5 at Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Modify existing northbound on-ramp to I-5 at Stonehill Drive to accommodate the widening of I-5;
- Convert one HOV lane to one HOT and add one HOT lane in each direction on I-5 from La Novia Avenue to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Roadways Improvements

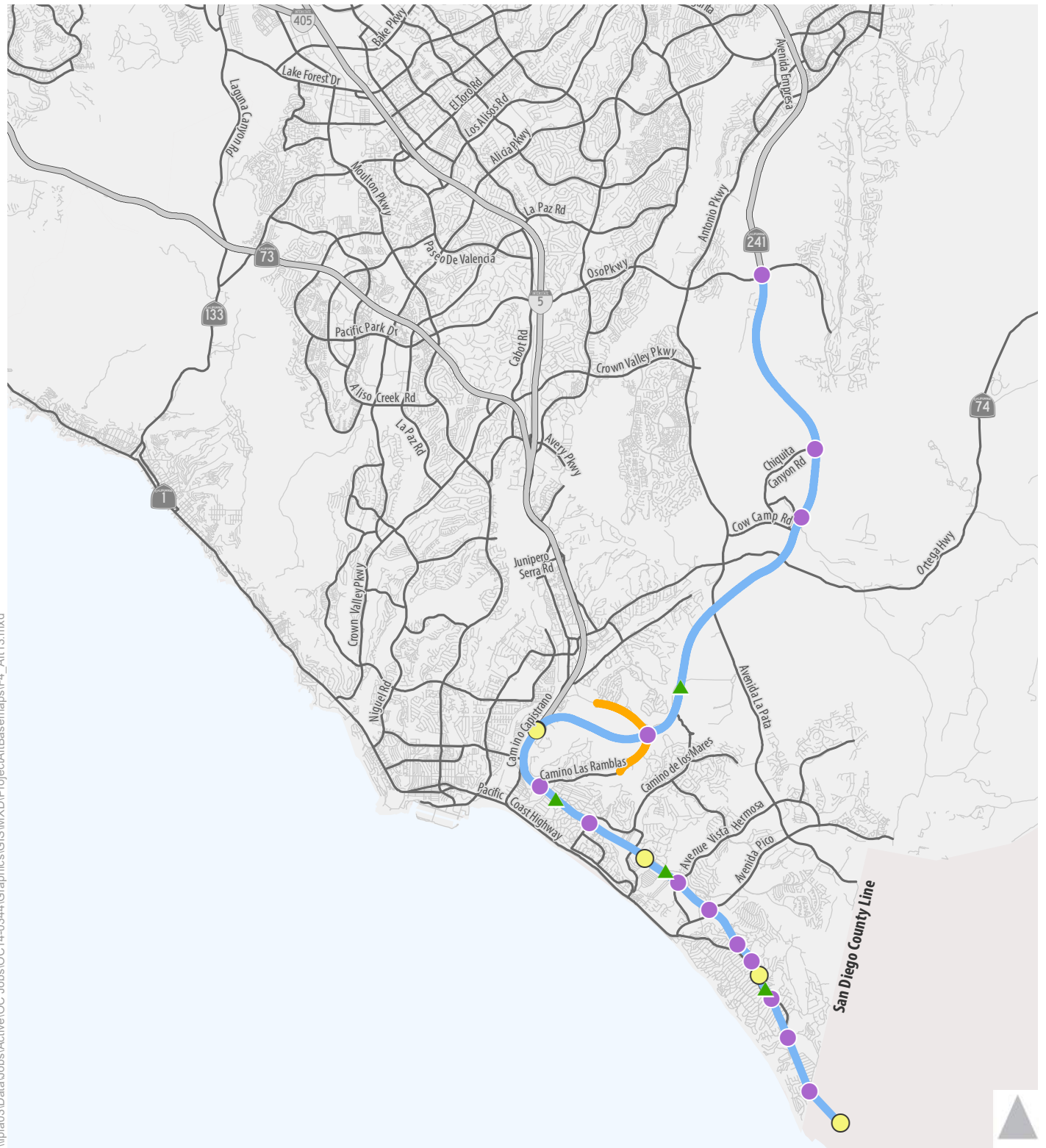
- Extend existing Camino Las Ramblas to proposed SR 241/Camino Las Ramblas interchange; and
- Extend existing La Novia to proposed SR 241/Camino Las Ramblas interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, Americans with Disabilities Act (ADA) ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 13 is shown in **Figure 4**.

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- Project Corridor
- Local Roadway Improvements
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

Figure 4
Project Alternative 13

Alternative 17: Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 17, would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Camino De Los Mares, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Camino De Los Mares to Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Ortega Highway as well as from Prima Deshecha Landfill to Camino Las Ramblas).

I-5 Improvements

- Modify eight existing interchanges along I-5 at Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Convert one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from Avenida Vaquero to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Roadway Improvements

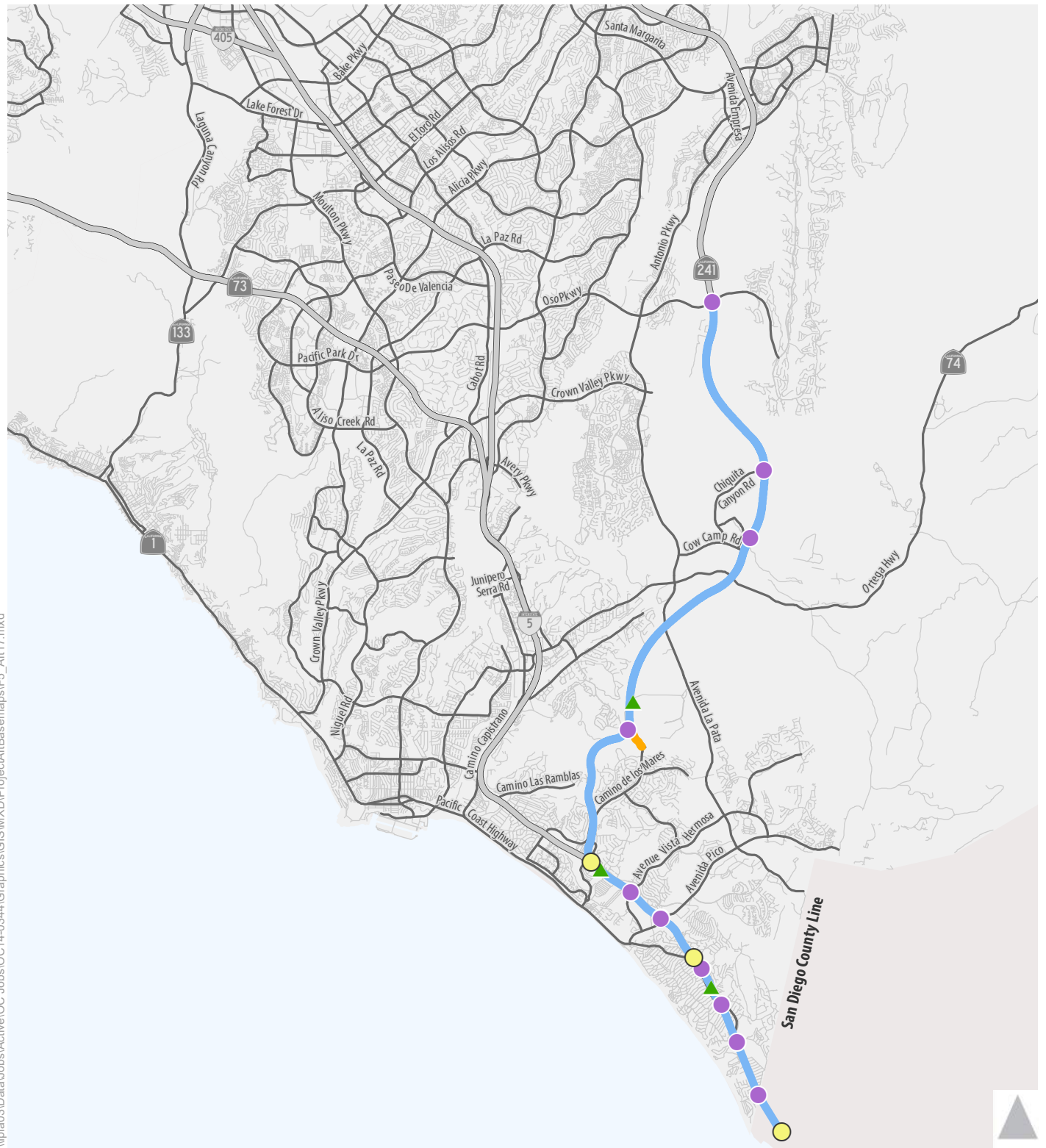
- Extend existing Camino De Los Mares to proposed SR 241/Camino De Los Mares interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 17 is shown in **Figure 5**.

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- Project Corridor
- Local Roadway Improvements
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

Figure 5
Project Alternative 17



Alternative 14: Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 14 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Calle Saluda, including northbound and southbound connections;
- Add one new interchange at Calle Del Cerro, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Calle Del Cerro to Prima Deshecha Landfill, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as from the Prima Deshecha Landfill to Camino Del Rio).

I-5 Improvements

- Modify seven existing interchanges along I-5 at Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real; Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

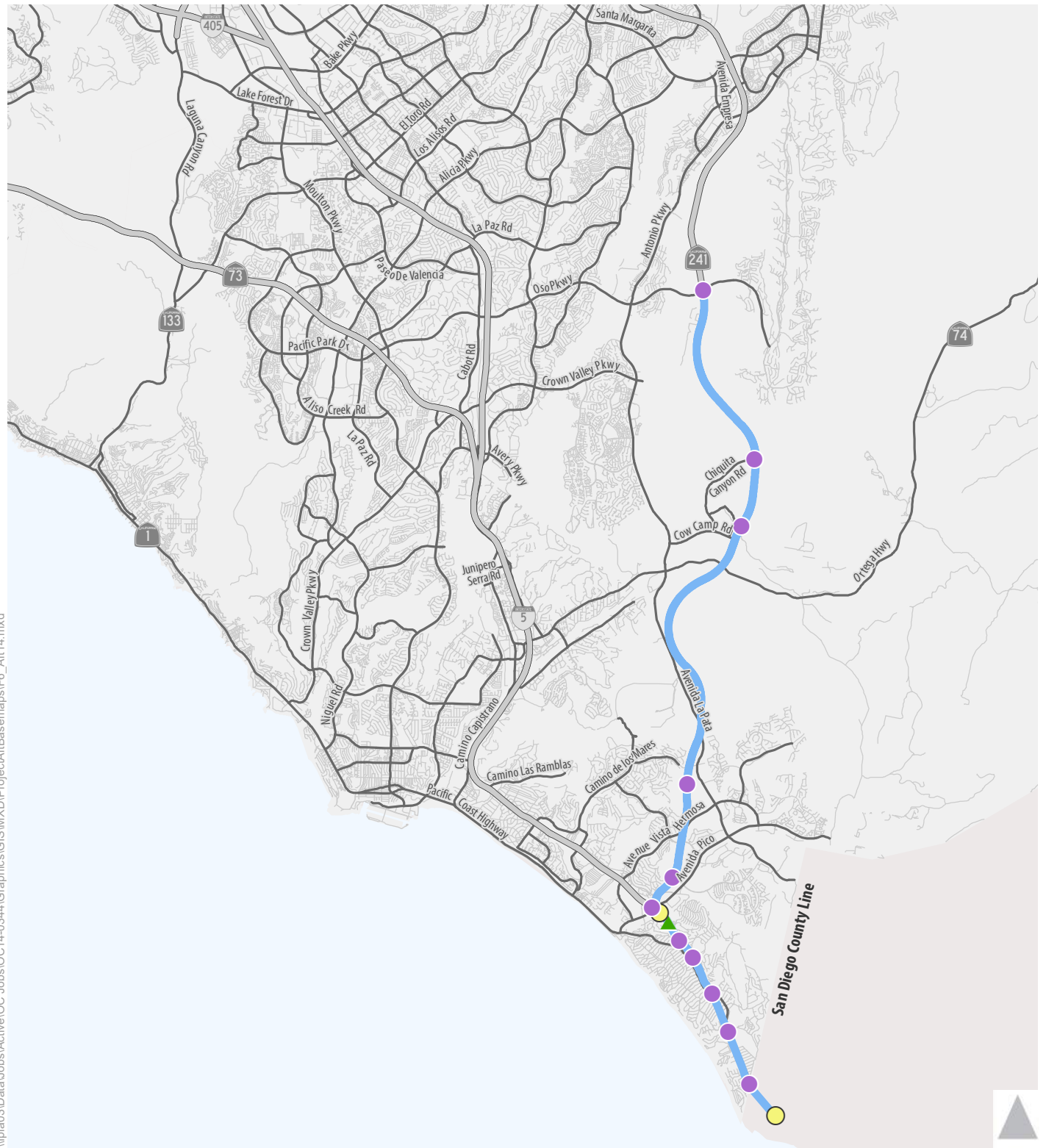
- Extend existing Calle Saluda to proposed SR 241/Calle Saluda interchange, including a new roundabout; and
- Extend existing Calle Del Cerro to proposed SR 241/Calle Del Cerro interchange, including a new roundabout.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 14 is shown in **Figure 6**.

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- Project Corridor
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

Figure 6
Project Alternative 14

Alternative 11: Add I-5 General Purpose Lane (From I-405 to San Diego County)

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 11 would include the following improvements to the identified portion of the corridor:

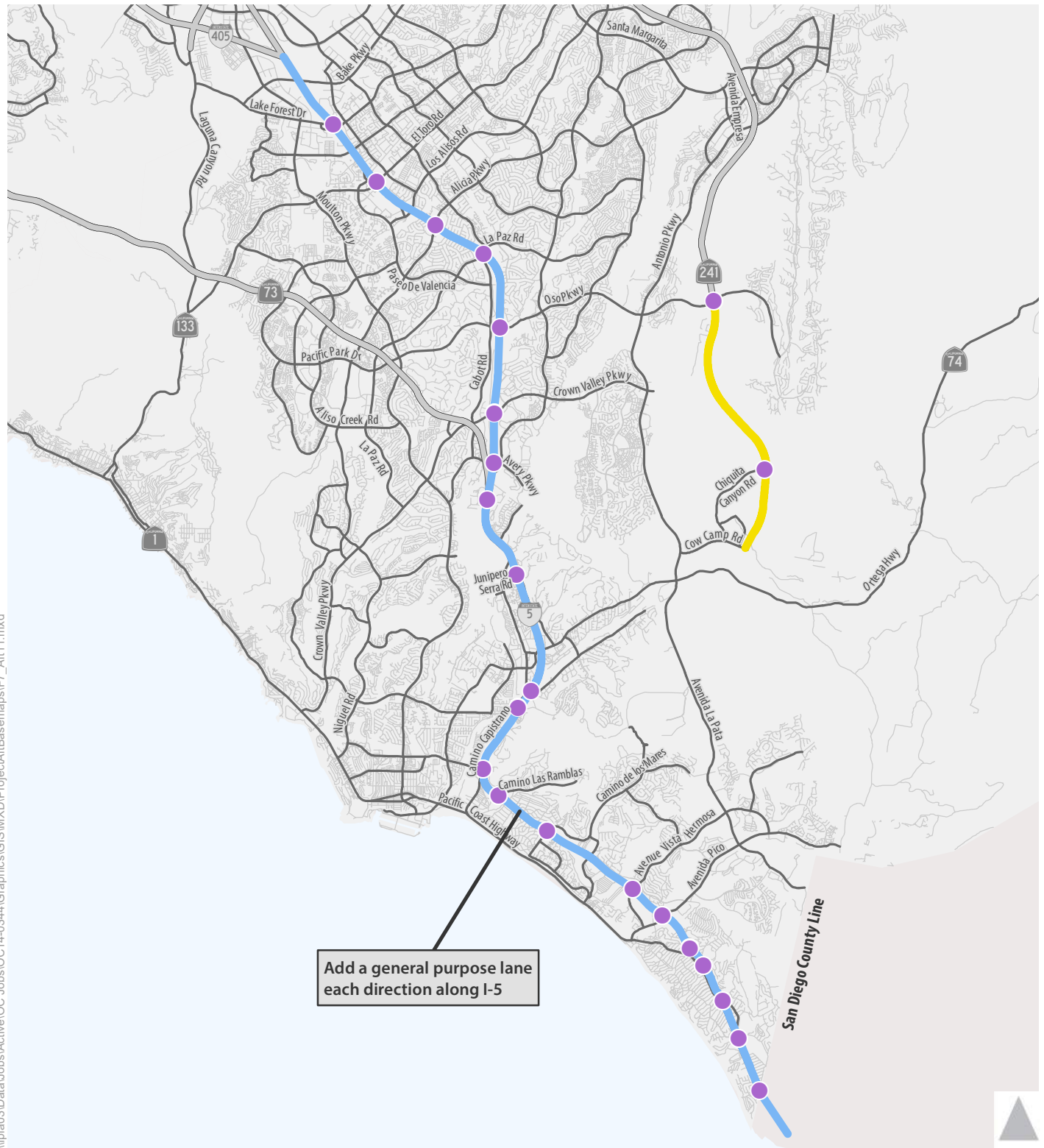
I-5 Improvements

- Modify twenty-three existing interchanges along I-5 at Lake Forest Drive, El Toro Road, Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 11 is shown in **Figure 7**.



- Project Corridor
- Interchange
- Improvements Proposed by Others

Figure 7
Project Alternative 11



Alternative 12: Add I-5 HOT Lane (From I-405 to San Diego County)

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 12, those HOV lanes would be incorporated into the Alternative 12 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 12 would include the following additional improvements to the identified portion of the corridor:

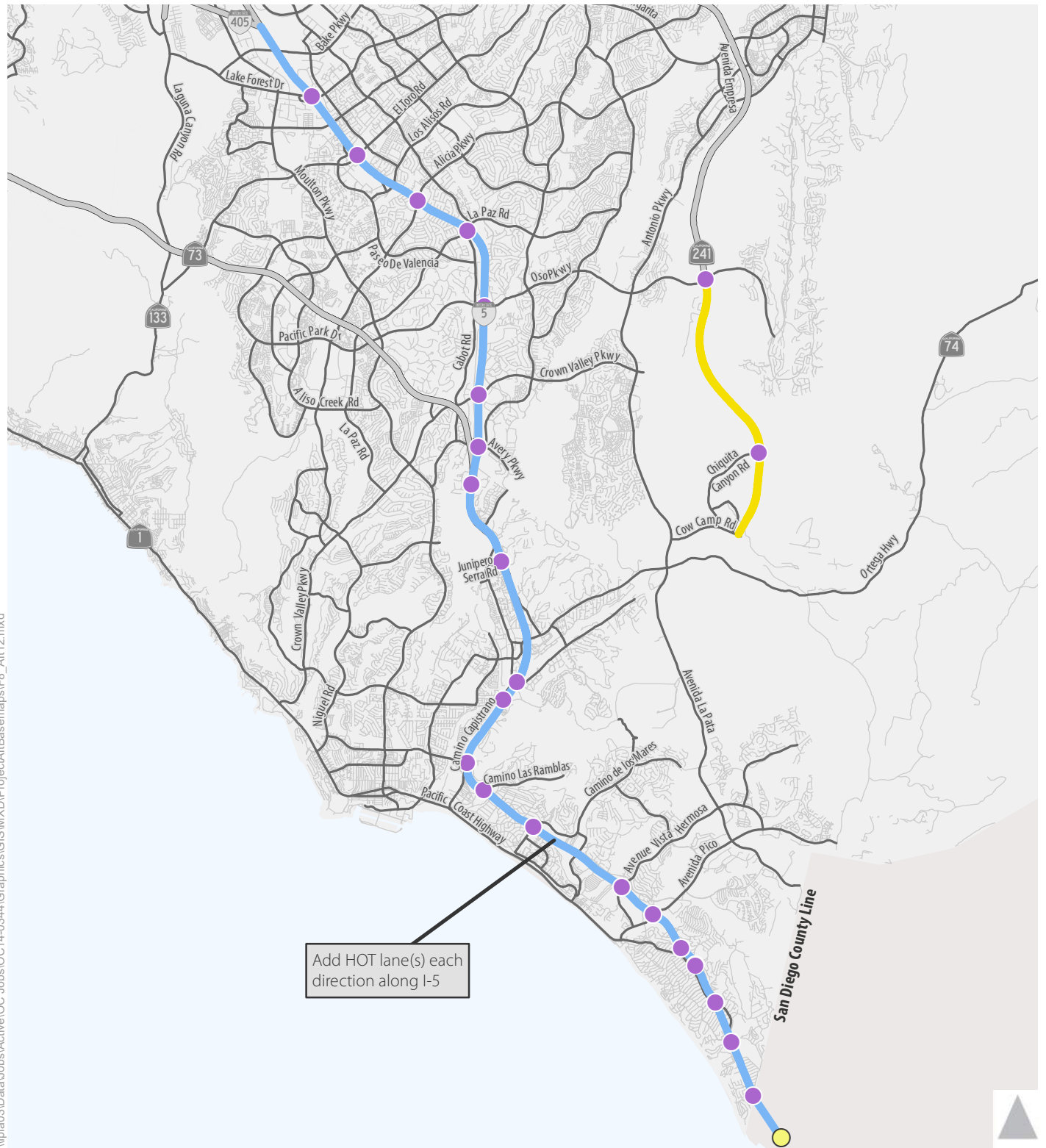
I-5 Improvements

- Modify twenty-one existing interchanges along I-5 at Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 12 is shown in **Figure 8**.



- Project Corridor
- Interchange
- Improvements Proposed by Others
- Ingress/Egress Lanes

Figure 8
Project Alternative 12



Alternative 9: Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

Alternative 9 would include the following additional improvements to the identified portion of the corridor:

Local Roadway Improvements

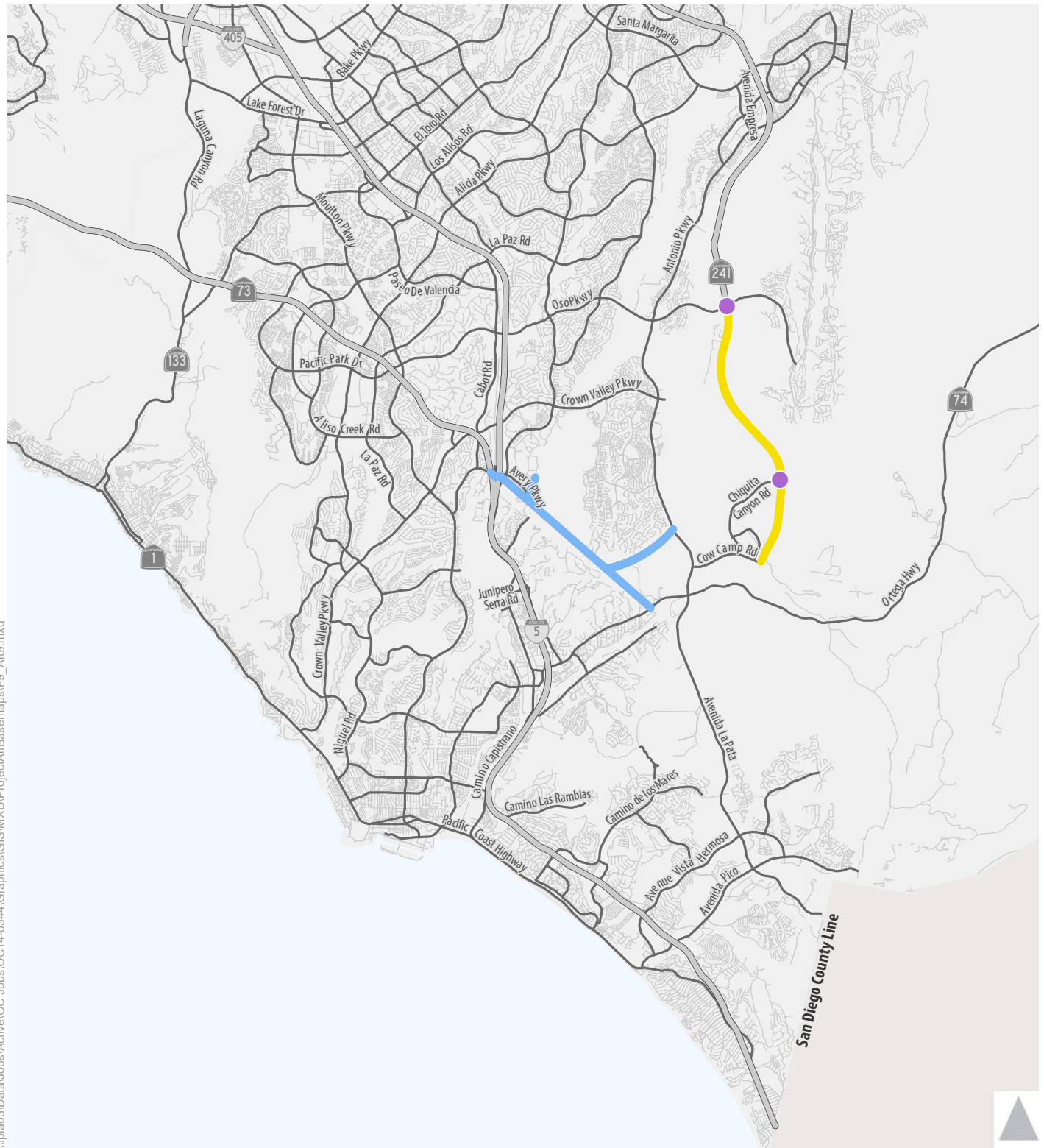
- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new intersection at the proposed arterial roadway and Antonio Parkway, including a signalized intersection; and
- Add one new intersection at the proposed arterial roadway and Ortega Highway, including a signalized intersection.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73, bicycles would not be permitted.

The layout of Alternative 9 is shown in **Figure 9**.

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- Project Corridor
- Interchange
- Improvements Proposed by Others

Figure 9
Project Alternative 9



Alternative 18: Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

Alternative 18 would include the following additional improvements to the identified portion of the corridor:

Local Roadway Improvements

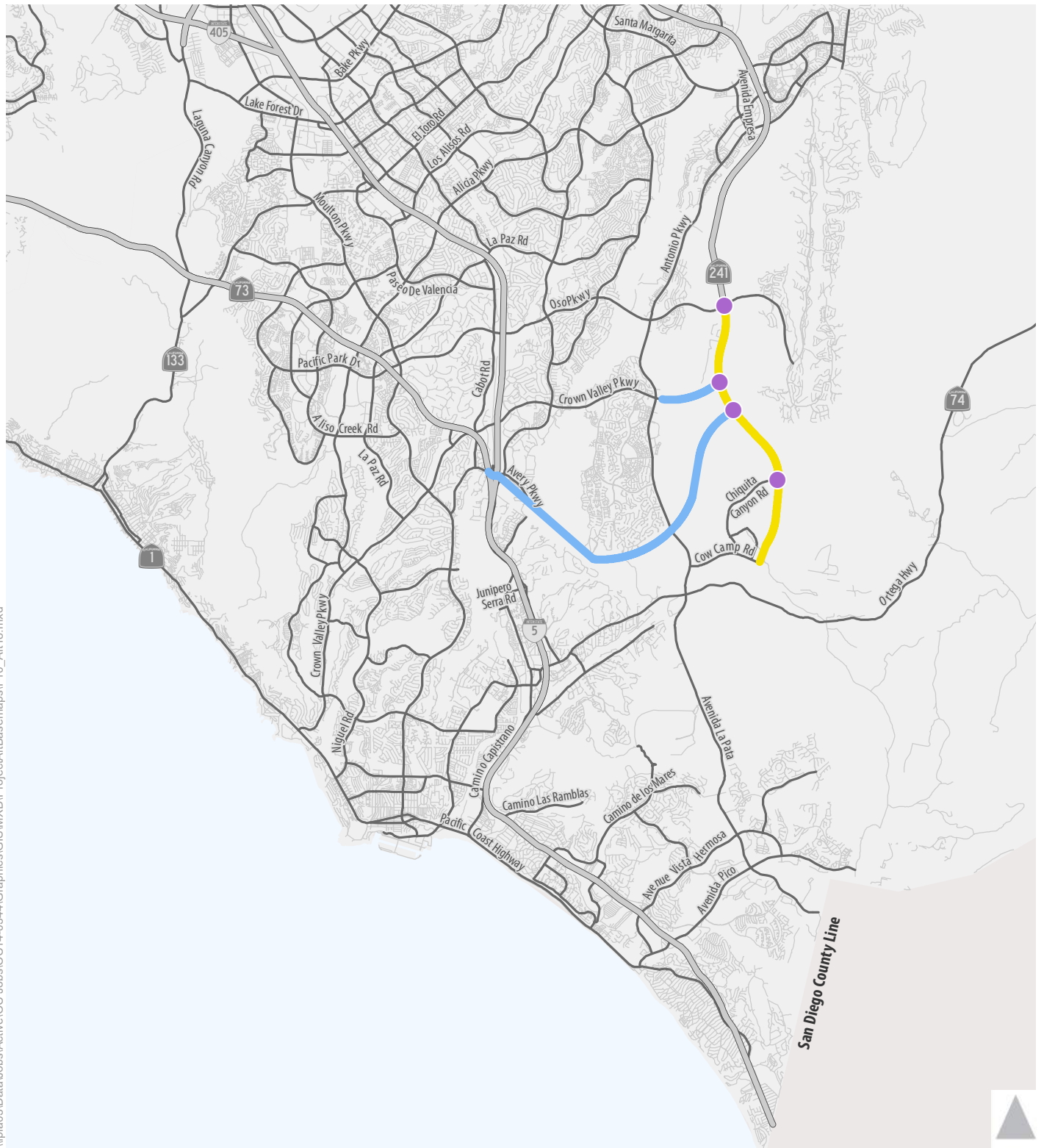
- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new interchange at the proposed arterial roadway and Los Patrones Parkway, including northbound and southbound connections; and
- Extend Crown Valley Parkway and add one new interchange at the Los Patrones Parkway, including northbound and southbound connections.

Multi-Modal and Sustainability Features

- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73 or a connection to a high-speed ramp to Los Patrones Parkway, bicycles would not be permitted.

The layout of Alternative 18 is shown in **Figure 10**.

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- Project Corridor
- Interchange
- Improvements Proposed by Others

Figure 10
Project Alternative 18



Alternative 21: Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 21 would include the following additional improvements to the identified portion of the corridor:

Los Patrones Parkway Improvements

- Construct a new interchange at 'I' Street and Los Patrones Parkway (the northern limit of this alternative is the limit of work required to construct the on- and off ramps at the 'I' Street interchange);
- Construct a grade separated interchange at the Vista Montana intersection to allow traffic on Avenida La Pata to proceed northbound and southbound without stopping, and provide on- and off- ramps for northbound and southbound access to Vista Montana; and
- Reconfigure the northbound access road from Prima Deshecha Landfill to provide grade separated "braided ramps" between the new northbound off ramp to Vista Montana and the existing northbound access road.
- Subject to further study, in the next phase of project development, this alternative may include the addition of tolling equipment along Los Patrones Parkway.

I-5 Improvements

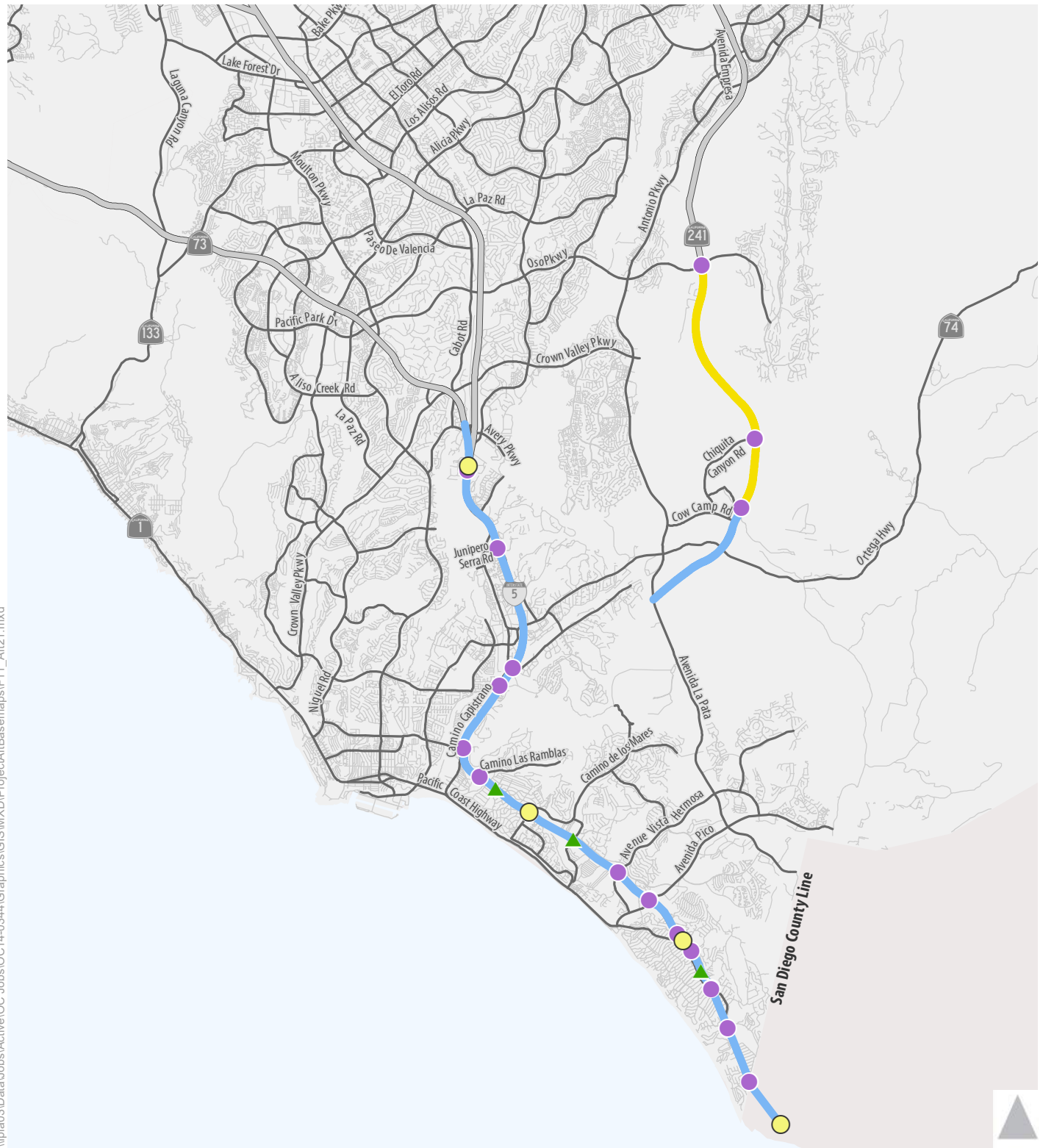
- Modify sixteen existing interchanges along I-5 at SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway /Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

The layout of Alternative 21 is shown in **Figure 11**.

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- Project Corridor
- Improvements Proposed by Others
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

Figure 11
Project Alternative 21

5. Design Year (2050) Conditions

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This chapter presents the analysis results of the project alternatives under design year (2050) conditions. The purpose of the design year analysis is to evaluate long-term traffic operations conditions on study corridors (I-5 and SR 241/Los Patrones Parkway) with and without the improvements alternatives. For each alternative, traffic operations are evaluated using the systemwide VHD for I-5 corridor, arterial roadways, and the entire study area, peak hour density and LOS for mainline and ramp junctions on I-5 and SR 241/Los Patrones Parkway, delay and LOS for ramp terminal intersections along SR 241/Los Patrones Parkway, peak hour density and LOS for I-5 mainline segments during weekend conditions, and ADT changes in arterial roadways.

Analysis Scenarios

Traffic forecasts were developed and traffic operations were evaluated for each of the following project alternatives under design year (2050) conditions.

- ❖ Alternative 1 No Build Alternative (no HOV lane on I-5 between Pico and Countyline)
- ❖ Alternative 1 No Build Alternative (with HOV lanes on I-5 between Pico and Countyline)
- ❖ Alternative 13 Connect SR 241 to I-5 Via Western Alignment (Local Connection at La Novia Avenue)
- ❖ Alternative 17 Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)
- ❖ Alternative 14 Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)
- ❖ Alternative 11 Add I-5 General Purpose Lanes From I-405 to San Diego County
- ❖ Alternative 12 Add I-5 High-Occupancy/Toll (HOT) Lane From I-405 to San Diego County
- ❖ Alternative 9 Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73
- ❖ Alternative 18 Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241
- ❖ Alternative 21 Los Patrones Parkway Extension and I-5 HOT Lanes

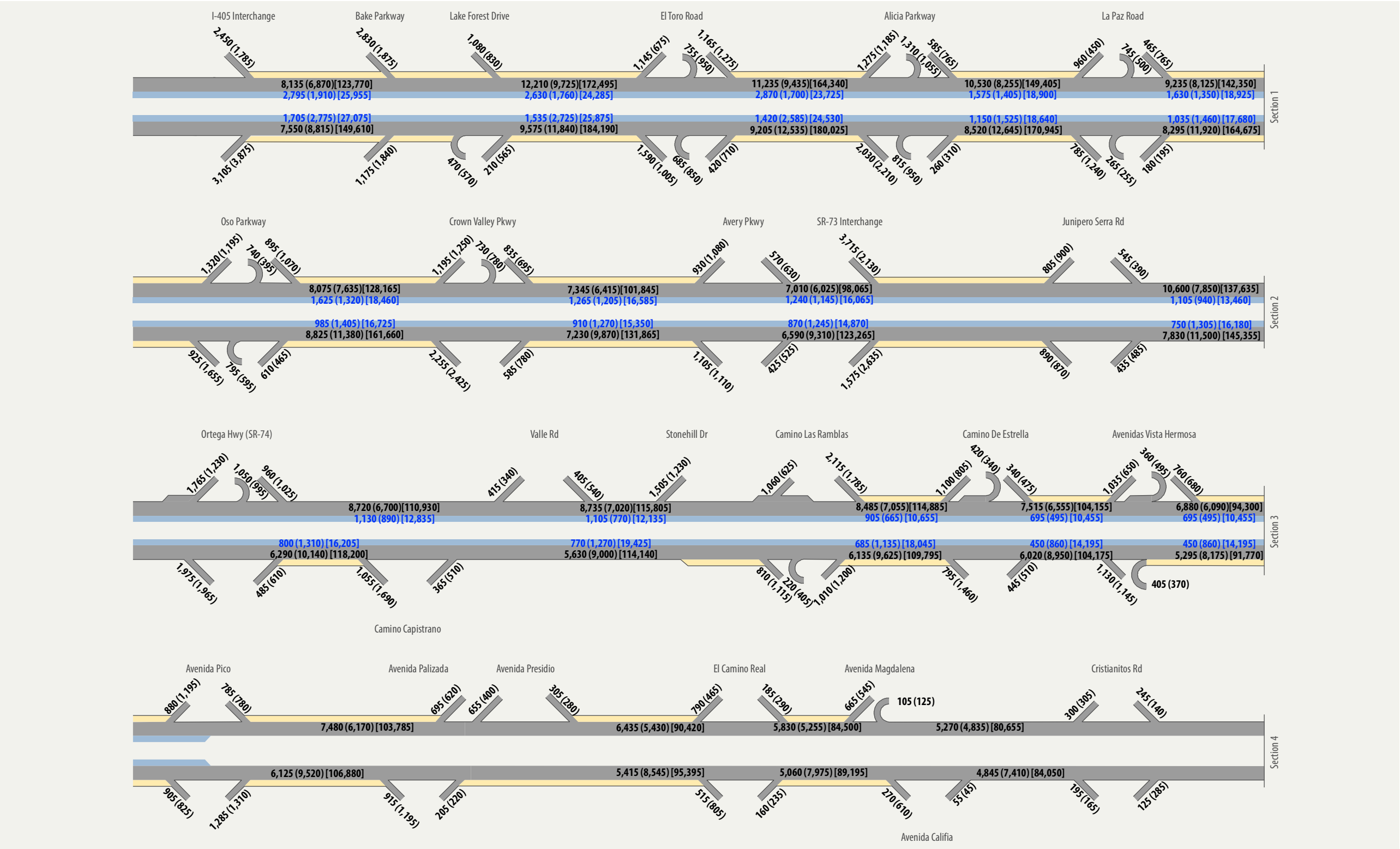
The detailed traffic forecasting methodology is contained in Chapter 2. The OCTAM model version 4.0 was used to develop the future year model for each of the study alternatives, which was used to develop the design year 2050 traffic forecasts.

For the No Build Alternative (no I-5 HOV scenario), the design year 2050 AM and PM peak hour and ADT traffic forecasts for the I-5 mainline segments, HOV lanes, and ramps are shown in **Figure 12A**. The SR 241/Los Patrones Parkway mainline and ramp peak hour and ADT traffic forecasts are displayed in **Figure 12B**. **Figure 13** illustrates the AM and PM peak hour intersection turning movement volumes at the SR 241/Los Patrones Parkway ramp terminal intersections.

The design year 2050 volume forecasts for I-5, SR 241/Los Patrones Parkway, and SR 241/Los Patrones Parkway ramp terminal intersections are contained in **Figures 14A, 14B, and 15** for the No Build Alternative (with I-5 HOV scenario), **Figures 16A, 16B, and 17** for Alternative 13, **Figures 18A, 18B, and 19** for Alternative 17, **Figures 20A, 20B, and 21** for Alternative 14, **Figures 22A, 22B, and 23** for Alternative 11, **Figures 24A, 24B, and 25** for Alternative 12, **Figures 26A, 26B, and 27** for Alternative 9, **Figures 28A, 28B, and 29** for Alternative 18, **Figures 30A, 30B, and 31** for Alternative 21.

As a result of proposed land use and regional network improvements, the averaged ADT on the I-5 study corridor would increase from approximately 240,000 to 275,000 by 15%, resulting in an annual growth of 0.5% on I-5.

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- General Purpose Lanes
- HOV Lane
- Auxiliary Lane

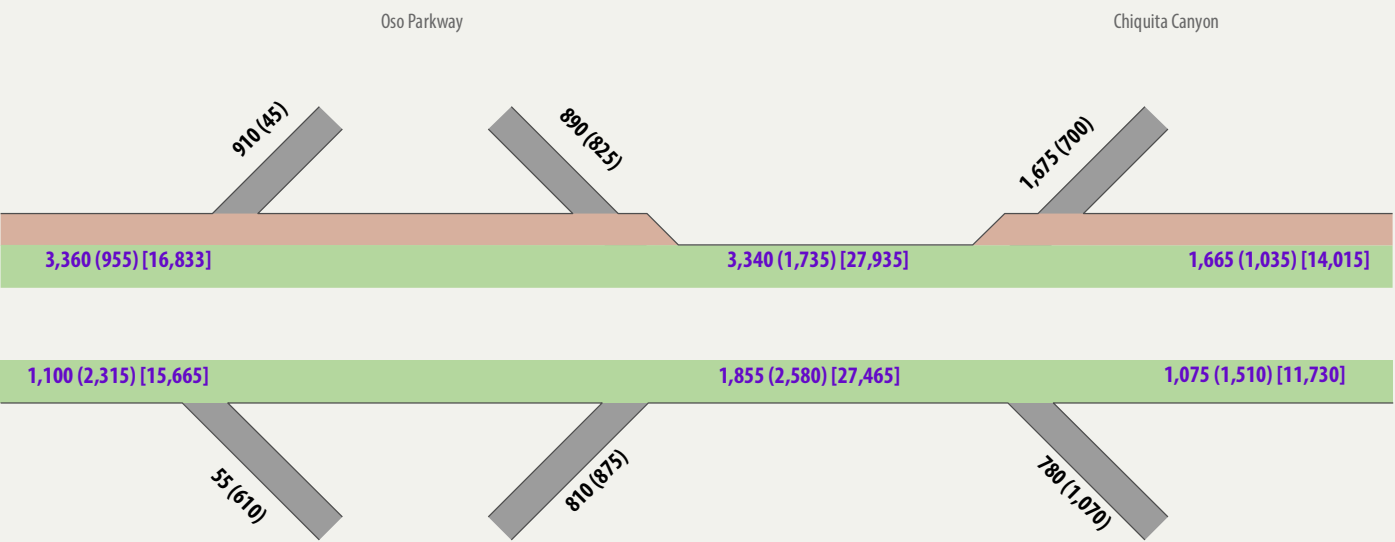
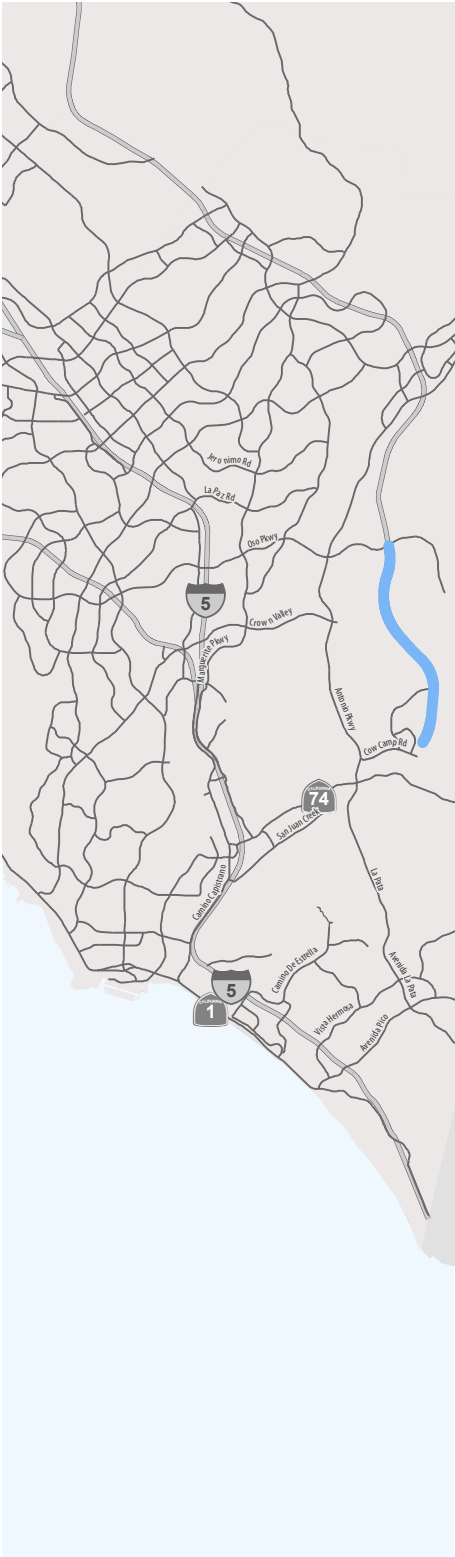
xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume

Design Year 2050 Mainline and Ramp Volumes
(I-5) - Alternative 1 (No Build No HOV)

Figure 12a

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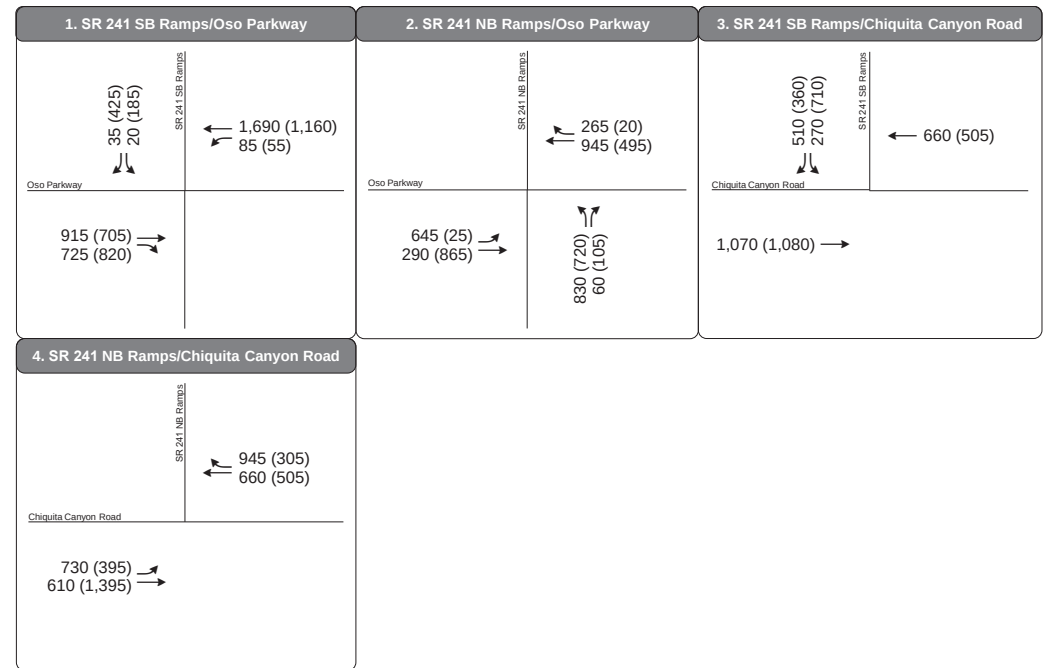
- Ramps
- HOV Lane
- Managed Lanes
- Auxiliary Lane
- Proposed Hill Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
Northbound
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
Southbound

Design Year 2050 Los Patrones Parkway Volumes
Alternative 1 (No Build No HOV)

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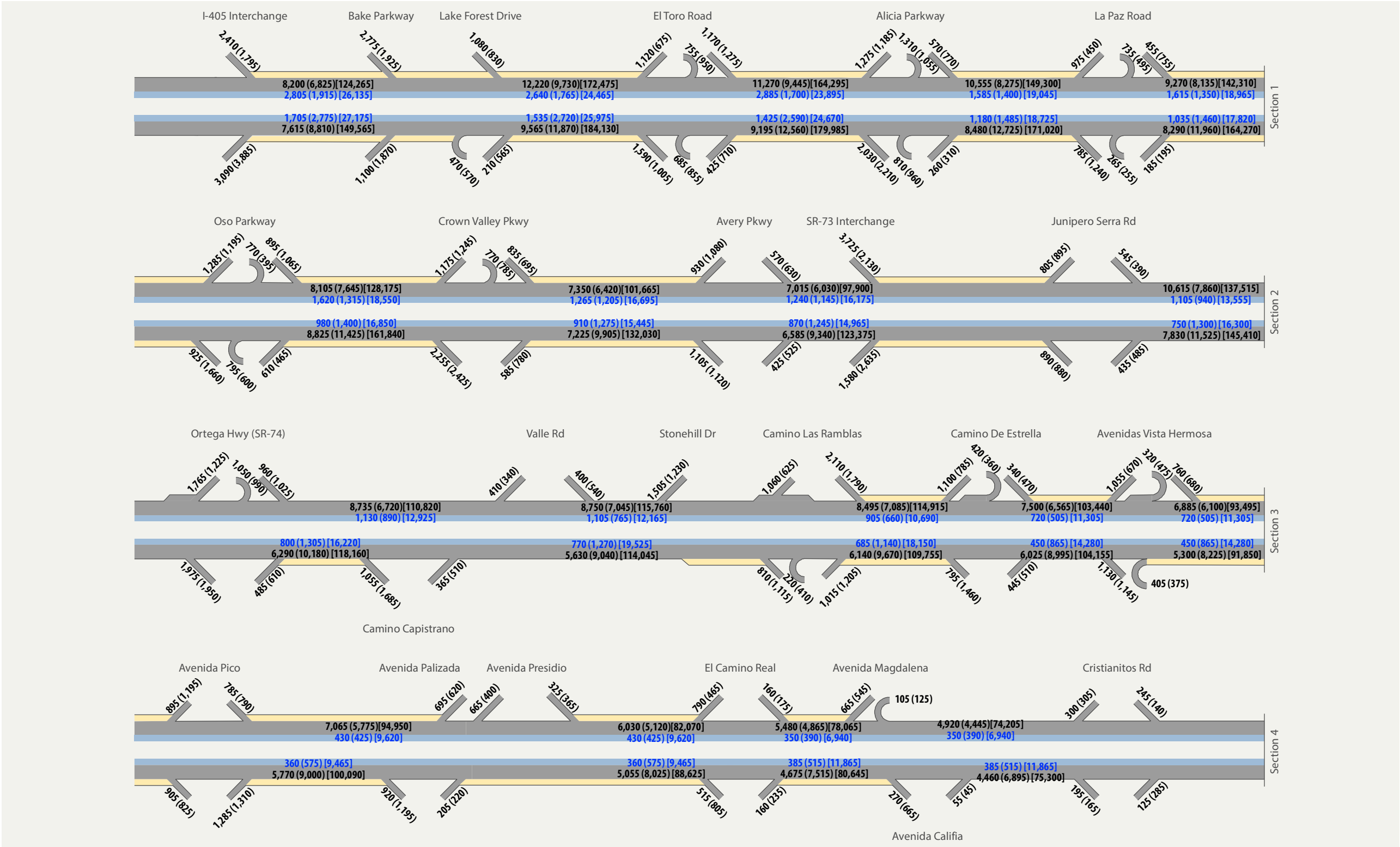


 Travel Direction
 AM (PM) Turning Movement

Figure 13
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 1 (No Build No HOV)

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- General Purpose Lanes
- HOV Lane
- Auxillary Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

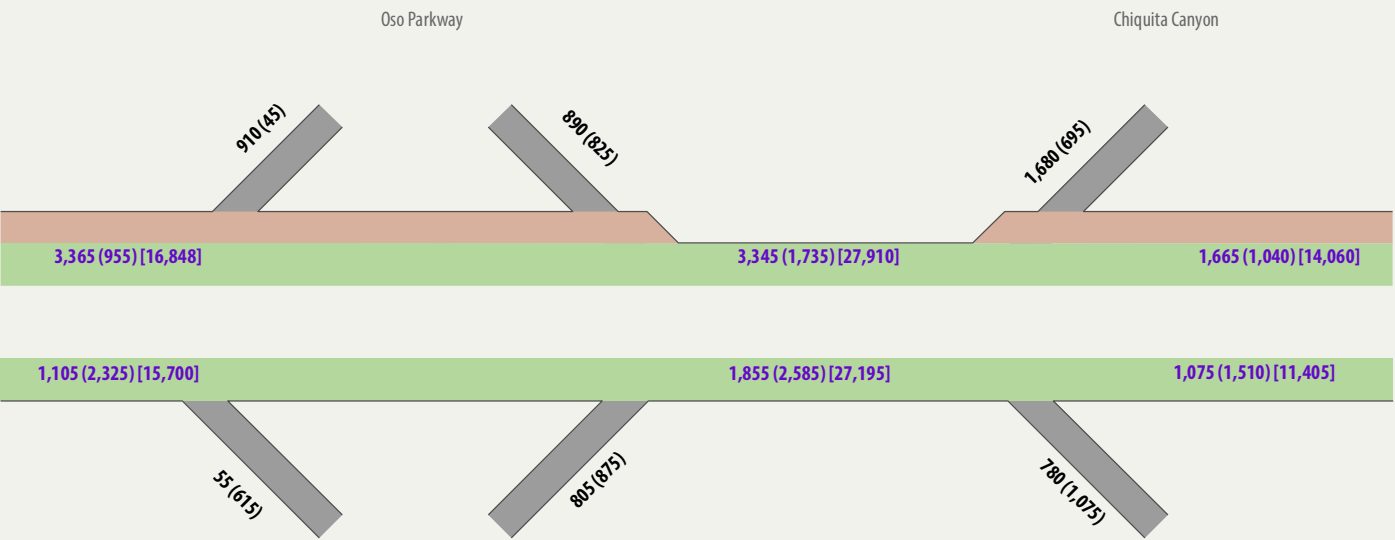
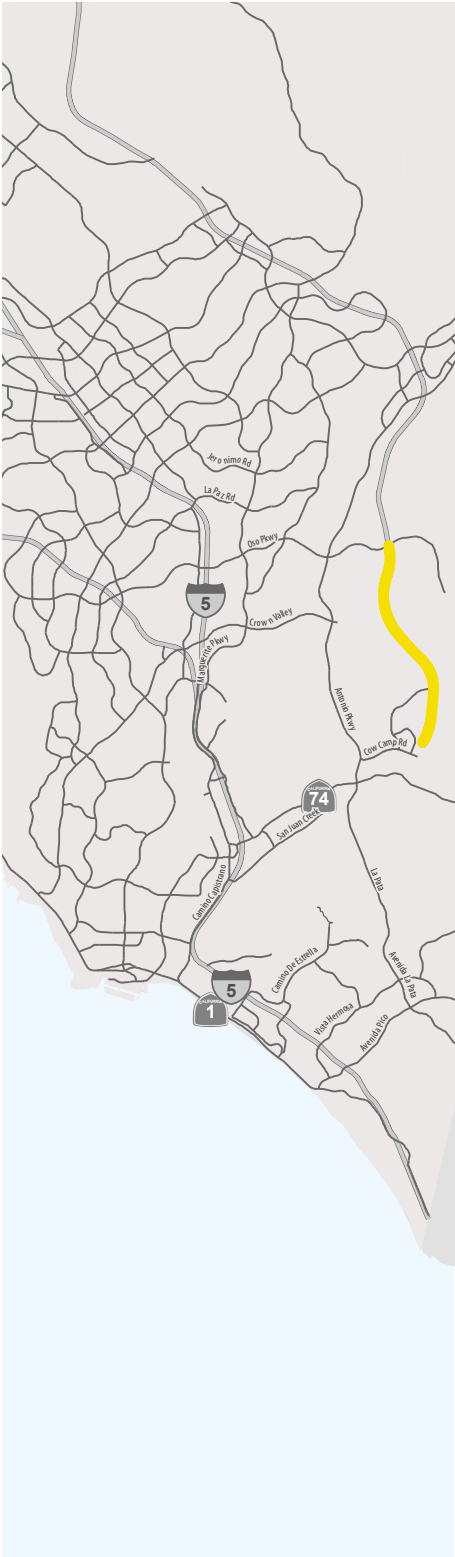
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume

Northbound
Southbound

Figure 14a

Design Year 2050 Mainline and Ramp Volumes
(I-5) - Alternative 1 (No Build with HOV)

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- Ramps
- HOV Lane
- Managed Lanes
- Auxiliary Lane
- Proposed Hill Lane

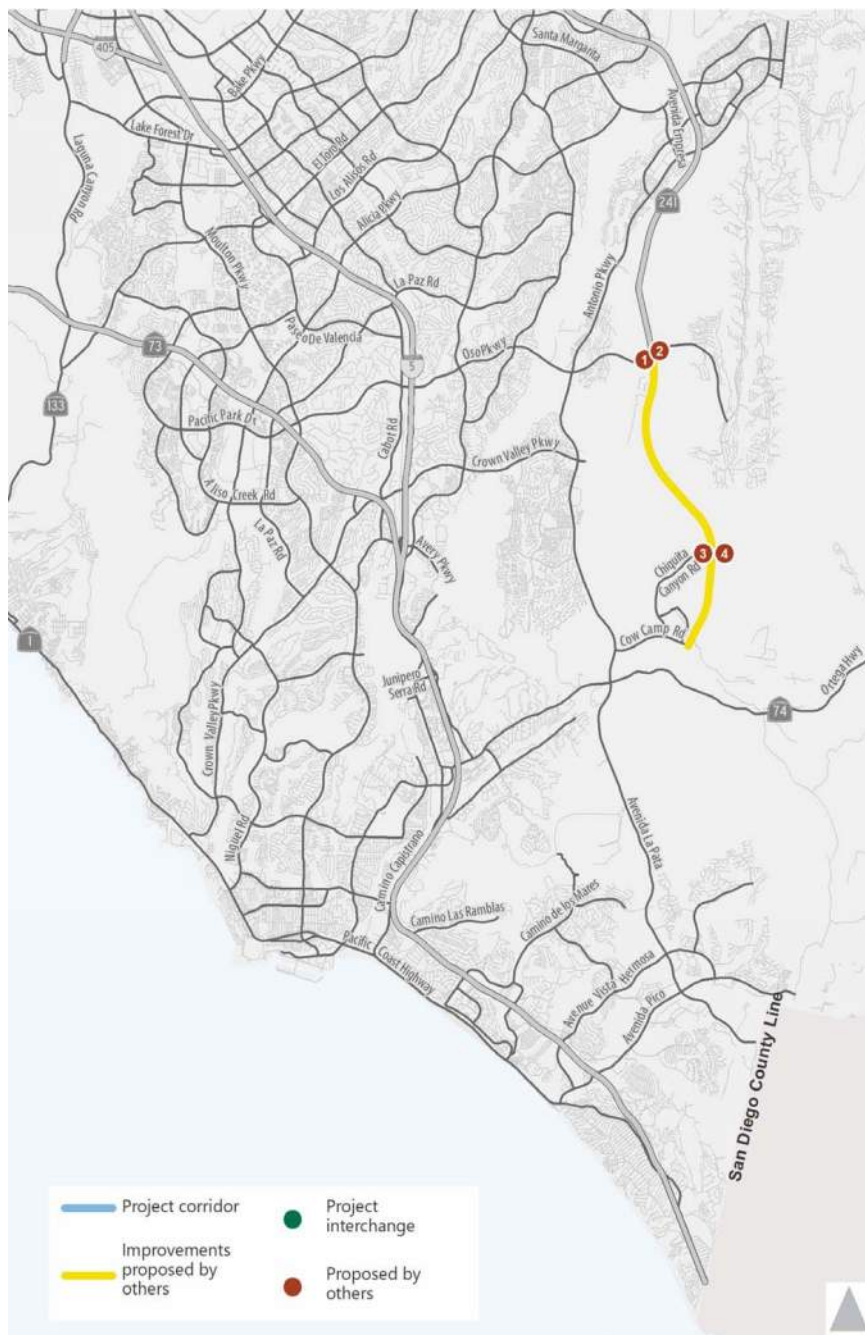
xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume

Northbound
Southbound

Design Year 2050 Los Patrones Parkway Volumes
Alternative 1 (No Build With HOV)

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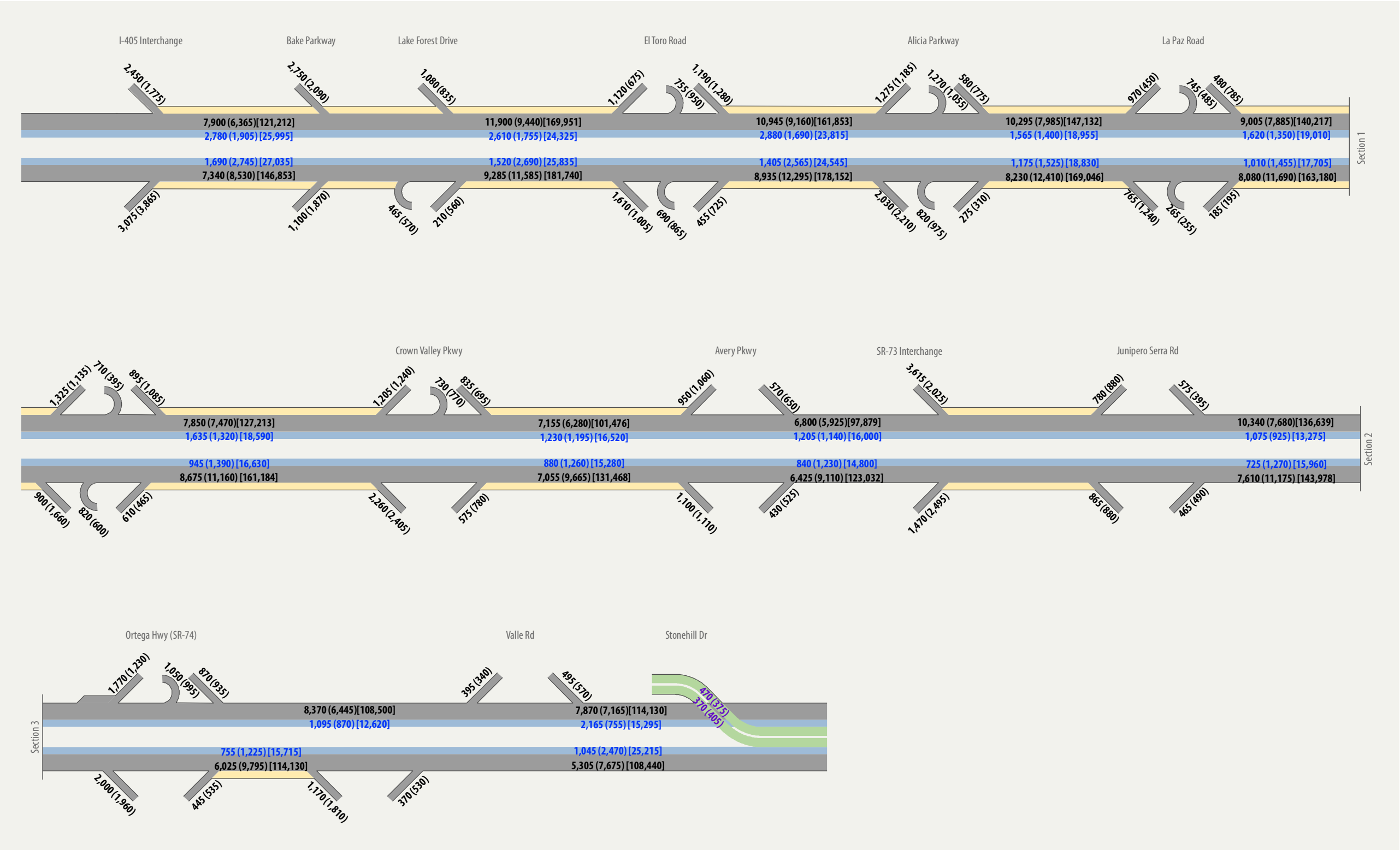
1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Chiquita Canyon Road
SR 241 SB Ramps 35 (430) 20 (185) Oso Parkway 920 (705) 720 (820) 1,690 (1,160) 85 (55) SR 241 NB Ramps 265 (20) 945 (495)	SR 241 NB Ramps 265 (20) 945 (495) Oso Parkway 645 (25) 295 (865) 830 (720) 60 (105) SR 241 SB Ramps 510 (360) 270 (715)	SR 241 SB Ramps 510 (360) 270 (715) Chiquita Canyon Road 1,075 (1,070) 660 (505) SR 241 NB Ramps 945 (305) 660 (505)
4. SR 241 NB Ramps/Chiquita Canyon Road		
SR 241 NB Ramps 945 (305) 660 (505) Chiquita Canyon Road 735 (390) 610 (1,395)		

 Travel Direction
 AM (PM) Turning Movement



Figure 15
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 1 (No Build With HOV)

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- General Purpose Lanes
- HOV Lane
- Managed Lanes
- Auxiliary Lane

XXX (XXX) AM (PM) Peak Hour Traffic Volume
[XXX] Average Daily Traffic Volume (ADT)

XXX (XXX) [XXX] General Purpose Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] HOV Lane Traffic Volume
XXX (XXX) [XXX] HOV Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] General Purpose Lane Traffic Volume

Design Year 2050 Mainline and Ramp Volumes (I-5) - Alternative 13

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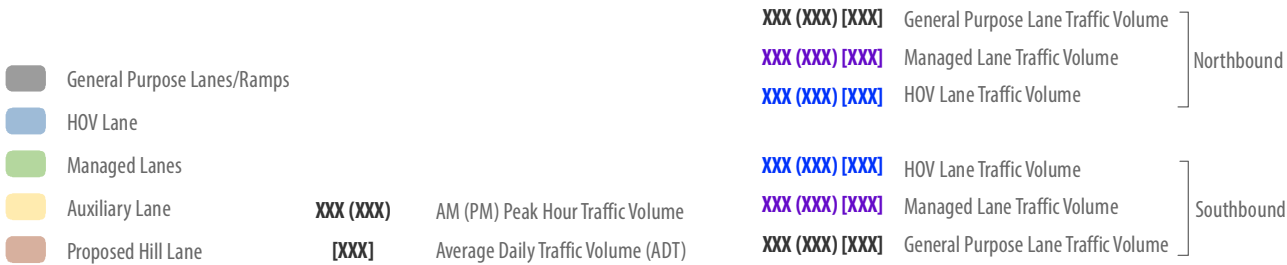
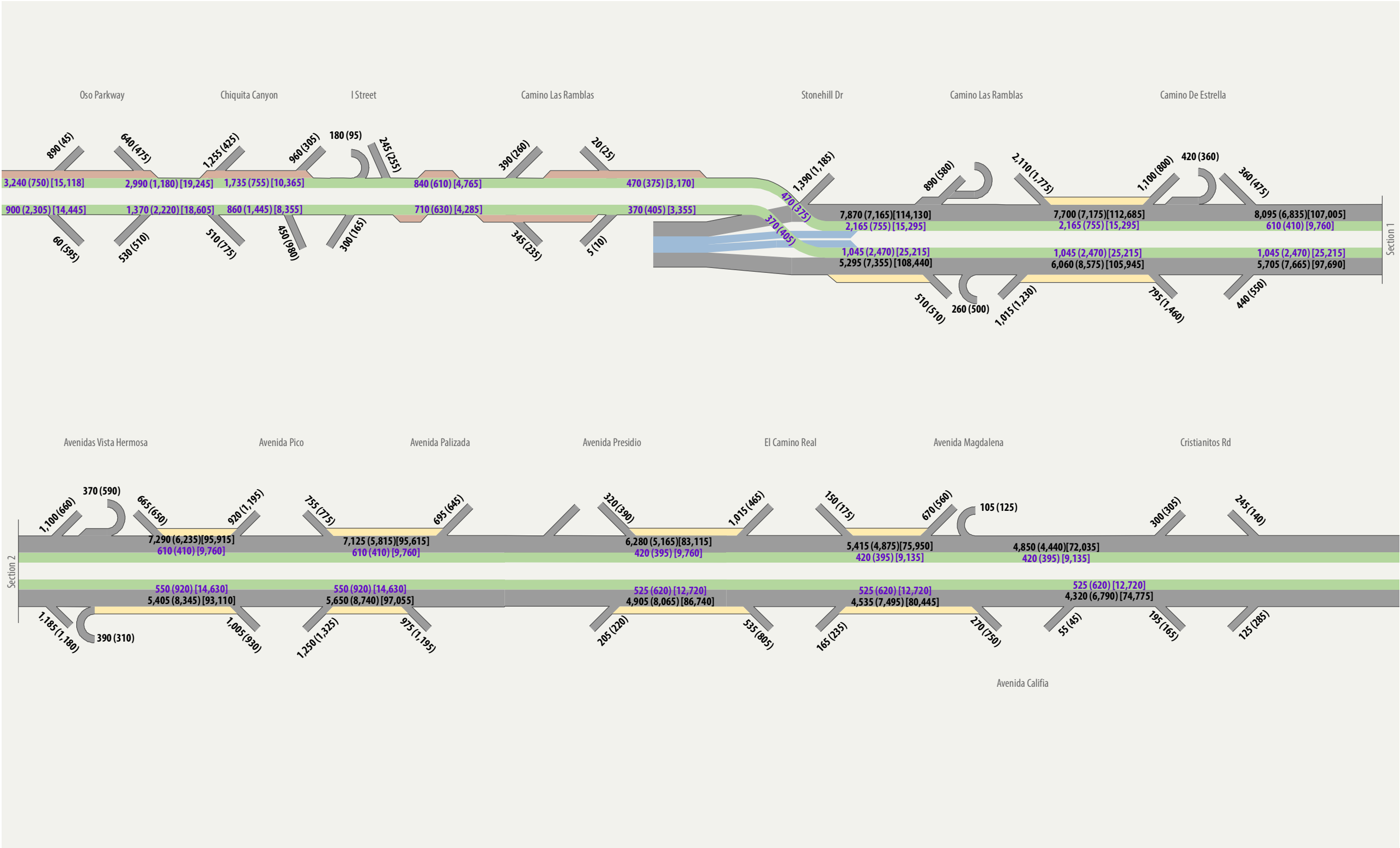
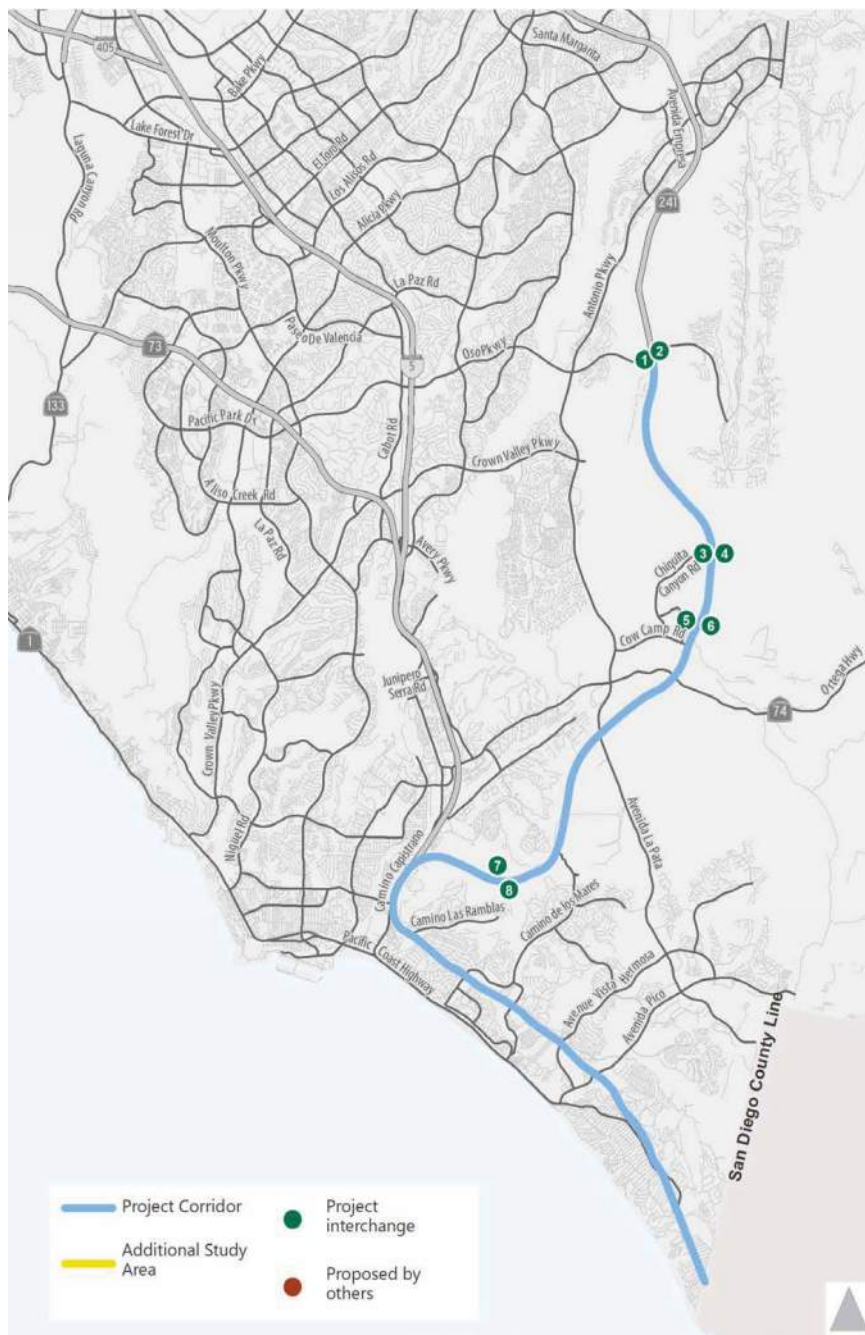


Figure 16b

Design Year 2050 Mainline and Ramp Volumes
(SR-241 and I-5 Managed Lanes) - Alternative 13



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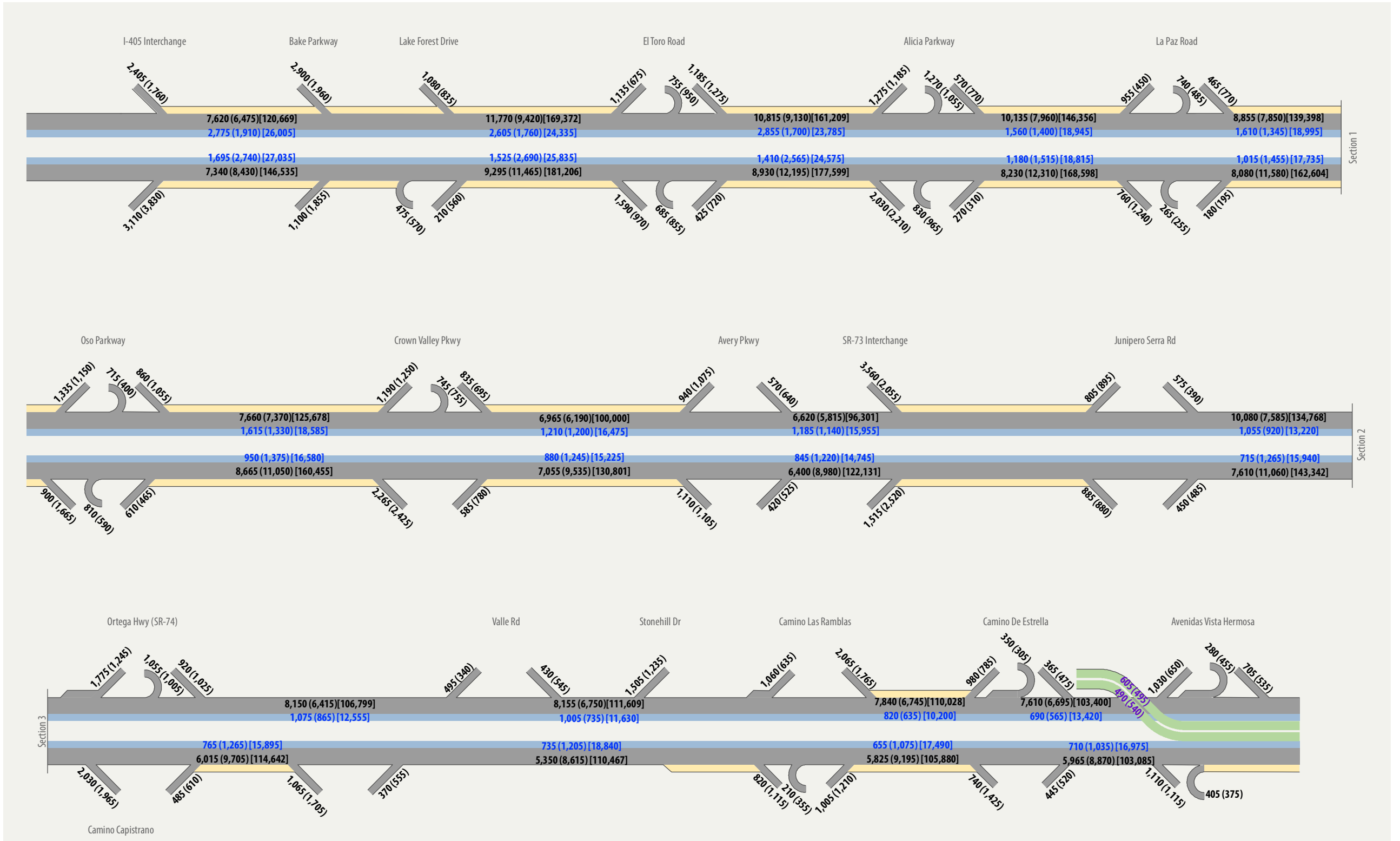


1. SR 241 SB Ramps/Oso Parkway 40 (430) 20 (165) SR 241 SB Ramps 1,470 (820) 115 (55) Oso Parkway 930 (755) 415 (455)	2. SR 241 NB Ramps/Oso Parkway SR 241 NB Ramps 235 (20) 1,005 (490) Oso Parkway 655 (25) 295 (895) 580 (385) 60 (90)	3. SR 241 SB Ramps/Chiquita Canyon Road SR 241 SB Ramps 295 (200) 215 (575) Chiquita Canyon Road 740 (565) 785 (970)
4. SR 241 NB Ramps/Chiquita Canyon Road SR 241 NB Ramps 840 (205) 740 (565) Chiquita Canyon Road 415 (220) 585 (1,325)	5. SR 241 SB Ramps/I Street SR 241 SB Ramps 130 (90) 320 (890) I Street 660 (500) 215 (80) 425 (655) 85 (85)	6. SR 241 NB Ramps/I Street SR 241 NB Ramps 960 (305) 775 (525) I Street 565 (1,450) 180 (95) 100 (55) 145 (200)
7. SR 241 SB Ramps/Camino Las Ramblas SR 241 SB Ramps 90 (55) 255 (180) Camino Las Ramblas 105 (90) 0 (0) 190 (135) 5 (10)	8. SR 241 NB Ramps/Camino Las Ramblas SR 241 NB Ramps 310 (225) 85 (65) Camino Las Ramblas 80 (35) 365 (280) 20 (25) 0 (0)	

 Travel Direction
 AM (PM) Turning Movement

Figure 17
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 13

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Design Year 2050 Mainline and Ramp Volumes
(I-5) Alternative 17

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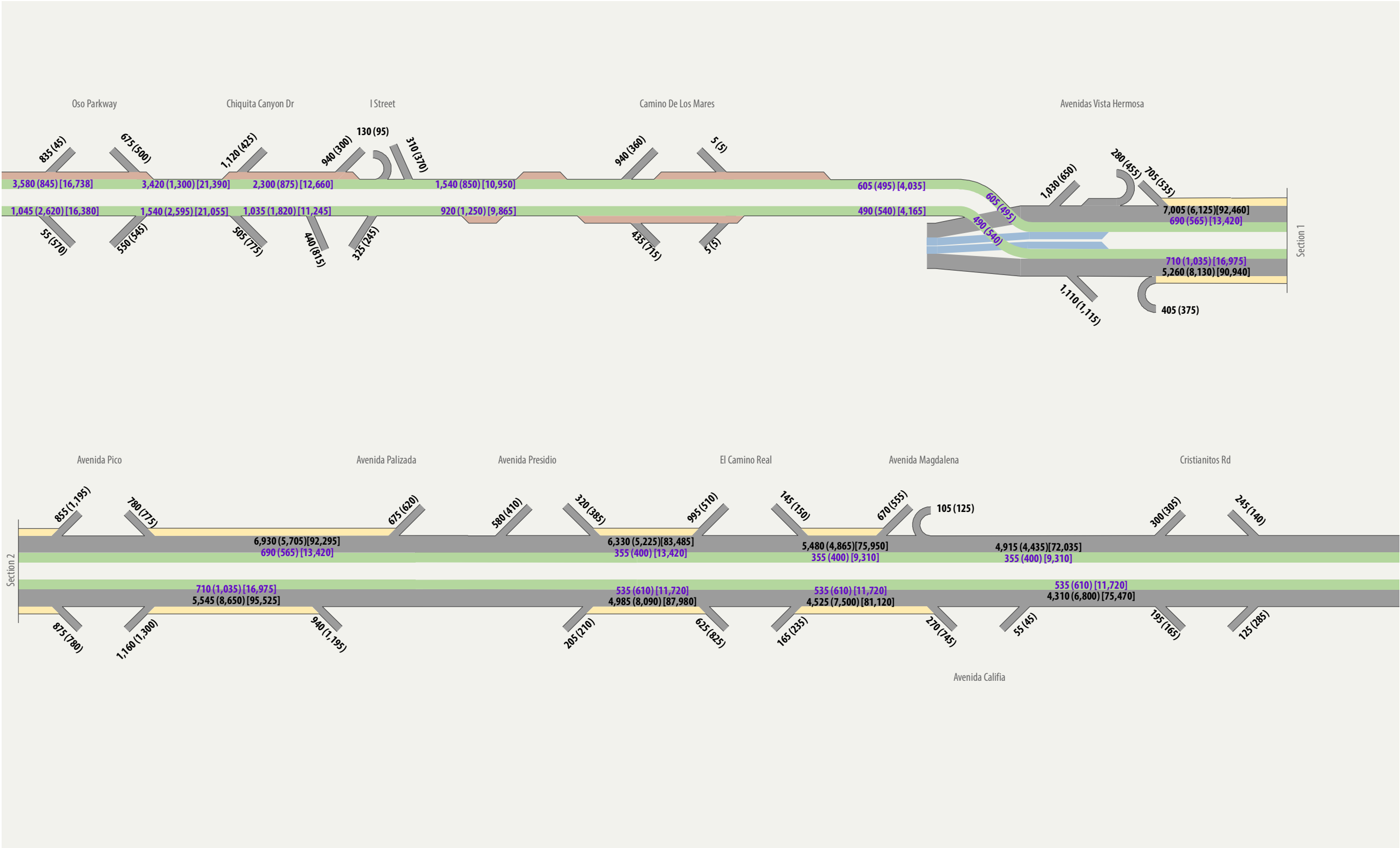
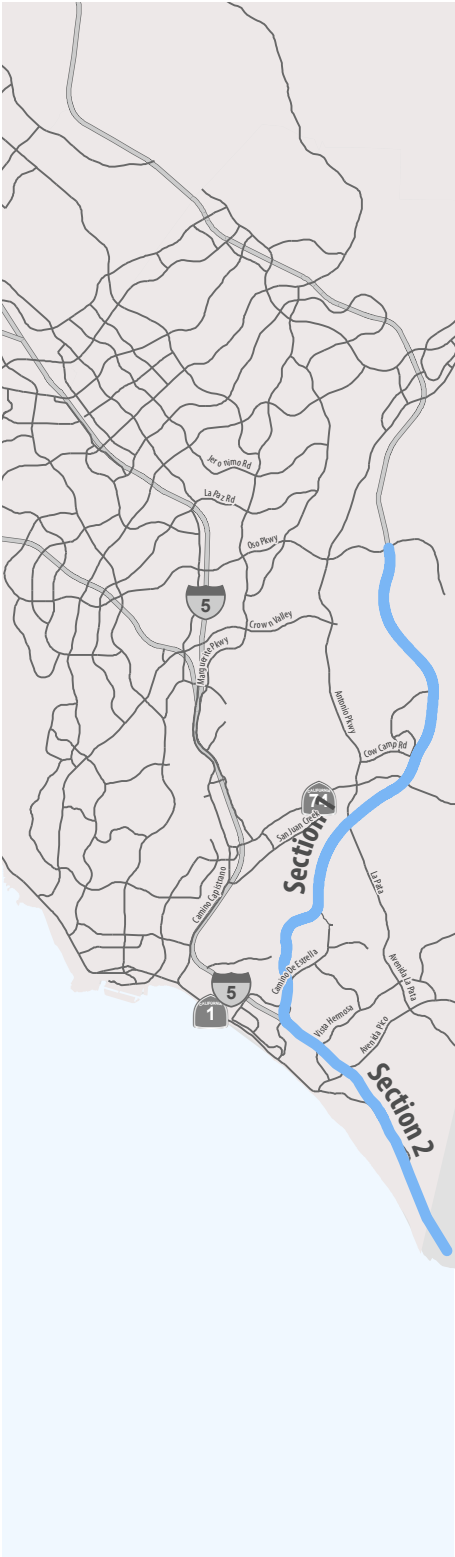


Figure 18b

Design Year 2050 Mainline and Ramp Volumes
(SR-241 and I-5 Managed Lanes) - Alternative 17



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General Purpose Lanes	XXX (XXX) [XXX]	General Purpose Lane Traffic Volume	Northbound
HOV Lane	XXX (XXX) [XXX]	Managed Lane Traffic Volume	
Managed Lanes	XXX (XXX) [XXX]	HOV Lane Traffic Volume	
Auxiliary Lane	XXX (XXX) [XXX]	HOV Lane Traffic Volume	Southbound
	XXX (XXX) [XXX]	Managed Lane Traffic Volume	
	XXX (XXX) [XXX]	General Purpose Lane Traffic Volume	
	XXX (XXX)	AM (PM) Peak Hour Traffic Volume	
	[XXX]	Average Daily Traffic Volume (ADT)	

Figure 20a

Design Year 2050 Mainline and Ramp Volumes (I-5) - Alternative 14

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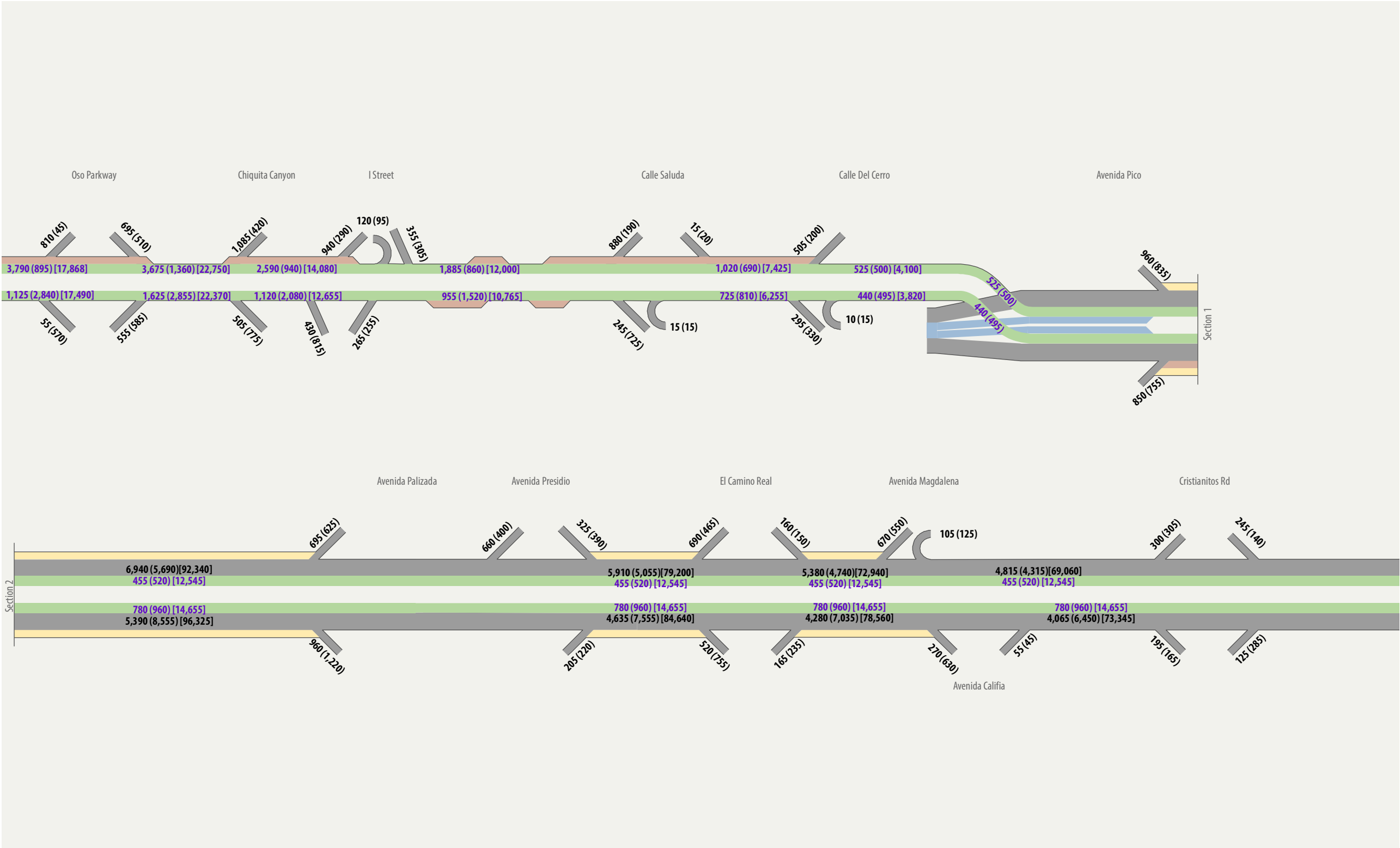
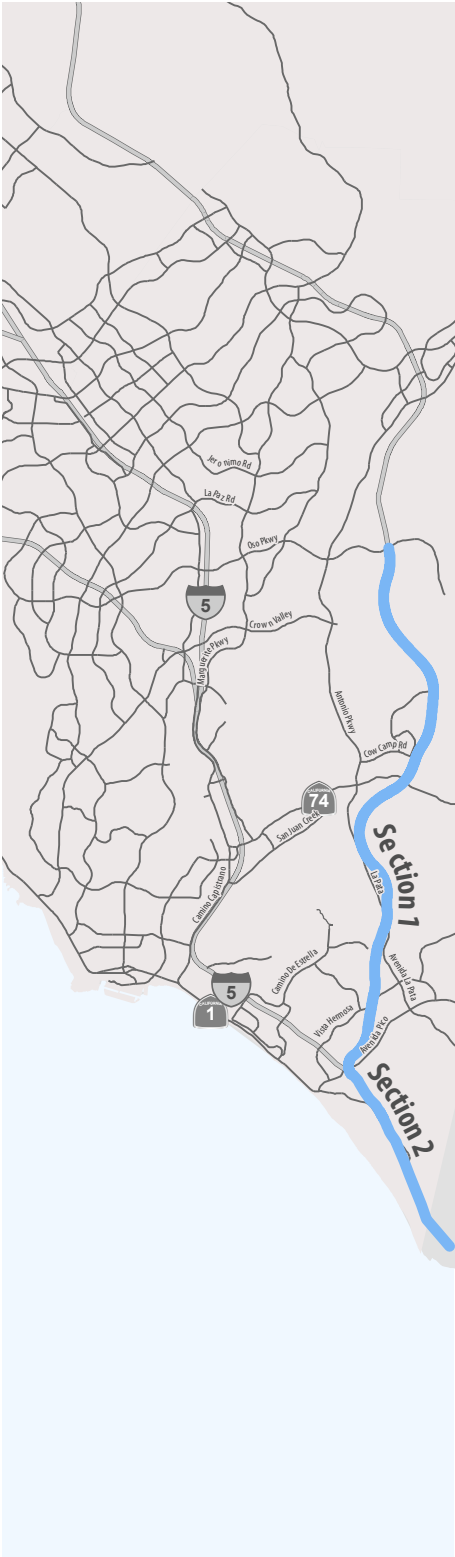


Figure 20b

Design Year 2050 Mainline and Ramp Volumes
(SR-241 and I-5 Managed Lanes) - Alternative 14



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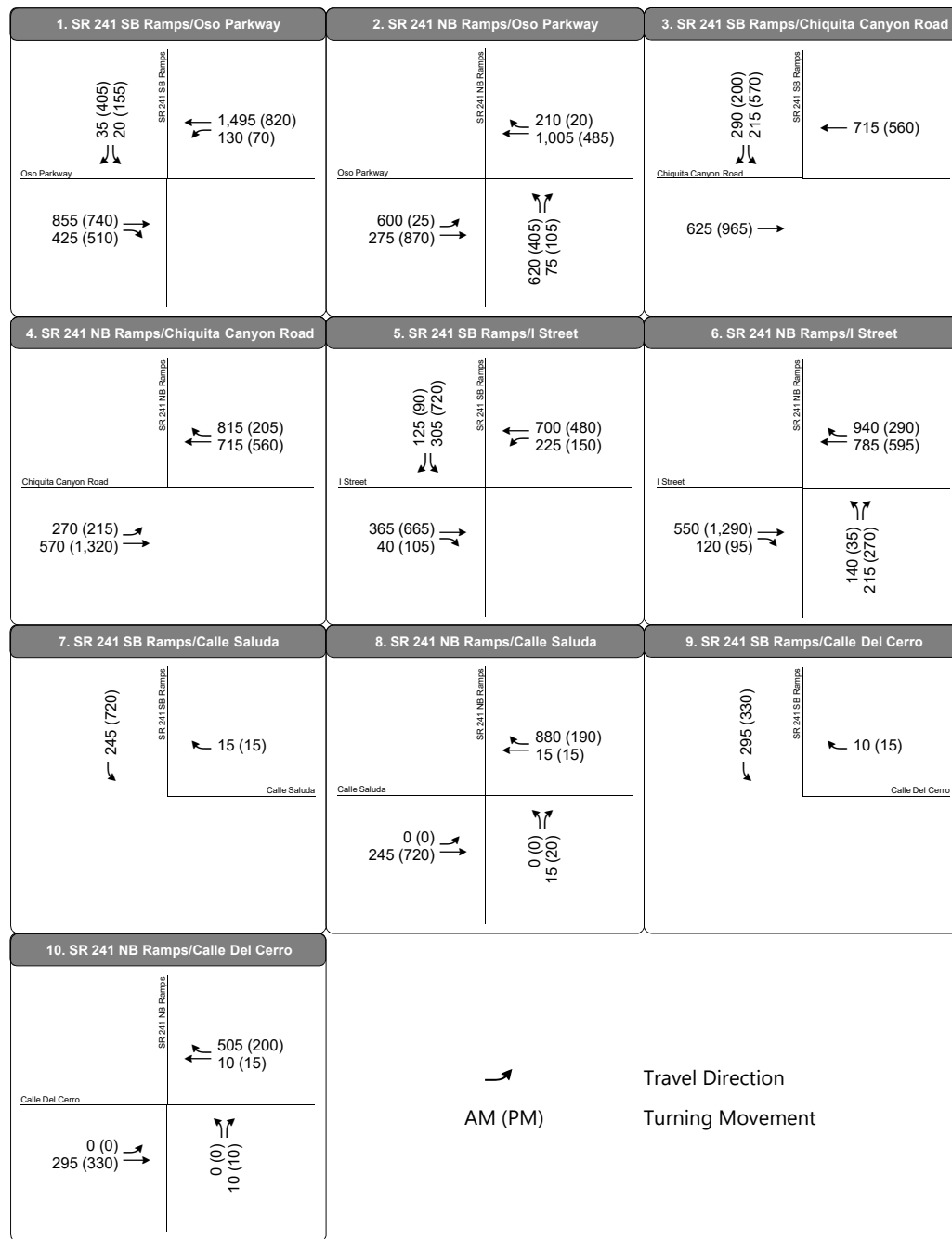
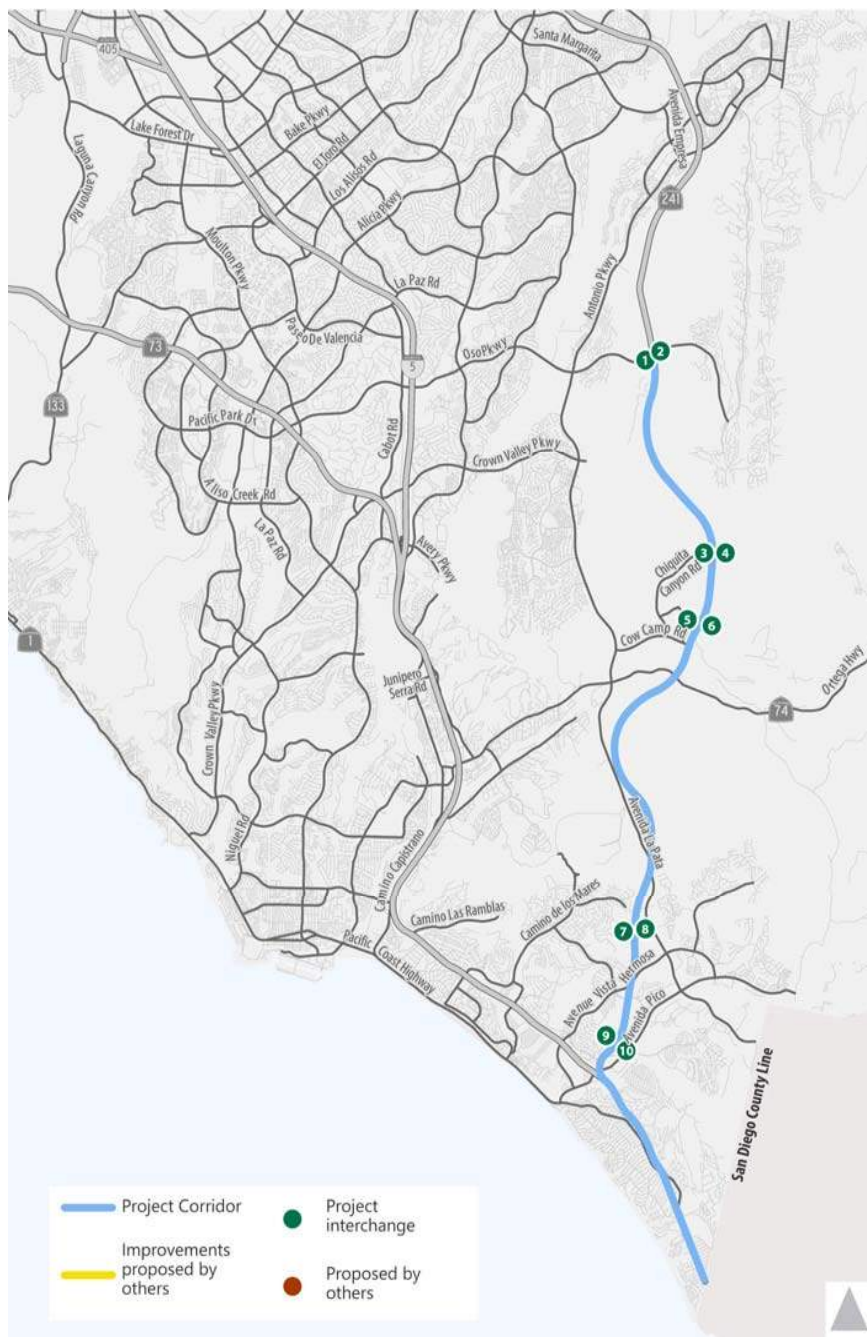
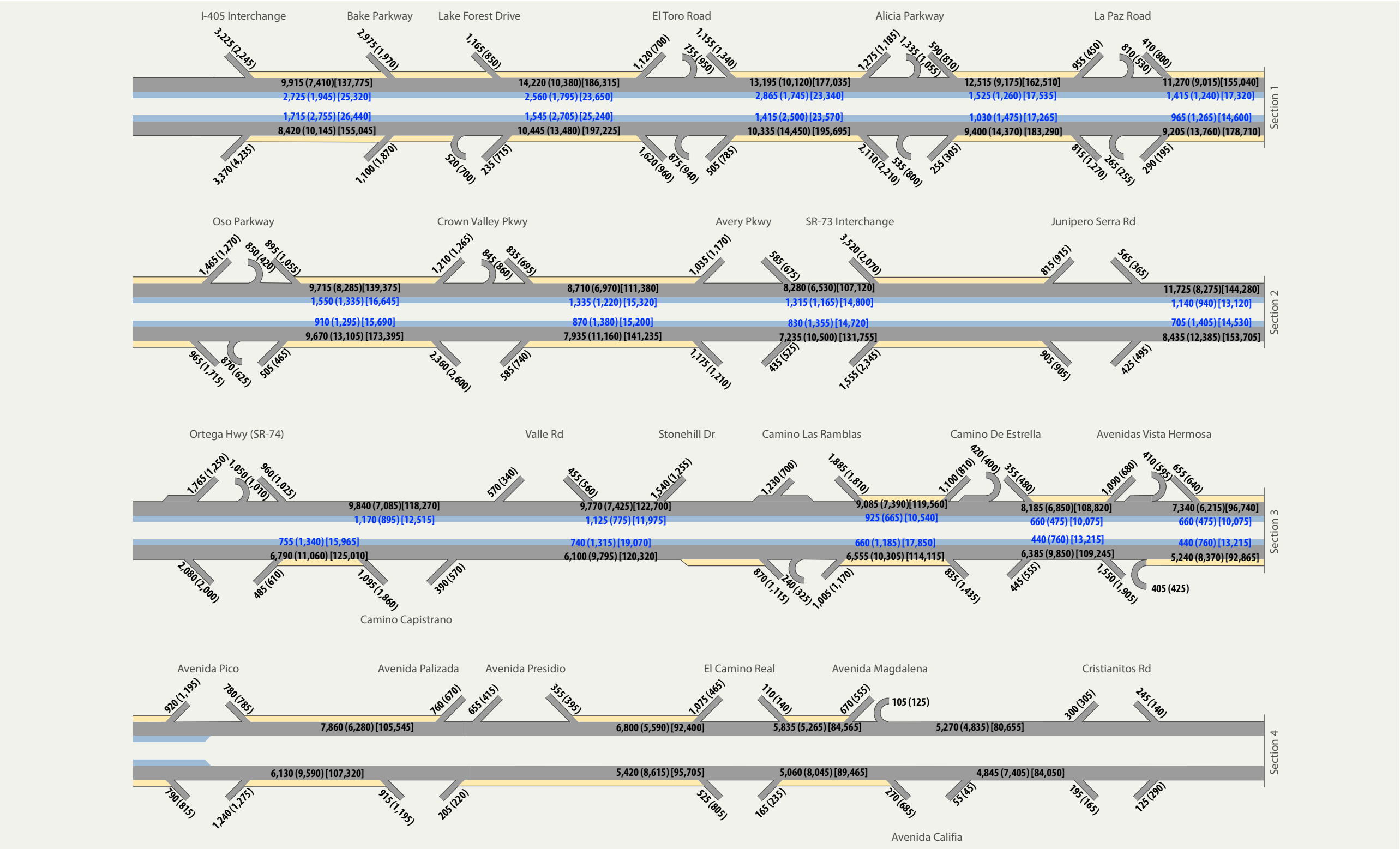


Figure 21
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 14

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- General Purpose Lanes
- HOV Lane
- Auxiliary Lane

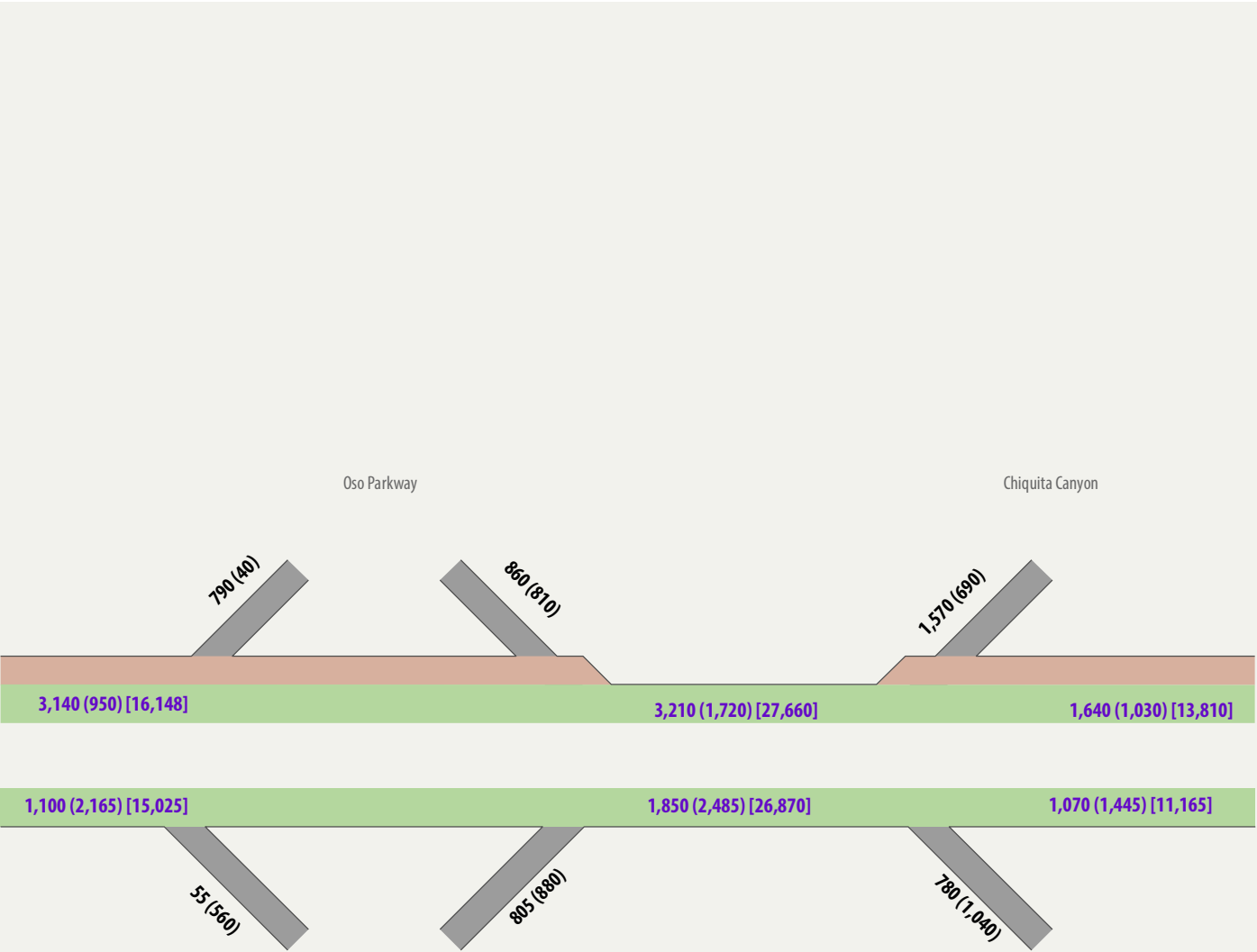
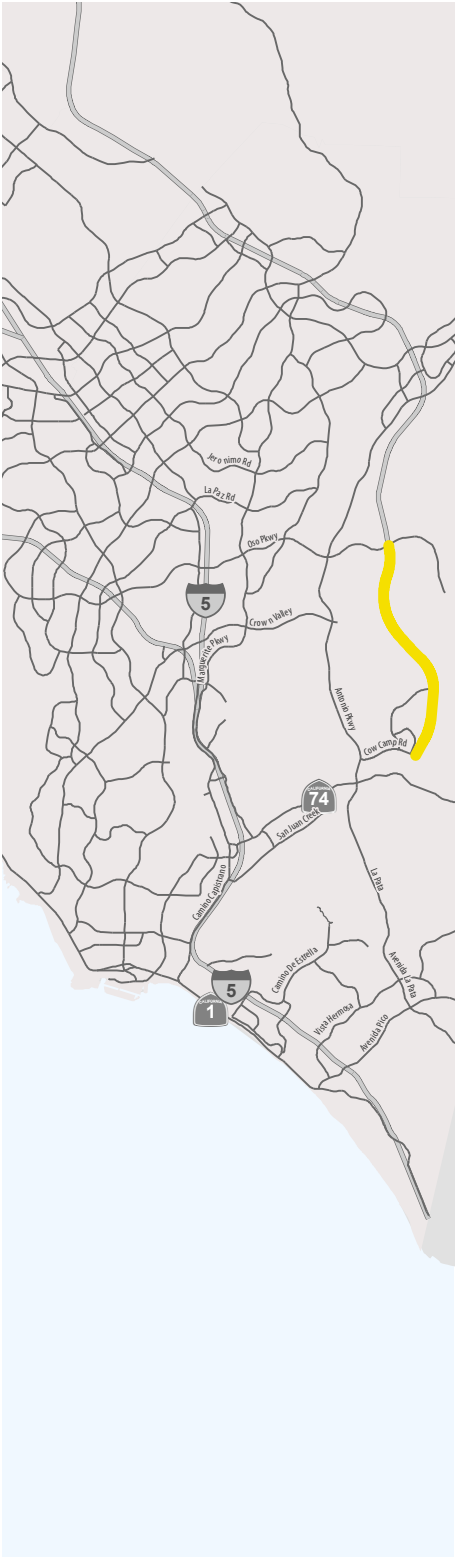
xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume

Northbound
Southbound

Design Year 2050 Mainline and Ramp Volumes
(I-5) Alternative 11

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- General Purpose Lanes/Ramps
- HOV Lane
- Managed Lanes
- Auxiliary Lane
- Proposed Hill Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

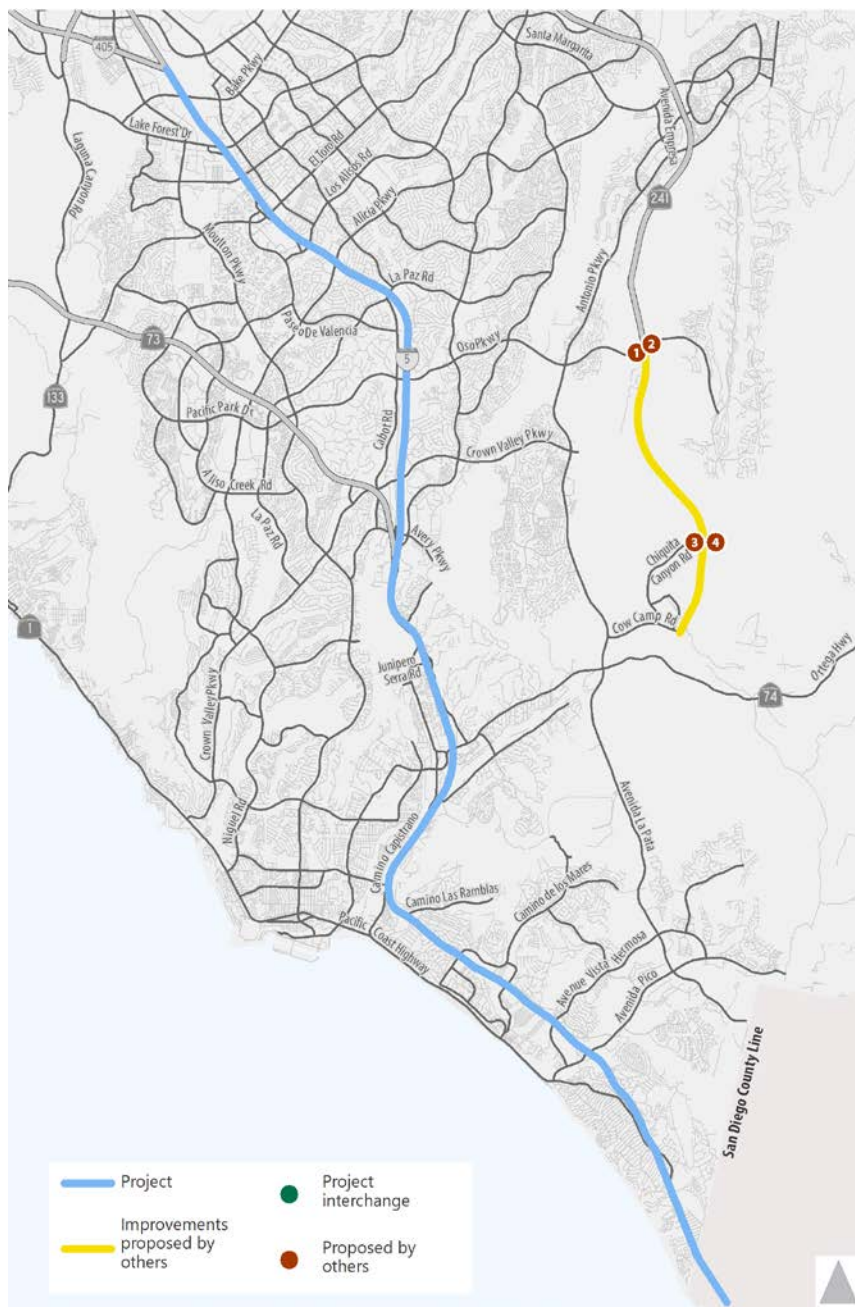
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume

Northbound
Southbound

Design Year 2050 Los Patrones Parkway Volumes
Alternative 11

Figure 22b

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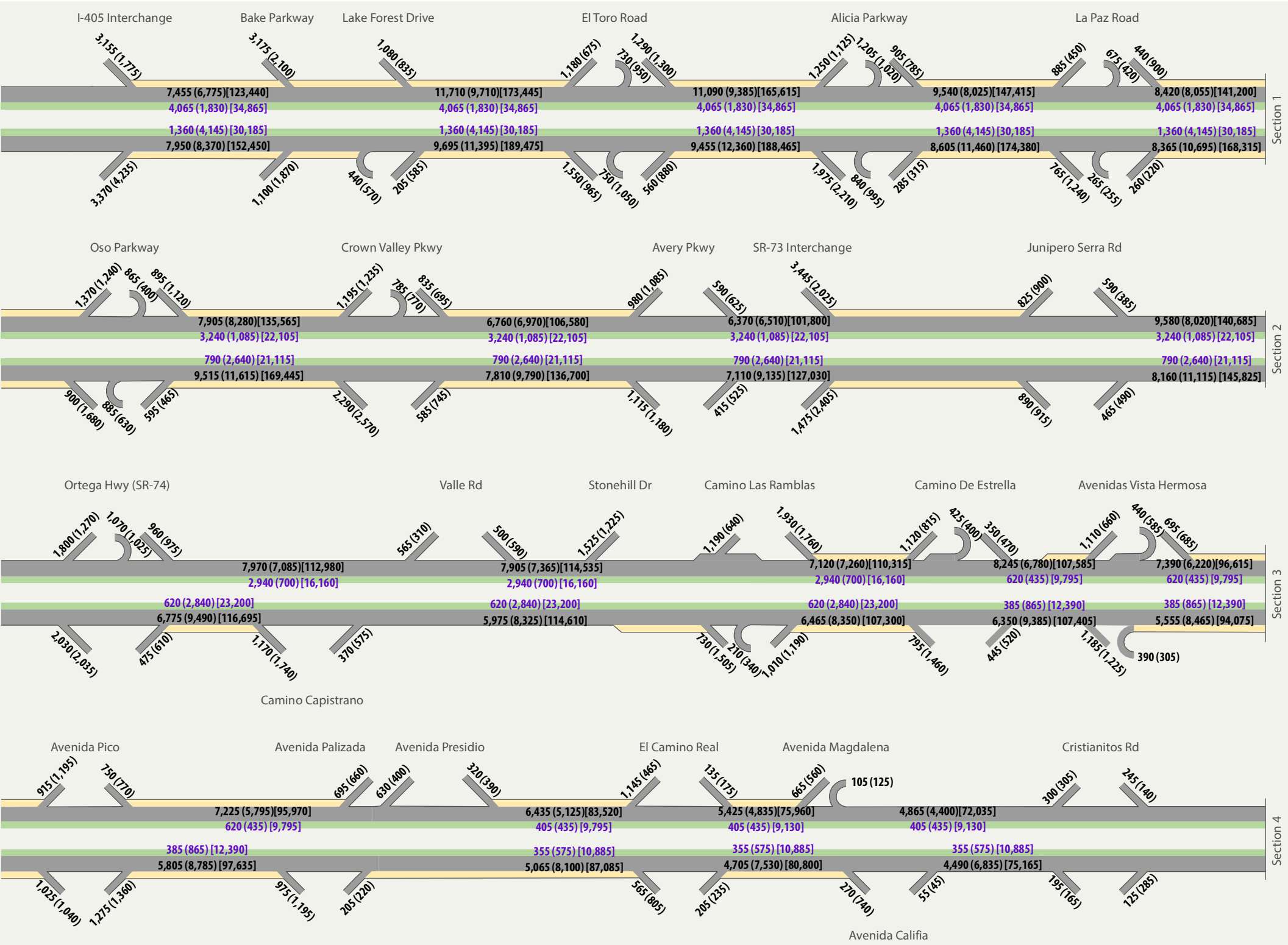


1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Chiquita Canyon Road
SR 241 SB Ramps 35 (395) 20 (165) 1,695 (1,160) 85 (55) Oso Parkway 840 (730) 720 (825)	SR 241 NB Ramps 220 (20) 975 (505) Oso Parkway 570 (20) 290 (875) 805 (710) 55 (100)	SR 241 SB Ramps 510 (340) 270 (700) Chiquita Canyon Road 640 (500) 1,000 (1,070) →
4. SR 241 NB Ramps/Chiquita Canyon Road		
SR 241 NB Ramps 900 (300) 640 (500) Chiquita Canyon Road 670 (390) 600 (1,380)		

 Travel Direction
 AM (PM) Turning Movement

Figure 23
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 11

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- Managed Lanes
- General Purpose Lanes
- Auxiliary Lane

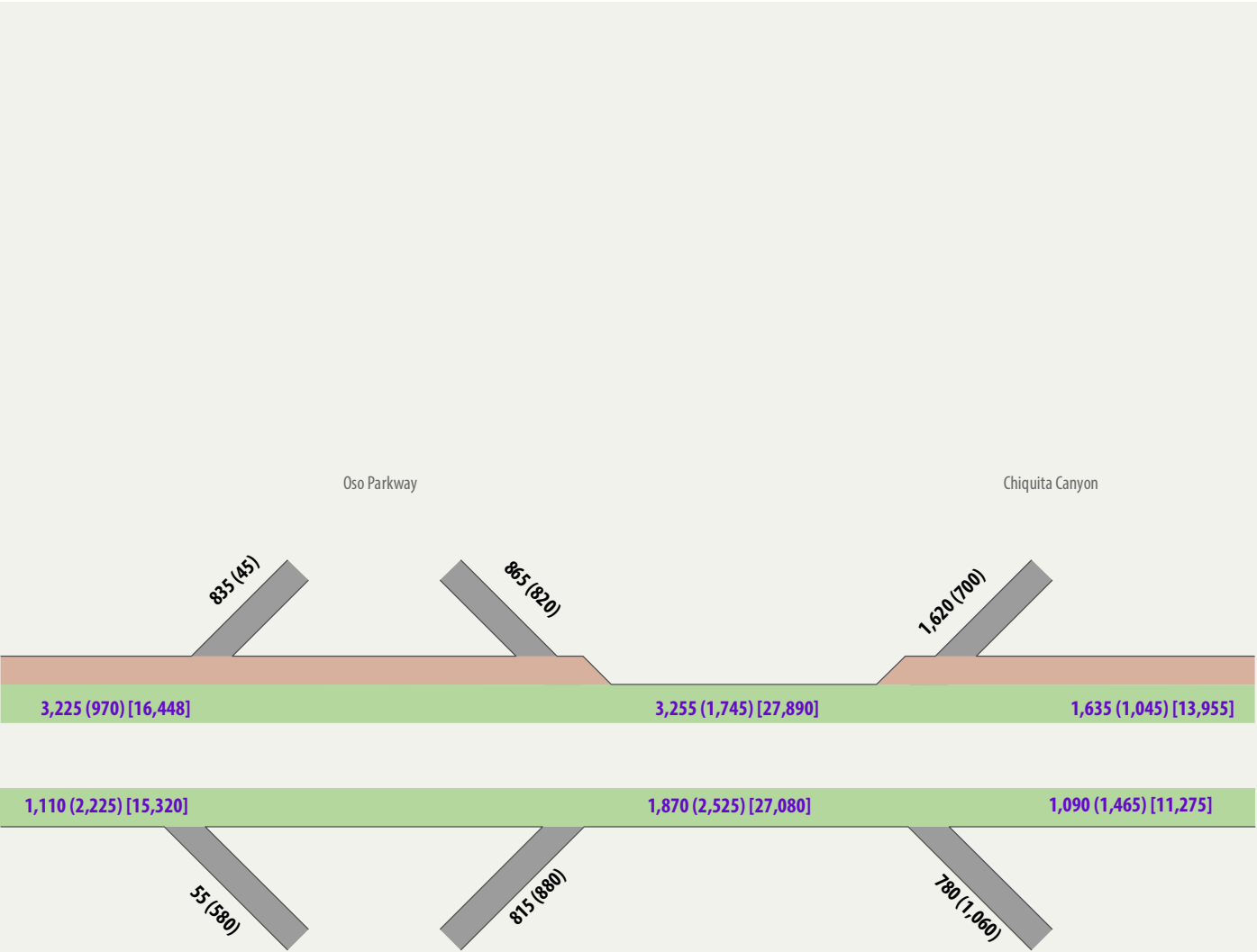
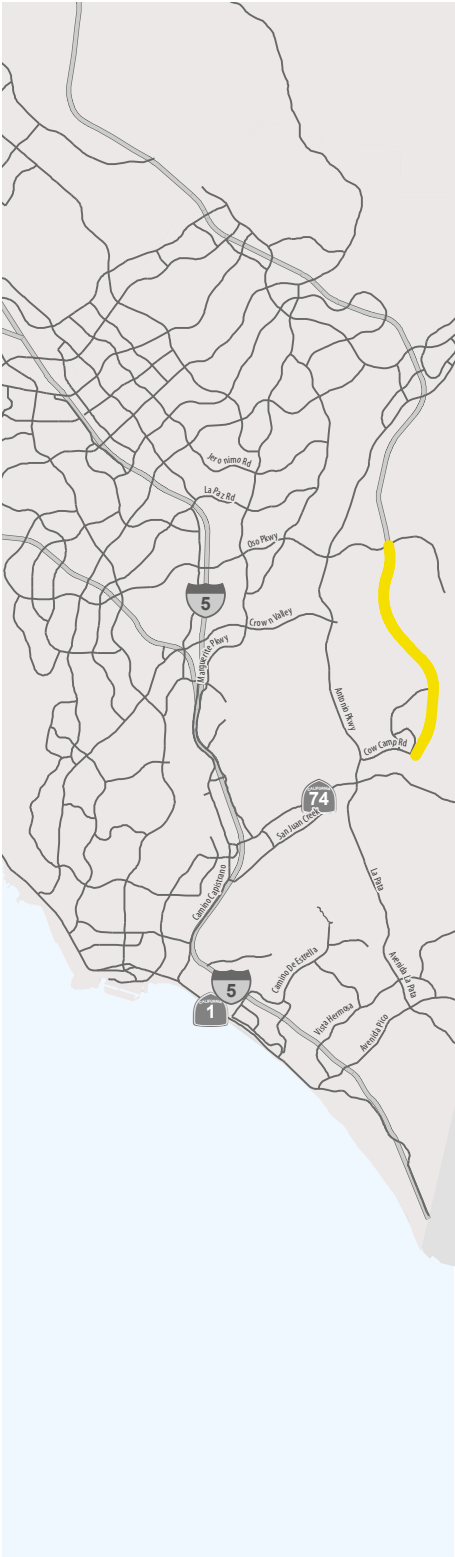
XXX (XXX) AM (PM) Peak Hour Traffic Volume
[XXX] Average Daily Traffic Volume (ADT)

XXX (XXX) [XXX] General Purpose Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] HOV Lane Traffic Volume
Northbound

XXX (XXX) [XXX] HOV Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] General Purpose Lane Traffic Volume
Southbound

Figure 24a
Design Year 2050 Mainline and Ramp Volumes
(I-5) - Alternative 12

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- General Purpose Lanes/Ramps
- HOV Lane
- Managed Lanes
- Auxiliary Lane
- Proposed Hill Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

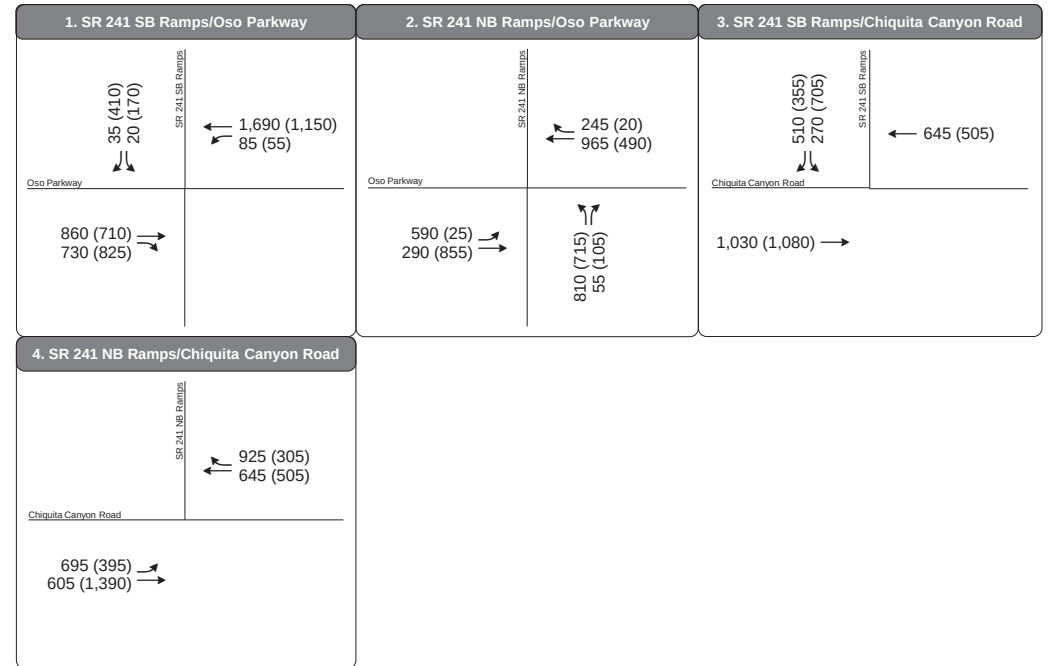
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume

Northbound

Southbound

Design Year 2050 Los Patrones Parkway Volumes
Alternative 12

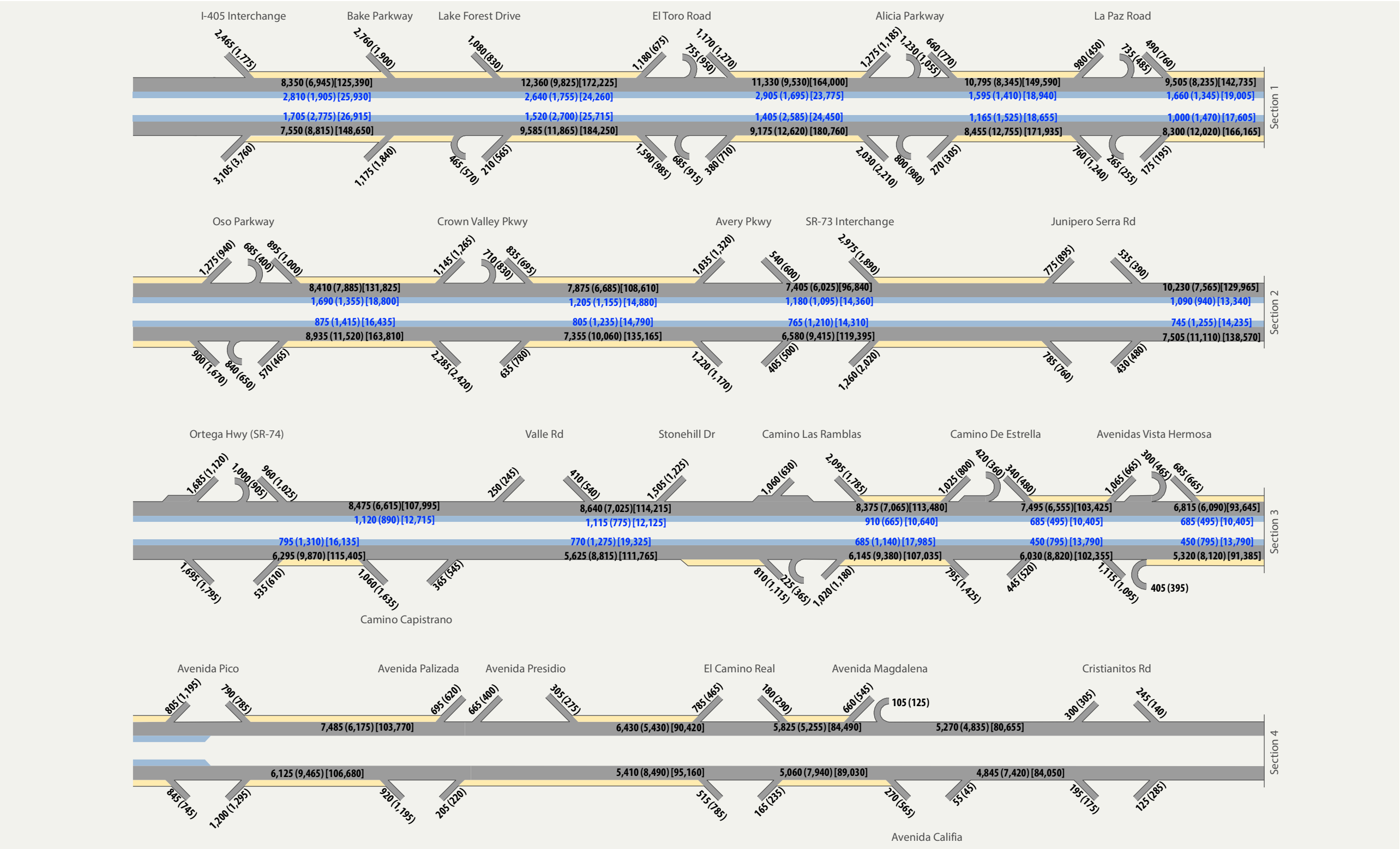
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Travel Direction
 Turning Movement
 AM (PM)

Figure 25
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 12

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- General Purpose Lanes
- HOV Lane
- Auxillary Lane

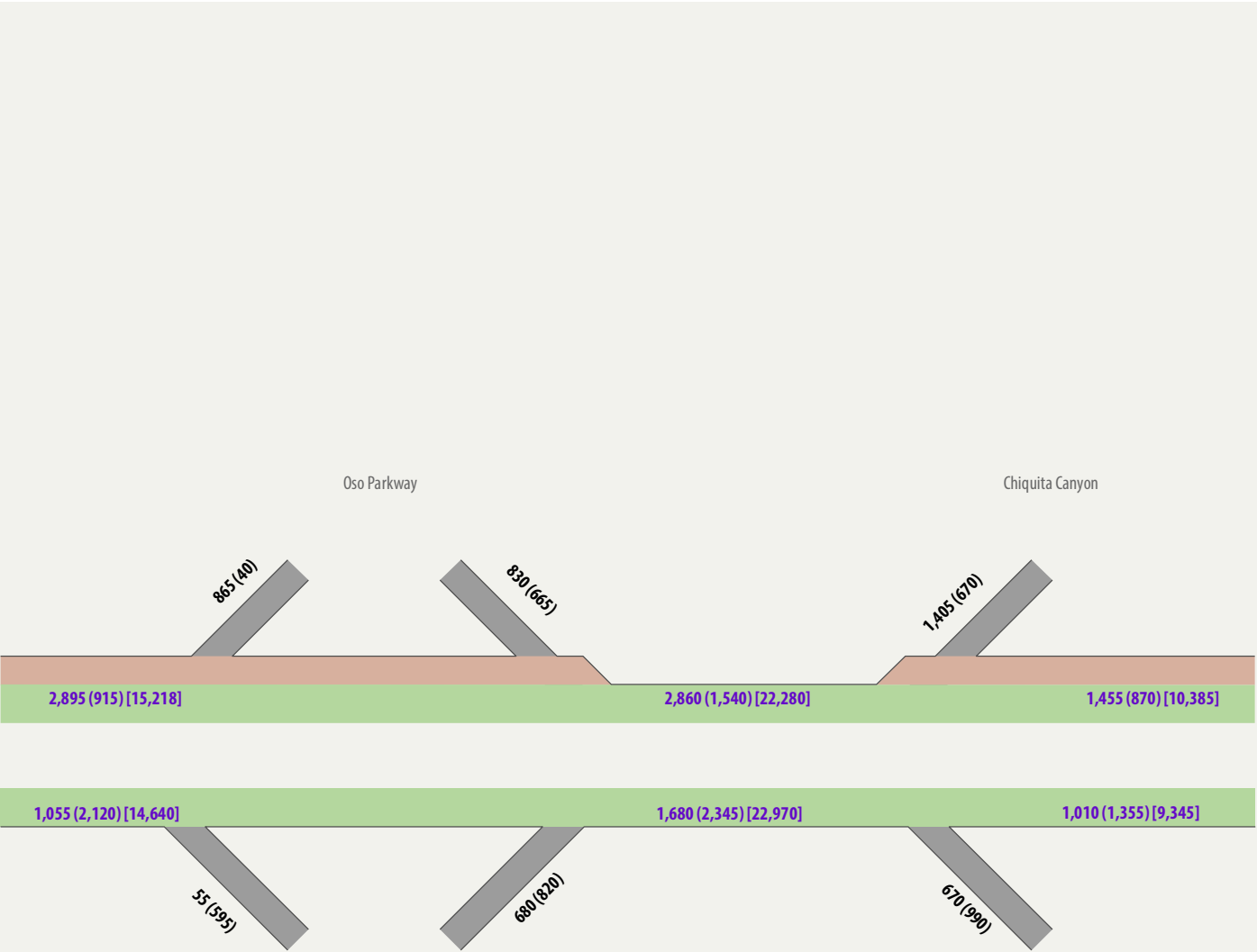
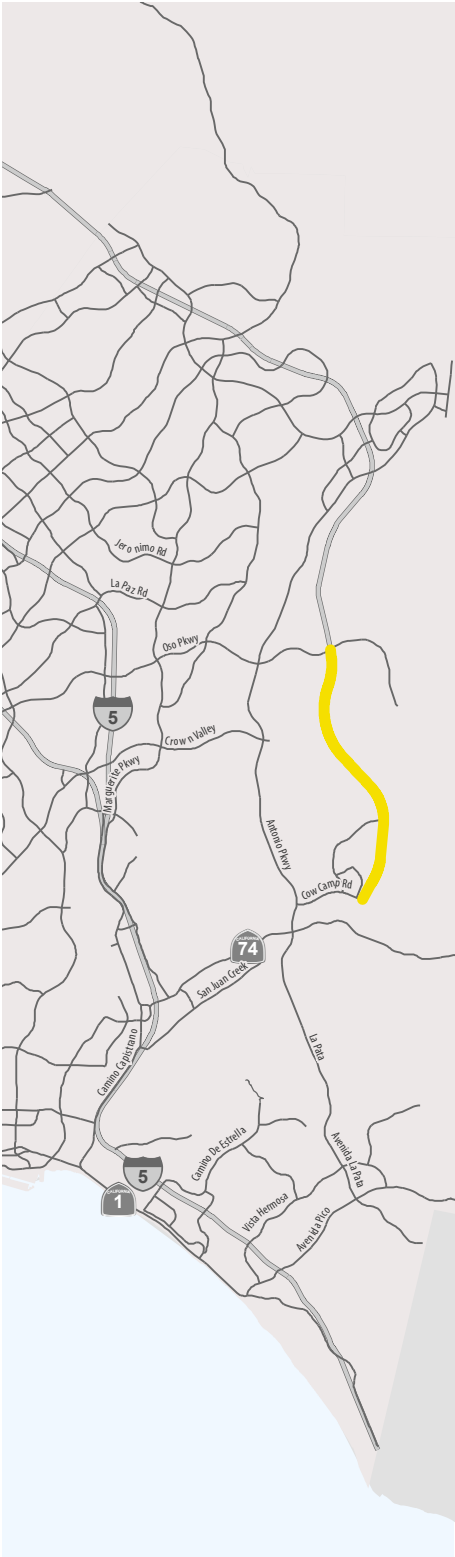
xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume

Northbound
Southbound

Figure 26a
Design Year 2050 Mainline and Ramp Volumes
(I-5) - Alternative 9

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General Purpose Lanes/Ramps
HOV Lane
Managed Lanes

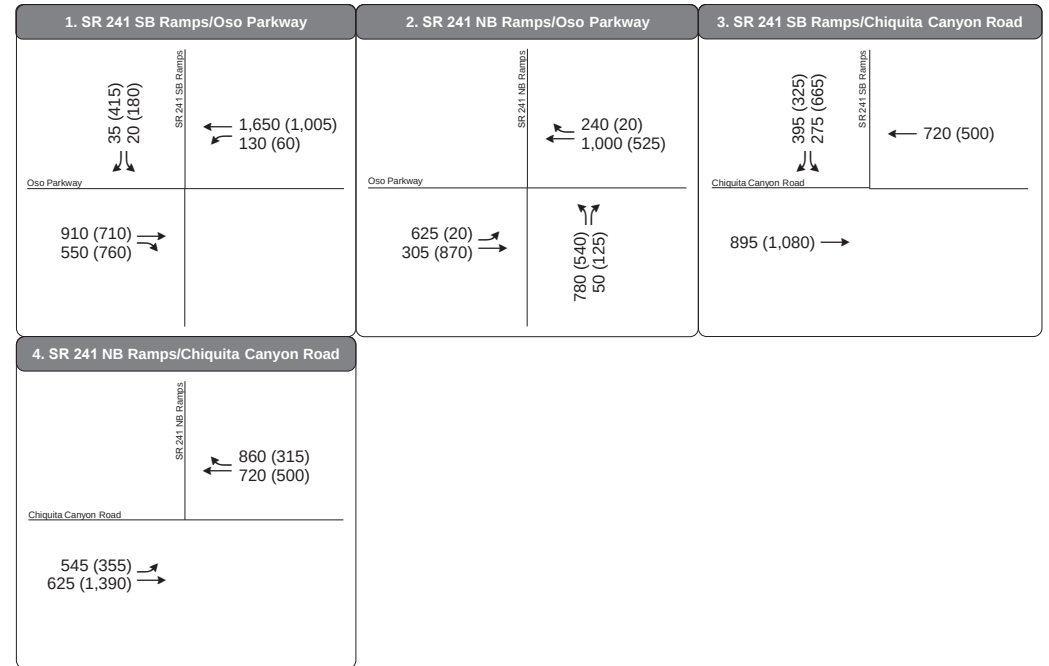
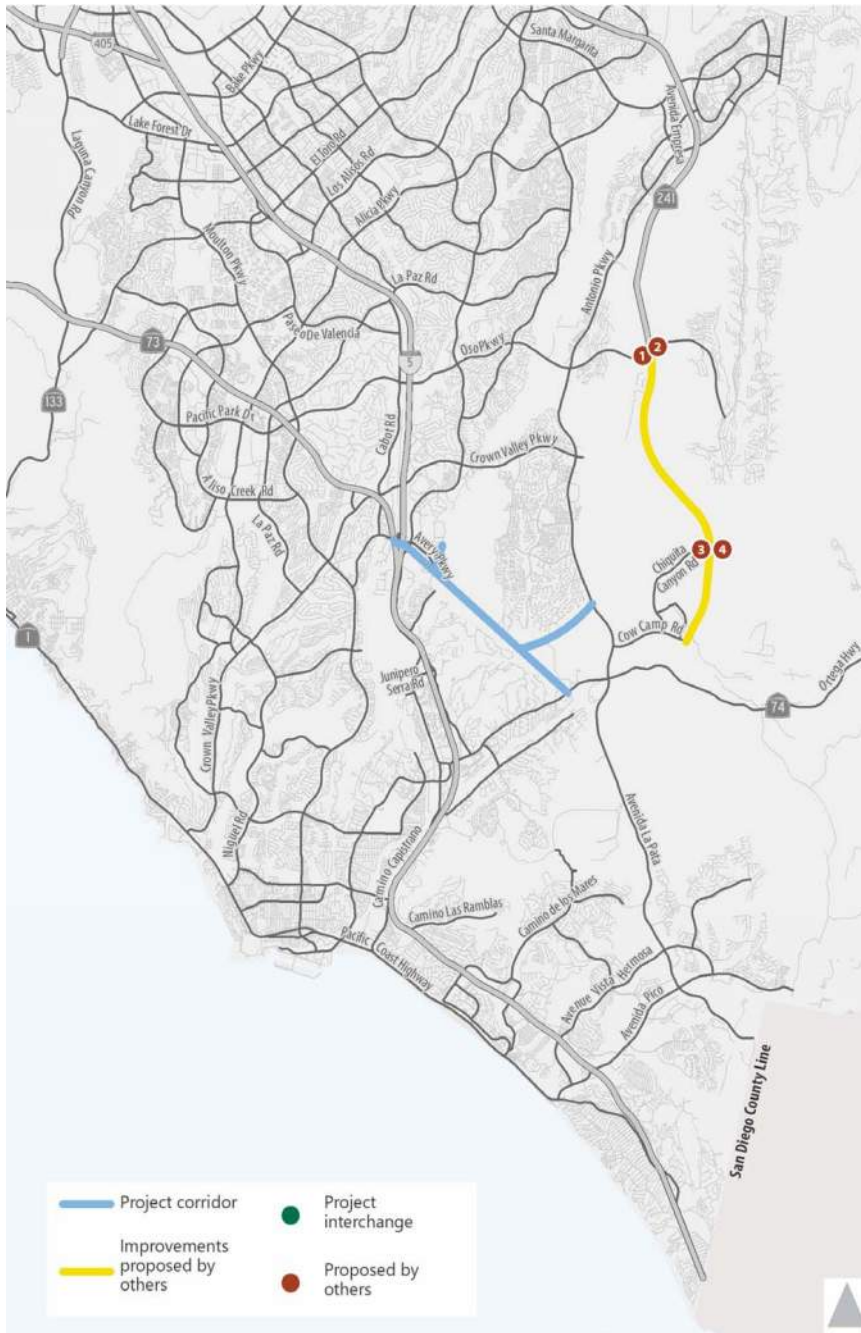
Auxiliary Lane
Proposed Hill Lane

AM (PM) Peak Hour Traffic Volume
Average Daily Traffic Volume (ADT)

xxx (xxx) [xxx]	General Purpose Lane Traffic Volume	Northbound
xxx (xxx) [xxx]	Managed Lane Traffic Volume	
xxx (xxx) [xxx]	HOV Lane Traffic Volume	
xxx (xxx) [xxx]	HOV Lane Traffic Volume	Southbound
xxx (xxx) [xxx]	Managed Lane Traffic Volume	
xxx (xxx) [xxx]	General Purpose Lane Traffic Volume	

Design Year 2050 Los Patrones Parkway Volumes
Alternative 9

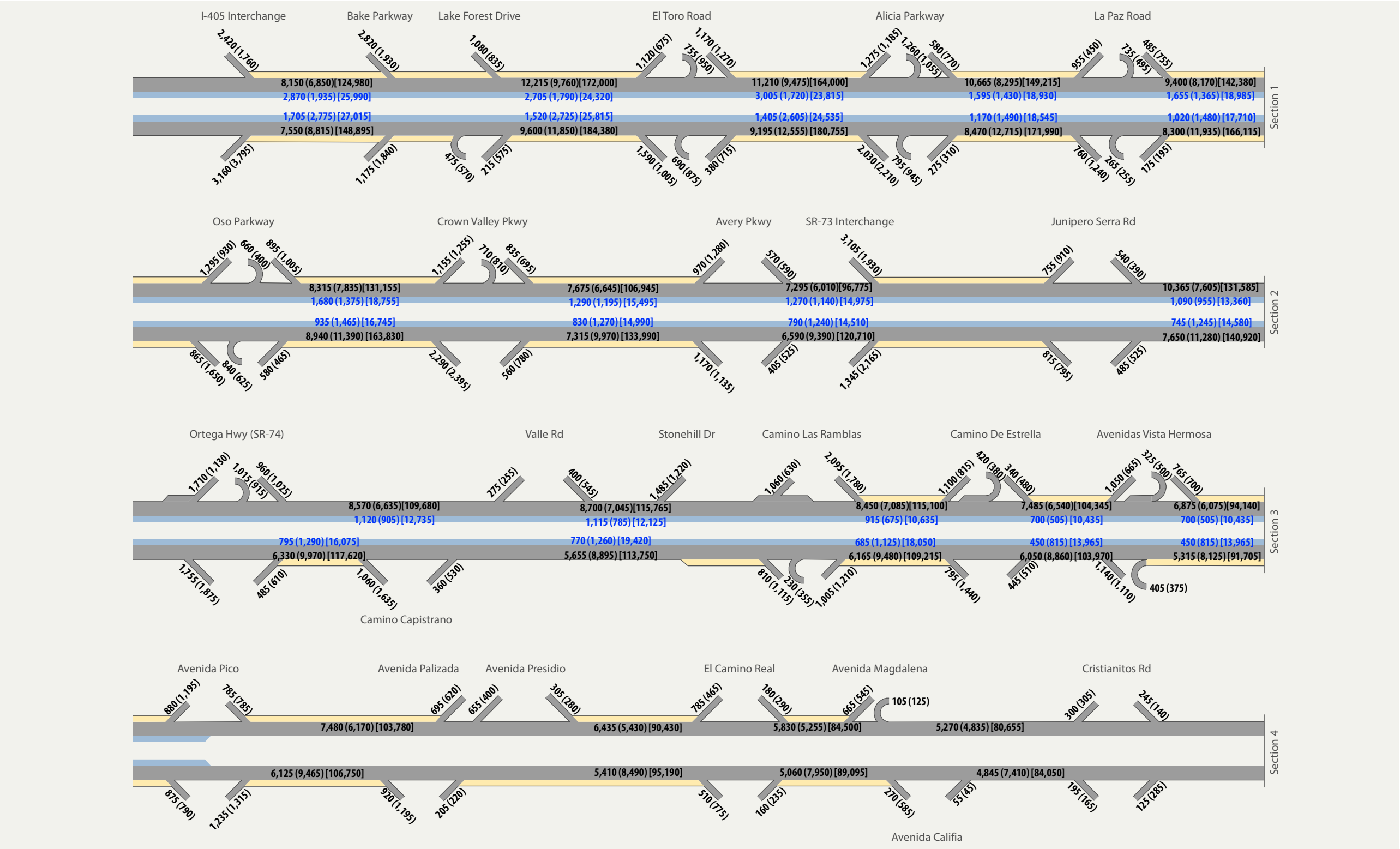
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Travel Direction
 AM (PM) Turning Movement

Figure 27
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 9

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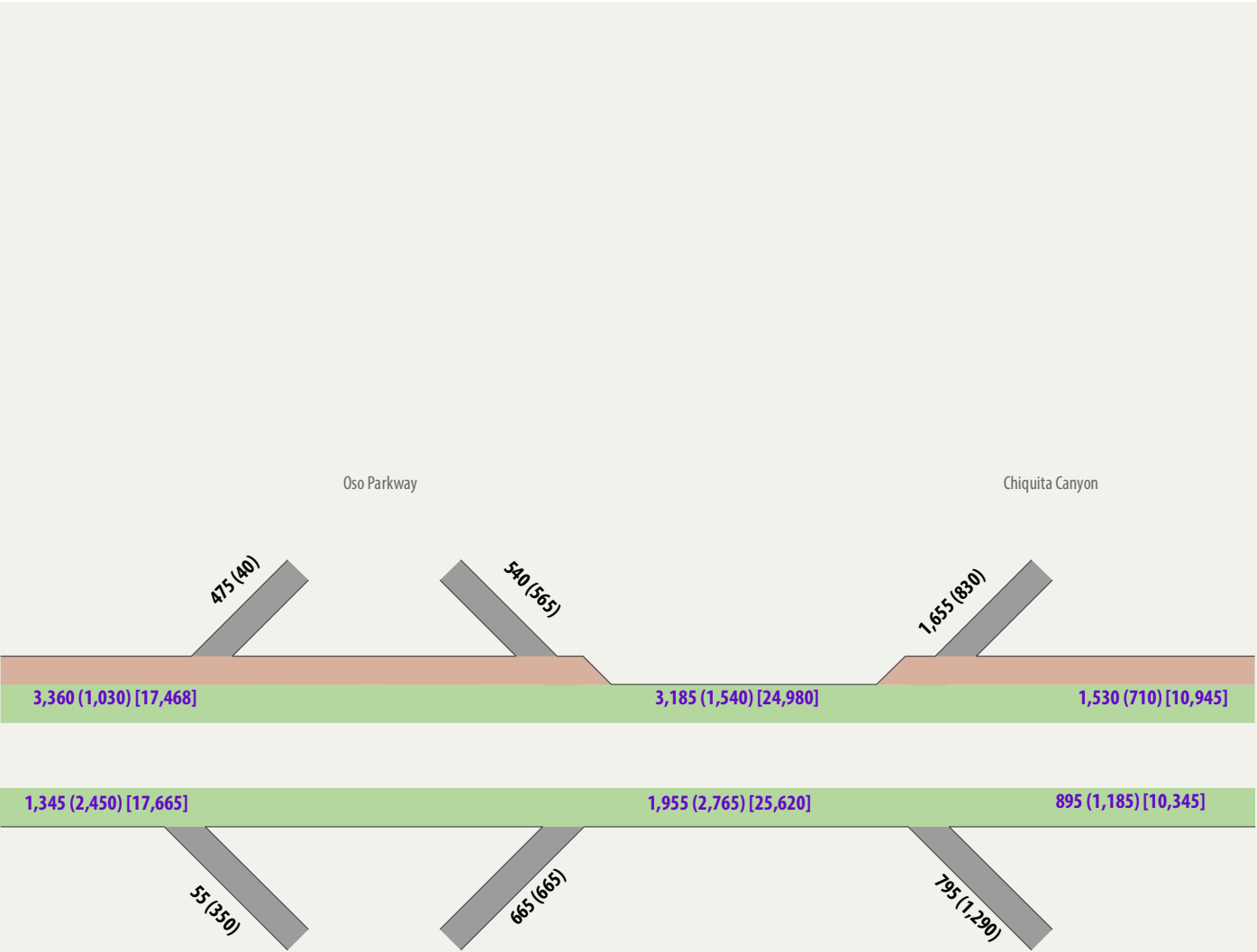
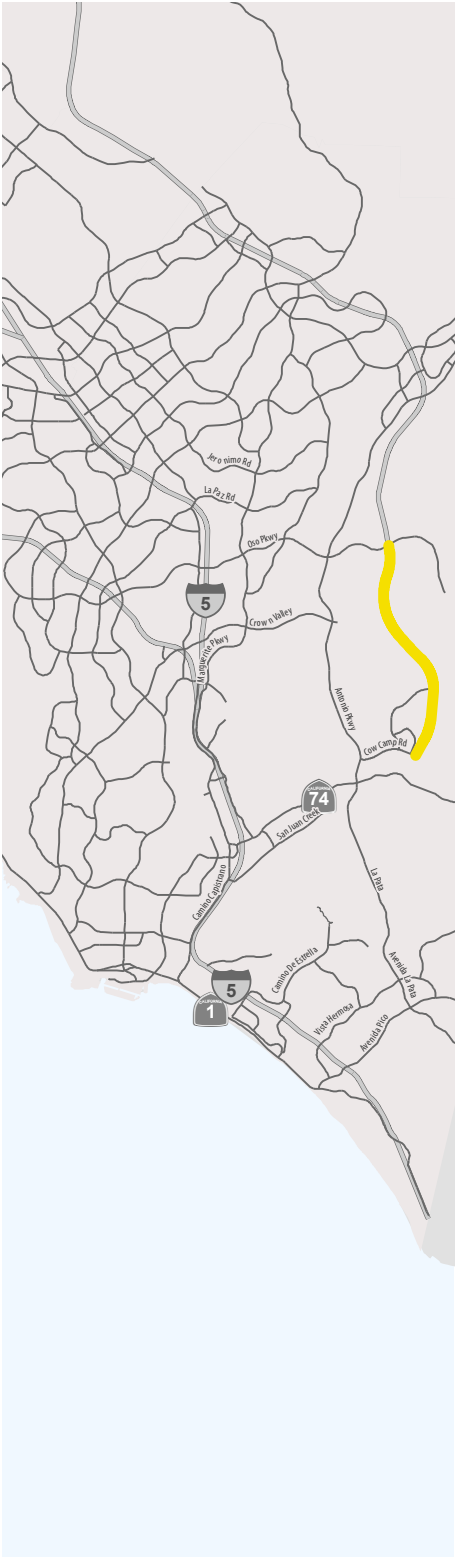


General Purpose Lanes	HOV Lane	Auxillary Lane	xxx (xxx) [xxx]	AM (PM) Peak Hour Traffic Volume	[xxx]	Average Daily Traffic Volume (ADT)	xxx (xxx) [xxx]	HOV Lane Traffic Volume	xxx (xxx) [xxx]	General Purpose Lane Traffic Volume	Northbound
			xxx (xxx) [xxx]				xxx (xxx) [xxx]				Southbound

Figure 28a

Design Year 2050 Mainline and Ramp Volumes (I-5) - Alternative 18

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- General Purpose Lanes/Ramps
- HOV Lane
- Managed Lanes
- Auxiliary Lane
- Proposed Hill Lane

xxx (xxx) AM (PM) Peak Hour Traffic Volume
[xxx] Average Daily Traffic Volume (ADT)

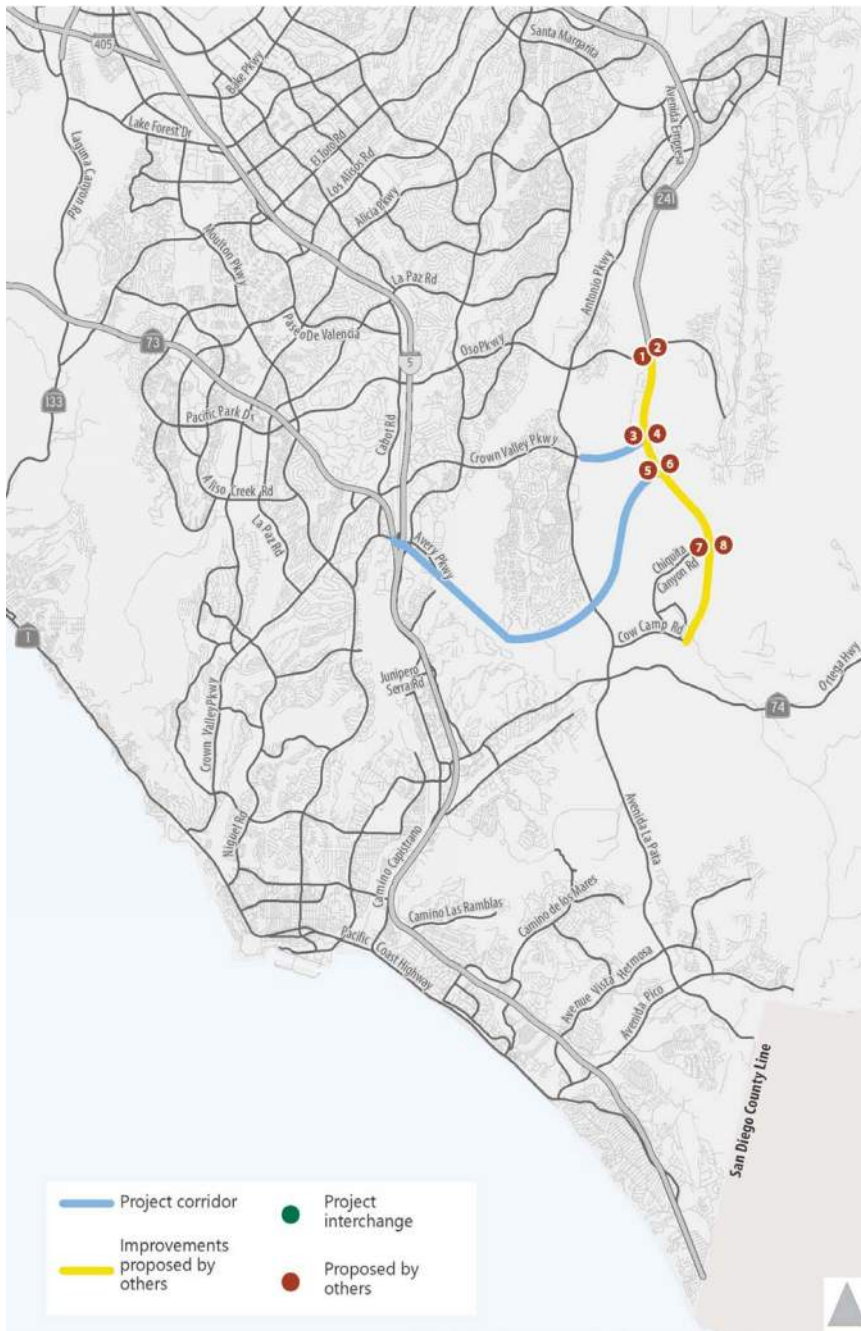
xxx (xxx) [xxx] General Purpose Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] HOV Lane Traffic Volume
xxx (xxx) [xxx] Managed Lane Traffic Volume
xxx (xxx) [xxx] General Purpose Lane Traffic Volume

Northbound
Southbound

Design Year 2050 Los Patrones Parkway Volumes
Alternative 18

Figure 28b

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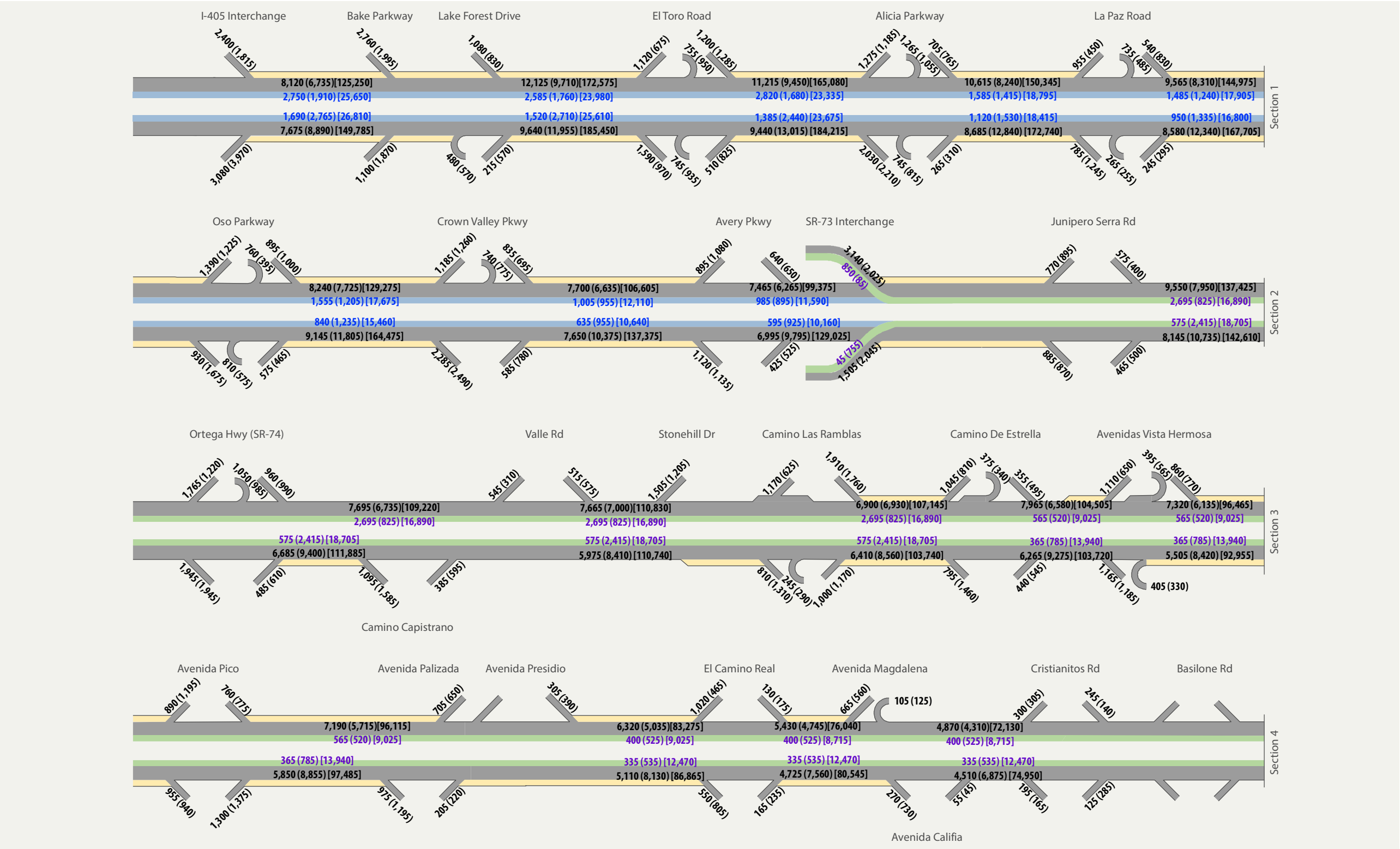


1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Crown Valley Parkway
SR 241 SB Ramps 35 (210) 20 (140) Oso Parkway 535 (555) 290 (485) SR 241 NB Ramps 1,035 (590) 375 (180) Oso Parkway 300 (20) 255 (675)	SR 241 NB Ramps 175 (20) 1,005 (530) Oso Parkway 405 (240) 135 (325) SR 241 SB Ramps 245 (200) 0 (0) Crown Valley Parkway 290 (190) 430 (810)	SR 241 NB Ramps 1,200 (500) 0 (0) Crown Valley Parkway 1,270 (380) 55 (95)
4. SR 241 NB Ramps/Crown Valley Parkway	5. SR 241 SB Ramps/SR-73	6. SR 241 NB Ramps/SR-73
SR 241 NB Ramps 290 (190) 1,200 (500) Crown Valley Parkway 505 (995) 0 (0) SR 241 SB Ramps 120 (55) 0 (0) SR-73 1,270 (380) 55 (95)	SR 241 NB Ramps 120 (55) 0 (0) SR-73 1,270 (380) 55 (95) SR 241 NB Ramps 120 (55) 0 (0) SR-73 1,270 (380) 55 (95)	SR 241 NB Ramps 120 (55) 0 (0) SR-73 1,270 (380) 55 (95) SR 241 NB Ramps 120 (55) 0 (0) SR-73 1,270 (380) 55 (95)
7. SR 241 SB Ramps/Chiquita Canyon Road	8. SR 241 NB Ramps/Chiquita Canyon Road	
SR 241 SB Ramps 445 (450) 350 (840) Chiquita Canyon Road 900 (970) 625 (1,380) SR 241 NB Ramps 525 (420) 625 (430) Chiquita Canyon Road 625 (430) 625 (1,380)	SR 241 NB Ramps 1,030 (400) 525 (420) Chiquita Canyon Road 625 (430) 625 (1,380) SR 241 NB Ramps 1,030 (400) 525 (420) Chiquita Canyon Road 625 (430) 625 (1,380)	

 Travel Direction
 AM (PM) Turning Movement

Figure 29
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 18

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- Managed Lanes
- General Purpose Lanes
- HOV Lane
- Auxiliary Lane

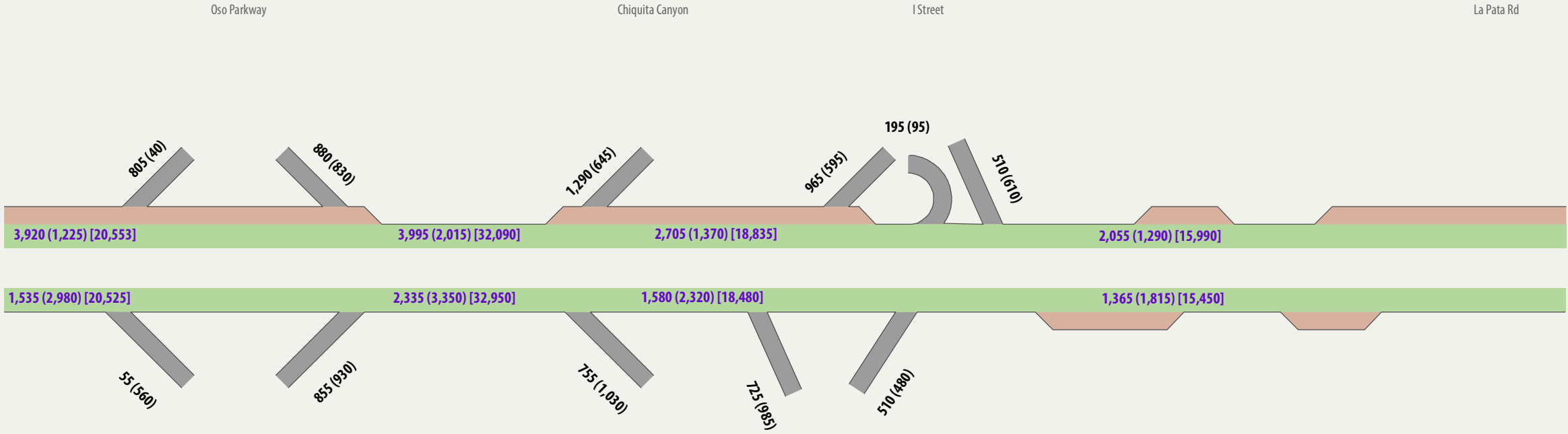
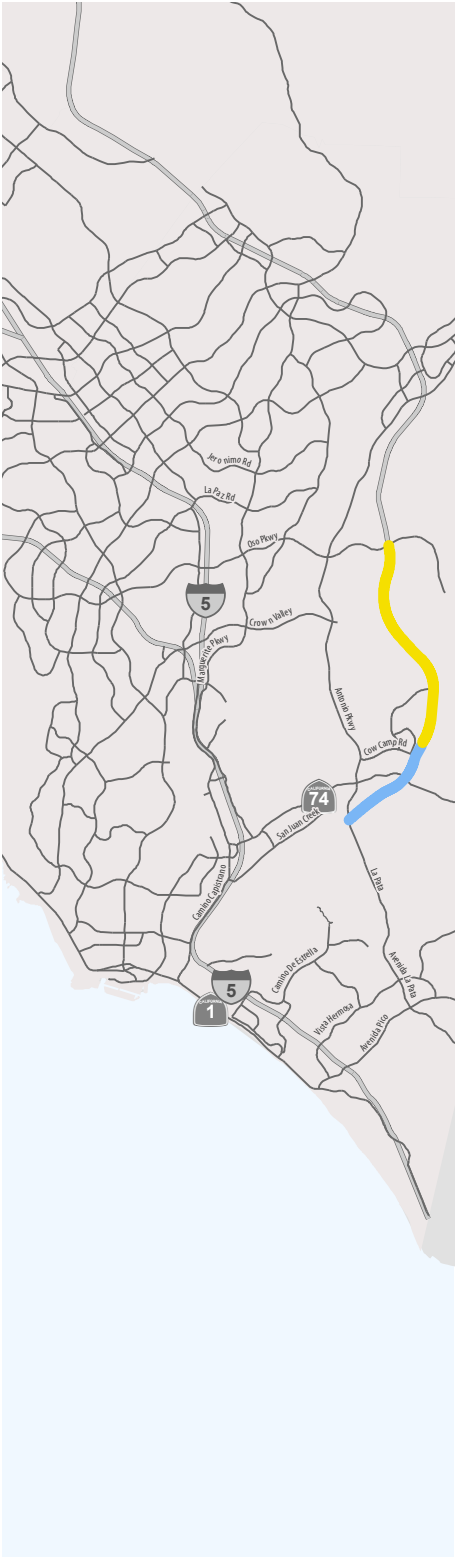
XXX (XXX) AM (PM) Peak Hour Traffic Volume
[XXX] Average Daily Traffic Volume (ADT)

XXX (XXX) [XXX] General Purpose Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] HOV Lane Traffic Volume
XXX (XXX) [XXX] HOV Lane Traffic Volume
XXX (XXX) [XXX] Managed Lane Traffic Volume
XXX (XXX) [XXX] General Purpose Lane Traffic Volume

Northbound
Southbound

Figure 30a
Design Year 2050 Mainline and Ramp Volumes
(I-5) - Alternative 21

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General Purpose Lanes/Ramp
HOV Lane
Managed Lanes

Auxiliary Lane
Proposed Hill Lane

XXX (XXX) AM (PM) Peak Hour Traffic Volume
[XXX] Average Daily Traffic Volume (ADT)

XXX (XXX) [XXX]	General Purpose Lane Traffic Volume	Northbound
XXX (XXX) [XXX]	Managed Lane Traffic Volume	
XXX (XXX) [XXX]	HOV Lane Traffic Volume	
XXX (XXX) [XXX]	HOV Lane Traffic Volume	Southbound
XXX (XXX) [XXX]	Managed Lane Traffic Volume	
XXX (XXX) [XXX]	General Purpose Lane Traffic Volume	

Design Year 2050 Los Patrones Parkway Volumes
Alternative 21

Figure 30b

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1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Chiquita Canyon Road
SR 241 SB Ramps 35 (400) 20 (160) 1,615 (1,080) 145 (100) Oso Parkway 820 (695) 710 (830)	SR 241 NB Ramps 230 (20) 965 (490) 575 (20) 265 (835) Oso Parkway 795 (690) 85 (140)	SR 241 SB Ramps 480 (330) 275 (700) 675 (500) Chiquita Canyon Road 765 (980)
4. SR 241 NB Ramps/Chiquita Canyon Road	5. SR 241 SB Ramps/I Street	6. SR 241 NB Ramps/I Street
SR 241 NB Ramps 850 (305) 675 (500) 440 (340) 600 (1,340) Chiquita Canyon Road	SR 241 SB Ramps 210 (145) 515 (840) 720 (575) 380 (280) I Street 430 (645) 130 (200)	SR 241 NB Ramps 965 (595) 925 (695) 750 (1,390) 195 (95) I Street 175 (160) 335 (450)

 Travel Direction
 AM (PM) Turning Movement

Figure 31
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 21

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VHD Analysis

The design year 2050 VHD analysis was conducted for I-5 corridor from I-405 to the San Diego County line, arterial and local roadways in South Orange County, and all the roadways (including freeways, toll roads, arterials and local roadways in South Orange County). The VHD for Year 2012 was derived directly from the Base Year (2012) OCTAM model. The Design Year (2050) VHD was calculated by projecting the 2040 VHD from the Future Year (2040) OCTAM model to Year 2050 using the VHD growth rate estimated from the Base Year and Future Year OCTAM models. The daily VHD results under each project alternative are summarized in **Table 10**.

VHD on I-5

Build Alternatives 14, 11, 12, and 21, are expected to have substantial VHD savings on I-5, with the daily delay savings of 1,500 vehicle hours or higher, through adding capacity to regional corridors (e.g., I-5 or SR 241) by either widening or extending the corridors. Moderate delay savings on I-5 of between 340-1,370 hours per day would result from other Build Alternatives.

VHD on Arterial/Local Roadways

Build Alternatives 17, 14, 11, 12, 18, and 21 would result in noticeable VHD savings of 500 vehicle hours or higher on the arterial and local roadways, as a result of the additional capacity along I-5 to relieve traffic demand and congestion along parallel north-south arterials or addition of the east-west arterial connecting SR 73 to SR 241/Los Patrones Parkway. Moderate delay savings on arterials would result from Built Alternative 9 as a result of the additional connections provided to the roadway network.

VHD on All Roadways

For all roadways as a whole, Build Alternatives 14, 11, 12, 18, and 21, are expected to have substantial VHD savings of greater than 2,000 vehicle hours on a daily basis, followed by Build Alternatives 17 and 9 with moderate delay savings. Among all the Project alternatives, Build Alternative 13 shows the least delay savings on the I-5 corridor, arterial/local system, and the entire study area.



Table 10 – Design Year (2050) Daily VHD

Scenario/Alternative	I-5 Corridor		Arterial and Local Roadways		All Roadways*	
	VHD	Delta (Compared to No Build)	VHD	Delta (Compared to No Build with HOV)	VHD	Delta (Compared to No Build)
Base Year (2012)	22,000	-	19,870	-	42,300	-
Design Year (2050) Alt 1 No Build (No HOV)	31,260	-	33,220	-	65,070	-
Design Year (2050) Alt 1 No Build (With HOV)	31,110	-	33,190	-	64,890	-
Design Year (2050) Alt 13	30,920	-340	33,420	200	64,870	-200
Design Year (2050) Alt 17	29,890	-1,370	32,640	-580	63,150	-1,920
Design Year (2050) Alt 14	29,520	-1,740	32,490	-730	62,720	-2,350
Design Year (2050) Alt 11	19,780	-11,480	30,460	-2,760	50,710	-14,360
Design Year (2050) Alt 12	27,590	-3,670	31,970	-1,250	60,100	-4,970
Design Year (2050) Alt 9	30,190	-1,070	32,760	-460	63,400	-1,670
Design Year (2050) Alt 18	30,650	-610	31,580	-1,640	62,780	-2,290
Design Year (2050) Alt 21	26,930	-4,330	31,820	-1,400	59,600	-5,470

*"All Roadways" includes all roadways south of the I-405/I-5 junction within Orange County, including freeways, toll roads, arterials, and local roadways.

Source: OCTAM Version 4.0 (Constrained Network).

I-5 Operations Analysis

The design year 2050 traffic operations analysis (see technical calculations in Appendix) was performed for I-5 mainline and ramp junctions under all the project alternatives including the two No Build Alternative scenarios.

Tables 11A and 11B show the AM peak hour density and LOS for the study freeway mainline segments and ramp junctions on northbound and southbound I-5 under 2050 conditions, respectively. The PM peak hour results are shown in Tables **12A and 12B**.

AM Peak Hour – Northbound I-5

Future traffic growth would result in operational deficiencies on northbound I-5 under the No Build Alternative (no HOV scenario), with unacceptable LOS E or F conditions at 28 out of 52 study locations during the AM peak hour. Majority of the deficient locations with LOS E or F would occur on the middle segments of the study corridor between Avenida Vista Hermosa and SR 73. The additional HOV lane proposed on I-5 between Avenida Pico and Countyline would slightly improve operations on I-5 south of Avenida Pico and reduce the total of deficient locations from 28 to 27 along the entire northbound I-5. However, most of the deficient locations along northbound I-5 north of Avenida Pico would remain to operate under deficiency due to the unresolved capacity constraints.

Under Alternatives 13, 17, and 14, the proposed SR 241 connection at I-5 would provide additional north-south capacity and reduce traffic demand and improve traffic operations along I-5 during the AM peak hour. Compared to the No Build Alternative, all three alternatives would improve operations at 81-90% of the study locations. Among the three SR 241 extension alignments, Alternative 14 shows the greatest traffic benefits on northbound I-5 and result in the largest number of locations (e.g., 37 out of 52) to operate at acceptable conditions, and improve operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 37% of the locations on northbound I-5.

Both Alternatives 11 and 12 propose additional capacity along I-5 corridor and would expect similarly sufficient traffic benefit to I-5 operations. Approximately 75% and 85% of the study locations along northbound I-5 would expect improved conditions under Alternatives 11 and 12, respectively. In addition, Alternatives 11 and 12 would improve operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 35% and 43% of the locations on northbound I-5, respectively.

Under Alternatives 9 and 18, the proposed arterial improvements would provide moderate benefits to I-5 corridor. Compared to the No Build Alternative, Alternatives 9 and 18 would improve operations from LOS E or F to at least one better LOS grade at 13% and 4% of the locations on northbound I-5, respectively.

Similar to Alternative 12, Alternative 21 would provide sufficient operational benefits to I-5 between Avenida Vista Hermosa and SR 73 and improve traffic operations at approximately 67% of the study locations along northbound I-5. In addition, Alternative 21 would improve operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 35% of the locations on northbound I-5.

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Table 11A – Design Year 2050 Northbound I-5 Operations – AM Peak Hour (Part 1/4)

Location		Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
			V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1	South of Cristianitos Rd	Basic	0.65	23.4	C	0.61	21.6	C	0.65	23.4	C	0.65	23.4	C	0.65	23.4	C	0.52	18.5	C
2	Cristianitos Rd Off-Ramp	Diverge	0.65	27.6	C	0.61	26.0	C	0.65	27.6	C	0.65	27.6	C	0.65	27.6	C	0.56	24.1	C
3	Cristianitos Rd On-Ramp	Merge	0.59	24.8	C	0.55	23.5	C	0.59	24.8	C	0.59	24.8	C	0.59	24.8	C	0.46	20.4	C
4	Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.66	23.6	C	0.62	21.9	C	0.61	21.6	C	0.62	21.9	C	0.60	21.4	C	0.53	18.7	C
5	Avenida Magdalena Off-Ramp	Diverge	0.64	27.0	C	0.60	25.4	C	0.59	25.1	C	0.60	25.4	C	0.58	24.9	C	0.54	23.4	C
6	Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.65	25.9	C	0.62	24.2	C	0.60	23.7	C	0.61	24.1	C	0.60	23.6	C	0.54	20.9	C
7	El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.71	29.8	D	0.66	27.7	C	0.68	29.8	D	0.65	28.2	D	0.69	26.8	C	0.65	26.6	C
8	Avenida Presidio On-Ramp	Merge	0.79	31.7	D	0.75	30.2	D	0.78	31.4	D	0.74	30.2	D	0.74	30.0	D	0.63	26.1	C
9	Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.85	33.3	D	0.80	30.2	D	0.83	32.0	D	0.79	29.4	D	0.78	29.4	D	0.71	25.9	C
10	Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.84	37.9	E	0.80	35.4	E	0.80	35.6	E	0.78	34.5	D	0.80	35.6	E	0.73	32.1	D
11	Avenida Pico On-Ramp	Merge	0.79	35.1	E	0.79	35.2	E	0.83	37.2	E	0.80	35.4	E	0.73	31.5	D	0.72	36.6	E
12	Avenida Vista Hermosa Off-Ramp	Diverge	0.79	35.1	E	0.79	35.2	E	0.83	37.2	E	0.80	35.4	E	0.73	31.5	D	0.72	36.6	E
13	Avenida Vista Hermosa Loop On-Ramp	Merge	0.72	30.4	D	0.71	30.1	D	0.57	26.6	C	0.72	30.5	D	0.66	28.3	D	0.59	25.9	C
14	Avenida Vista Hermosa Slip On-Ramp	Merge	0.92	35.5	E	0.92	35.5	E	0.80	32.1	D	0.93	35.8	E	0.89	33.7	D	0.79	30.7	D
15	Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.94	39.9	E	0.94	39.7	E	0.82	31.4	D	0.96	40.9	E	0.89	35.5	E	0.82	31.5	D
16	Camino De Estrella Off-Ramp	Diverge	0.89	37.1	E	0.89	37.0	E	0.78	33.0	D	0.84	35.1	E	0.84	35.1	E	0.78	33.1	D
17	Camino De Estrella Loop On-Ramp	Merge	0.81	32.9	D	0.80	32.8	D	0.71	29.4	D	0.74	30.4	D	0.75	30.9	D	0.65	27.4	C
18	Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	1.51	-	F	1.51	-	F	1.51	-	F	1.43	-	F	1.43	-	F	1.40	-	F
19	Camino Las Ramblas On-Ramp	Merge	0.88	35.2	E	0.88	35.3	E	0.77	31.1	D	0.82	33.1	D	0.80	32.5	D	0.80	32.3	D
20	Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.88	35.4	E	0.89	35.6	E	0.77	28.7	D	0.81	31.0	D	0.79	29.8	D	0.80	30.4	D
21	Stonehill Dr On-Ramp	Merge	1.09	-	F	1.09	-	F	1.04	-	F	1.03	-	F	1.01	-	F	0.98	35.0	E
22	Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	1.04	-	F	1.04	-	F	1.03	-	F	0.97	42.2	E	0.95	40.3	E	0.93	38.8	E
23	Camino Capistrano Off-Ramp	Diverge	1.04	-	F	1.04	-	F	1.04	-	F	0.97	39.6	E	0.95	38.7	E	0.94	38.3	E
24	Camino Capistrano/Valle Rd On-Ramp	Merge	0.97	-	F	0.98	-	F	0.92	-	F	0.88	35.4	E	0.86	34.9	D	0.83	33.8	D
25	Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	1.03	-	F	1.04	-	F	0.99	44.2	E	0.97	41.8	E	0.95	40.3	E	0.93	39.0	E
26	Ortega Highway Off-Ramp	Diverge	1.11	-	F	1.11	-	F	1.06	-	F	1.04	-	F	1.02	-	F	1.01	-	F

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11A – Design Year 2050 Northbound I-5 Operations – AM Peak Hour (Part 2/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 South of Cristianitos Rd	Basic	0.65	23.4	C	0.65	23.4	C	0.65	23.4	C	0.65	23.4	C	0.65	23.4	C	0.65	23.4	C
2 Cristianitos Rd Off-Ramp	Diverge	0.65	27.6	C	0.65	27.6	C	0.65	27.6	C	0.65	27.6	C	0.65	27.6	C	0.65	27.6	C
3 Cristianitos Rd On-Ramp	Merge	0.59	24.8	C	0.59	24.8	C	0.59	24.8	C	0.59	24.8	C	0.59	24.8	C	0.59	24.8	C
4 Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.66	23.6	C	0.66	23.6	C	0.61	21.6	C	0.66	23.6	C	0.66	23.6	C	0.61	21.6	C
5 Avenida Magdalena Off-Ramp	Diverge	0.64	27.0	C	0.60	25.4	C	0.59	25.2	C	0.64	27.0	C	0.64	27.0	C	0.59	25.2	C
6 Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.65	25.9	C	0.62	24.2	C	0.60	23.7	C	0.65	26.0	C	0.65	26.0	C	0.60	23.7	C
7 El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.71	29.8	D	0.66	27.7	C	0.70	31.1	D	0.71	29.8	D	0.71	29.8	D	0.68	30.0	D
8 Avenida Presidio On-Ramp	Merge	0.79	31.7	D	0.75	30.2	D	0.78	31.5	D	0.79	31.8	D	0.79	31.7	D	0.77	31.1	D
9 Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.85	33.3	D	0.80	30.2	D	0.85	33.0	D	0.85	33.3	D	0.85	33.3	D	0.83	32.2	D
10 Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.84	37.9	E	0.80	35.4	E	0.81	36.2	E	0.84	38.0	E	0.84	37.9	E	0.81	36.1	E
11 Avenida Pico On-Ramp	Merge	0.79	35.1	E	0.79	35.2	E	0.84	38.0	E	0.77	34.0	D	0.79	35.1	E	0.84	38.4	E
12 Avenida Vista Hermosa Off-Ramp	Diverge	0.79	35.1	E	0.79	35.2	E	0.84	38.0	E	0.77	34.0	D	0.79	35.1	E	0.84	38.4	E
13 Avenida Vista Hermosa Loop On-Ramp	Merge	0.72	30.4	D	0.71	30.1	D	0.52	24.6	C	0.71	30.0	D	0.71	30.1	D	0.50	24.1	C
14 Avenida Vista Hermosa Slip On-Ramp	Merge	0.92	35.5	E	0.92	35.5	E	0.76	29.9	D	0.92	35.5	E	0.92	35.4	E	0.75	29.5	D
15 Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.94	39.9	E	0.94	39.7	E	0.74	27.3	D	0.94	39.7	E	0.94	39.5	E	0.73	26.8	D
16 Camino De Estrella Off-Ramp	Diverge	0.89	37.1	E	0.89	37.0	E	0.71	30.4	D	0.89	37.0	E	0.89	37.0	E	0.70	30.1	D
17 Camino De Estrella Loop On-Ramp	Merge	0.81	32.9	D	0.80	32.8	D	0.65	27.3	C	0.80	32.8	D	0.80	32.8	D	0.63	26.5	C
18 Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	1.51	-	F	1.51	-	F	0.98	-	F	1.47	-	F	1.50	-	F	0.95	31.5	D
19 Camino Las Ramblas On-Ramp	Merge	0.88	35.2	E	0.88	35.3	E	0.79	32.1	D	0.87	34.9	D	0.88	35.2	E	0.77	31.2	D
20 Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.88	35.4	E	0.89	35.6	E	0.76	28.1	D	0.87	34.7	D	0.88	35.3	E	0.73	26.8	D
21 Stonehill Dr On-Ramp	Merge	1.09	-	F	1.09	-	F	0.99	35.5	E	1.08	-	F	1.08	-	F	0.96	34.5	D
22 Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	1.04	-	F	1.04	-	F	0.94	39.7	E	1.03	-	F	1.04	-	F	0.91	37.4	E
23 Camino Capistrano Off-Ramp	Diverge	1.04	-	F	1.04	-	F	0.96	38.9	E	1.03	-	F	1.03	-	F	0.93	38.0	E
24 Camino Capistrano/Valle Rd On-Ramp	Merge	0.97	-	F	0.98	-	F	0.86	34.8	D	0.91	-	F	0.93	-	F	0.83	33.8	D
25 Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	1.03	-	F	1.04	-	F	0.94	40.0	E	1.00	-	F	1.02	-	F	0.91	37.4	E
26 Ortega Highway Off-Ramp	Diverge	1.11	-	F	1.11	-	F	1.02	-	F	1.08	-	F	1.09	-	F	0.99	40.9	E

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11A – Design Year 2050 Northbound I-5 Operations – AM Peak Hour (Part 3/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Ortega Highway Loop On-Ramp	Merge	1.01	-	F	1.01	-	F	0.98	-	F	0.96	37.3	E	0.95	36.8	E	0.90	35.2	E
28 Ortega Highway Slip On-Ramp	Merge	1.40	-	F	1.40	-	F	1.34	-	F	1.27	-	F	1.24	-	F	1.17	-	F
29 Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	1.01	-	F	1.01	-	F	0.98	43.1	E	0.96	40.9	E	0.94	39.8	E	0.93	38.5	E
30 Junipero Serra Rd Off-Ramp	Diverge	1.02	-	F	1.02	-	F	1.00	-	F	0.98	40.2	E	0.97	39.7	E	1.17	-	F
31 Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.95	40.7	E	0.80	30.0	D	0.93	38.5	E	0.90	36.6	E	0.89	35.8	E	0.88	35.2	E
32 SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.83	32.0	D	0.83	32.0	D	0.81	30.6	D	0.78	29.4	D	0.77	28.5	D	0.79	29.4	D
33 Avery Parkway Off-Ramp	Diverge	0.86	35.3	E	0.86	35.3	E	0.84	34.4	D	0.82	33.6	D	0.80	33.0	D	0.82	33.7	D
34 Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.61	25.4	C	0.61	25.3	C	0.83	24.5	C	0.82	33.1	D	0.82	32.3	D	0.61	25.8	C
35 Crown Valley Parkway Loop On-Ramp	Merge	0.63	26.0	C	0.61	21.7	C	0.62	25.5	C	0.61	25.2	C	0.60	24.8	C	0.63	25.8	C
36 Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.65	23.0	C	0.65	23.2	C	0.62	22.1	C	0.61	21.5	C	0.59	21.0	C	0.67	23.8	C
37 Oso Parkway Loop On-Ramp	Merge	0.67	28.1	D	0.68	28.4	D	0.65	27.3	C	0.64	27.0	C	0.64	26.9	C	0.66	27.4	C
38 Oso Parkway Slip On-Ramp	Merge	0.82	37.6	E	0.80	37.4	E	0.81	36.1	E	0.81	35.3	E	0.82	34.9	D	0.77	28.5	D
39 Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.82	37.6	E	0.80	37.4	E	0.81	36.1	E	0.81	35.3	E	0.82	34.9	D	0.77	28.5	D
40 La Paz Road Off Ramp	Diverge	0.82	37.6	E	0.80	37.4	E	0.81	36.1	E	0.81	35.3	E	0.82	34.9	D	0.77	28.5	D
41 La Paz Road Loop On Ramp	Merge	0.79	29.5	D	0.79	29.5	D	0.76	28.5	D	0.75	28.0	C	0.74	27.7	C	0.78	29.1	D
42 La Paz Road Slip On Ramp	Merge	0.87	37.0	E	0.87	37.3	E	0.82	34.6	D	0.81	33.9	D	0.80	33.4	D	0.87	-	F
43 Alicia Parkway Off Ramp	Diverge	0.87	37.0	E	0.87	37.3	E	0.82	34.6	D	0.81	33.9	D	0.80	33.4	D	0.87	-	F
44 Alicia Parkway Loop On Ramp	Merge	0.86	33.8	D	0.86	34.0	D	0.84	32.5	D	0.83	31.8	D	0.82	31.3	D	0.87	34.3	D
45 Alicia Parkway Slip On Ramp	Merge	0.81	29.8	D	0.81	29.9	D	0.90	33.3	D	0.89	32.8	D	0.88	32.4	D	0.90	33.2	D
46 Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.86	33.8	D	0.86	33.9	D	0.84	32.4	D	0.83	31.8	D	0.82	31.3	D	0.87	34.1	D
47 El Toro Road Off Ramp	Diverge	0.86	33.8	D	0.86	33.9	D	0.84	32.4	D	0.83	31.8	D	0.82	31.3	D	0.87	34.1	D
48 El Toro Road Loop On Ramp	Merge	0.91	34.1	D	0.92	34.2	D	0.88	33.1	D	0.87	32.6	D	0.86	32.3	D	0.88	33.0	D
49 El Toro Road Slip On Ramp	Merge	0.93	-	F	0.93	-	F	0.89	35.7	E	0.88	35.1	E	0.87	34.5	D	0.91	37.4	E
50 Lake Forest Drive Off Ramp	Diverge	1.20	-	F	1.20	-	F	1.18	-	F	1.17	-	F	1.15	-	F	1.59	-	F
51 Bake Parkway/Truck Bypass Off Ramp	Diverge	0.85	33.3	D	0.85	33.3	D	0.83	31.8	D	0.82	31.2	D	0.81	30.7	D	0.86	33.6	D
52 Bake Parkway to I-405 Off Ramp	Basic	0.76	28.2	D	0.77	28.5	D	0.74	27.2	D	0.72	26.0	C	0.70	25.5	C	0.76	28.1	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11A – Design Year 2050 Northbound I-5 Operations – AM Peak Hour (Part 4/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Ortega Highway Loop On-Ramp	Merge	1.01	-	F	1.01	-	F	0.90	36.6	E	0.97	-	F	0.99	-	F	0.87	35.5	E
28 Ortega Highway Slip On-Ramp	Merge	1.40	-	F	1.40	-	F	0.93	38.9	E	1.31	-	F	1.34	-	F	0.90	36.5	E
29 Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	1.01	-	F	1.01	-	F	0.91	37.1	E	0.97	42.1	E	0.98	43.3	E	0.91	36.9	E
30 Junipero Serra Rd Off-Ramp	Diverge	1.02	-	F	1.02	-	F	0.94	38.6	E	0.99	40.5	E	1.00	-	F	0.93	38.4	E
31 Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.95	40.7	E	0.80	30.0	D	0.85	33.3	D	0.77	28.4	D	0.78	28.9	D	0.85	33.2	D
32 SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.83	32.0	D	0.83	32.0	D	0.75	27.9	D	0.88	34.9	D	0.86	34.1	D	0.78	35.4	E
33 Avery Parkway Off-Ramp	Diverge	0.86	35.3	E	0.86	35.3	E	0.79	32.7	D	0.90	36.8	E	0.89	36.5	E	0.88	37.6	E
34 Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.61	25.4	C	0.61	25.3	C	0.84	32.1	D	0.65	27.3	C	0.63	26.5	C	0.81	37.2	E
35 Crown Valley Parkway Loop On-Ramp	Merge	0.63	26.0	C	0.61	21.7	C	0.61	25.0	C	0.66	26.8	C	0.64	26.3	C	0.65	26.7	C
36 Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.65	23.0	C	0.65	23.2	C	0.63	22.4	C	0.68	24.5	C	0.67	24.1	C	0.72	23.7	C
37 Oso Parkway Loop On-Ramp	Merge	0.67	28.1	D	0.68	28.4	D	0.70	28.7	D	0.68	28.5	D	0.67	28.0	D	0.69	28.7	D
38 Oso Parkway Slip On-Ramp	Merge	0.82	37.6	E	0.80	37.4	E	0.87	33.4	D	0.79	37.2	E	0.80	36.8	E	0.76	37.9	E
39 Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.82	37.6	E	0.80	37.4	E	0.87	33.4	D	0.79	37.2	E	0.80	36.8	E	0.76	37.9	E
40 La Paz Road Off Ramp	Diverge	0.82	37.6	E	0.80	37.4	E	0.87	33.4	D	0.79	37.2	E	0.80	36.8	E	0.76	37.9	E
41 La Paz Road Loop On Ramp	Merge	0.79	29.5	D	0.79	29.5	D	0.70	26.1	C	0.81	30.3	D	0.80	29.9	D	0.83	30.1	D
42 La Paz Road Slip On Ramp	Merge	0.87	37.0	E	0.87	37.3	E	0.73	30.7	D	0.86	36.5	E	0.85	36.1	E	0.81	35.0	E
43 Alicia Parkway Off Ramp	Diverge	0.87	37.0	E	0.87	37.3	E	0.73	30.7	D	0.86	36.5	E	0.85	36.1	E	0.81	35.0	E
44 Alicia Parkway Loop On Ramp	Merge	0.86	33.8	D	0.86	34.0	D	0.75	27.7	D	0.87	34.3	D	0.87	34.2	D	0.91	33.4	D
45 Alicia Parkway Slip On Ramp	Merge	0.81	29.8	D	0.81	29.9	D	0.79	29.2	D	0.82	30.1	D	0.80	29.7	D	0.85	33.9	D
46 Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.86	33.8	D	0.86	33.9	D	0.85	33.1	D	0.87	34.2	D	0.86	33.6	D	0.92	33.7	D
47 El Toro Road Off Ramp	Diverge	0.86	33.8	D	0.86	33.9	D	0.85	33.1	D	0.87	34.2	D	0.86	33.6	D	0.86	33.7	D
48 El Toro Road Loop On Ramp	Merge	0.91	34.1	D	0.92	34.2	D	0.88	33.0	D	0.92	-	F	0.91	34.0	D	0.92	33.9	D
49 El Toro Road Slip On Ramp	Merge	0.93	-	F	0.93	-	F	0.89	36.1	E	0.94	-	F	0.93	-	F	0.91	37.1	E
50 Lake Forest Drive Off Ramp	Diverge	1.20	-	F	1.20	-	F	1.16	-	F	1.22	-	F	1.20	-	F	0.91	-	F
51 Bake Parkway/Truck Bypass Off Ramp	Diverge	0.85	33.3	D	0.85	33.3	D	0.81	31.0	D	0.86	34.0	D	0.85	33.3	D	1.20	32.9	D
52 Bake Parkway to I-405 Off Ramp	Basic	0.76	28.2	D	0.77	28.5	D	0.68	24.6	C	0.78	29.3	D	0.76	28.3	D	0.85	27.4	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11B – Design Year 2050 Southbound I-5 Operations – AM Peak Hour (Part 1/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 I-405 On Ramp to Bake Pkwy	Basic	0.69	25.0	C	0.70	25.3	C	0.67	24.2	C	0.67	24.2	C	0.68	24.3	C	0.55	19.4	C
2 Bake Parkway/Truck Bypass On Ramp	Merge	0.67	23.8	C	0.67	23.8	C	0.64	22.9	C	0.64	22.9	C	0.65	23.1	C	0.54	19.2	C
3 Lake Forest Drive Loop On Ramp	Merge	0.55	21.2	C	0.55	21.2	C	0.53	20.7	C	0.53	20.8	C	0.54	20.8	C	0.48	18.9	B
4 Lake Forest Drive Slip On Ramp	Merge	0.51	20.5	C	0.51	20.5	C	0.50	20.0	C	0.50	20.0	C	0.50	20.1	C	0.38	15.9	B
5 Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.73	26.8	D	0.73	26.8	D	0.71	25.8	C	0.71	25.8	C	0.71	25.9	C	0.61	21.4	C
6 El Toro Road Off Ramp	Diverge	0.73	26.8	D	0.73	26.8	D	0.71	25.8	C	0.71	25.8	C	0.71	25.9	C	0.61	21.4	C
7 El Toro Road Loop On Ramp	Merge	0.70	26.6	C	0.70	26.6	C	0.68	25.9	C	0.68	26.0	C	0.68	26.0	C	0.61	23.2	C
8 El Toro Road Slip On Ramp	Merge	0.80	30.0	D	0.80	30.0	D	0.77	28.5	D	0.77	28.6	D	0.77	28.8	D	0.81	25.2	C
9 El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	0.80	30.0	D	0.80	30.0	D	0.77	28.5	D	0.77	28.6	D	0.77	28.8	D	0.81	25.2	C
10 Alicia Parkway Off Ramp	Diverge	0.80	30.0	D	0.80	30.0	D	0.77	28.5	D	0.77	28.6	D	0.77	28.8	D	0.81	25.2	C
11 Alicia Parkway Loop On Ramp	Merge	0.61	21.6	C	0.61	21.6	C	0.58	20.5	C	0.58	20.5	C	0.58	20.6	C	0.49	17.4	B
12 Alicia Parkway Slip On Ramp	Merge	0.50	19.9	B	0.50	19.9	B	0.49	19.5	B	0.49	19.5	B	0.49	19.5	B	0.39	16.0	B
13 La Paz Road Off Ramp	Diverge	0.65	23.2	C	0.65	23.1	C	0.63	22.4	C	0.63	22.4	C	0.63	22.4	C	0.54	18.9	C
14 La Paz Road Loop On Ramp	Merge	0.59	23.0	C	0.59	22.9	C	0.58	22.6	C	0.58	22.6	C	0.58	22.7	C	0.45	18.1	B
15 La Paz Road Slip On Ramp	Merge	0.75	27.4	D	0.74	27.3	D	0.72	26.4	D	0.73	26.4	D	0.73	26.5	D	0.59	20.8	C
16 La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.75	27.4	D	0.74	27.3	D	0.72	26.4	D	0.73	26.4	D	0.73	26.5	D	0.59	20.8	C
17 Oso Parkway Off-Ramp	Diverge	0.75	27.4	D	0.74	27.3	D	0.72	26.4	D	0.73	26.4	D	0.73	26.5	D	0.59	20.8	C
18 Oso Parkway Loop On-Ramp	Merge	0.71	27.8	C	0.70	27.8	C	0.70	27.5	C	0.70	27.5	C	0.70	27.5	C	0.59	23.7	C
19 Oso Parkway Slip On-Ramp	Merge	0.78	28.9	D	0.77	28.9	D	0.76	28.1	D	0.76	28.0	D	0.76	28.1	D	0.92	23.9	C
20 Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	0.78	28.9	D	0.77	28.9	D	0.76	28.1	D	0.76	28.0	D	0.76	28.1	D	0.92	23.9	C
21 Crown Valley Parkway Off-Ramp	Diverge	0.78	28.9	D	0.77	28.9	D	0.76	28.1	D	0.76	28.0	D	0.76	28.1	D	0.92	23.9	C
22 Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.59	23.8	C	0.59	23.8	C	0.58	27.0	C	0.58	27.1	C	0.58	27.1	C	0.56	20.0	C
23 Avery Parkway On-Ramp	Merge	0.71	28.2	D	0.71	28.2	D	0.69	27.6	C	0.69	27.5	C	0.69	27.5	C	0.52	21.5	C
24 Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	0.79	29.6	D	0.79	29.6	D	0.77	28.6	D	0.77	28.5	D	0.77	28.4	D	0.58	20.4	C
25 SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	0.79	29.6	D	0.79	29.6	D	0.77	28.6	D	0.77	28.5	D	0.77	28.4	D	0.78	22.3	C
26 Junipero Springs Road On-Ramp	Merge	0.62	22.0	C	0.62	22.0	C	0.61	21.6	C	0.60	21.5	C	0.60	21.4	C	0.50	17.9	B

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11B – Design Year 2050 Southbound I-5 Operations – AM Peak Hour (Part 2/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 I-405 On Ramp to Bake Pkwy	Basic	0.69	25.0	C	0.70	25.3	C	0.73	26.7	D	0.69	25.0	C	0.69	25.0	C	0.70	25.5	C
2 Bake Parkway/Truck Bypass On Ramp	Merge	0.67	23.8	C	0.67	23.8	C	0.69	24.9	C	0.67	23.8	C	0.67	23.8	C	0.67	24.0	C
3 Lake Forest Drive Loop On Ramp	Merge	0.55	21.2	C	0.55	21.2	C	0.56	21.6	C	0.55	21.2	C	0.55	21.3	C	0.55	21.4	C
4 Lake Forest Drive Slip On Ramp	Merge	0.51	20.5	C	0.51	20.5	C	0.51	20.6	C	0.51	20.5	C	0.51	20.6	C	0.51	20.7	C
5 Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.73	26.8	D	0.73	26.8	D	0.74	27.2	D	0.73	26.8	D	0.73	26.9	D	0.74	27.0	D
6 El Toro Road Off Ramp	Diverge	0.73	26.8	D	0.73	26.8	D	0.74	27.2	D	0.78	32.5	D	0.78	32.6	D	0.74	27.0	D
7 El Toro Road Loop On Ramp	Merge	0.70	26.6	C	0.70	26.6	C	0.73	27.6	C	0.70	26.6	C	0.70	26.7	C	0.72	27.3	C
8 El Toro Road Slip On Ramp	Merge	0.80	30.0	D	0.80	30.0	D	0.82	31.2	D	0.80	30.1	D	0.80	30.2	D	0.82	31.4	D
9 El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	0.80	30.0	D	0.80	30.0	D	0.82	31.2	D	0.80	30.1	D	0.80	30.2	D	0.82	31.4	D
10 Alicia Parkway Off Ramp	Diverge	0.80	30.0	D	0.80	30.0	D	0.82	31.2	D	0.80	30.1	D	0.80	30.2	D	0.82	31.4	D
11 Alicia Parkway Loop On Ramp	Merge	0.61	21.6	C	0.61	21.6	C	0.64	22.6	C	0.61	21.5	C	0.61	21.5	C	0.62	22.1	C
12 Alicia Parkway Slip On Ramp	Merge	0.50	19.9	B	0.50	19.9	B	0.48	19.4	B	0.50	19.9	B	0.50	19.9	B	0.50	19.8	B
13 La Paz Road Off Ramp	Diverge	0.65	23.2	C	0.65	23.1	C	0.66	23.5	C	0.65	23.0	C	0.65	23.1	C	0.66	23.8	C
14 La Paz Road Loop On Ramp	Merge	0.59	23.0	C	0.59	22.9	C	0.59	22.9	C	0.75	27.4	D	0.75	27.4	D	0.59	23.1	C
15 La Paz Road Slip On Ramp	Merge	0.75	27.4	D	0.74	27.3	D	0.74	27.3	D	0.75	27.4	D	0.75	27.4	D	0.77	28.4	D
16 La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.75	27.4	D	0.74	27.3	D	0.74	27.3	D	0.75	27.4	D	0.75	27.4	D	0.77	28.4	D
17 Oso Parkway Off-Ramp	Diverge	0.75	27.4	D	0.74	27.3	D	0.74	27.3	D	0.75	27.4	D	0.75	27.4	D	0.77	28.4	D
18 Oso Parkway Loop On-Ramp	Merge	0.71	27.8	C	0.70	27.8	C	0.73	28.8	D	0.72	28.3	D	0.72	28.3	D	0.72	28.5	D
19 Oso Parkway Slip On-Ramp	Merge	0.78	28.9	D	0.77	28.9	D	0.85	33.0	D	0.78	29.3	D	0.79	29.4	D	0.81	31.0	D
20 Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	0.78	28.9	D	0.77	28.9	D	0.85	33.0	D	0.78	29.3	D	0.79	29.4	D	0.81	31.0	D
21 Crown Valley Parkway Off-Ramp	Diverge	0.78	28.9	D	0.77	28.9	D	0.85	33.0	D	0.78	29.3	D	0.79	29.4	D	0.81	31.0	D
22 Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.59	23.8	C	0.59	23.8	C	0.64	26.3	C	0.60	24.4	C	0.59	23.9	C	0.62	25.7	C
23 Avery Parkway On-Ramp	Merge	0.71	28.2	D	0.71	28.2	D	0.76	30.1	D	0.70	28.1	D	0.70	28.1	D	0.75	29.6	D
24 Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	0.79	29.6	D	0.79	29.6	D	0.85	33.3	D	0.79	29.6	D	0.79	29.6	D	0.84	32.4	D
25 SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	0.79	29.6	D	0.79	29.6	D	0.85	33.3	D	0.79	29.6	D	0.79	29.6	D	0.84	32.7	D
26 Junipero Springs Road On-Ramp	Merge	0.62	22.0	C	0.62	22.0	C	0.65	23.3	C	0.60	21.4	C	0.62	22.0	C	0.65	23.1	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11B – Design Year 2050 Southbound I-5 Operations – AM Peak Hour (Part 3/4)

Location		Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
			V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27	Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	0.75	27.6	D	0.75	27.6	D	0.73	26.6	D	0.73	26.6	D	0.73	26.6	D	0.58	20.3	C
28	Ortega Highway Off-Ramp	Diverge	0.75	-	F	0.75	-	F	0.73	26.6	D	0.73	26.6	D	0.73	26.6	D	0.58	20.3	C
29	Ortega Highway On-Ramp	Merge	0.69	26.8	C	0.69	26.8	C	0.66	25.6	C	0.67	25.8	C	0.67	25.8	C	0.50	19.9	B
30	Camino Capistrano Off-Ramp	Diverge	0.65	15.4	B	0.65	15.4	B	0.62	14.3	B	0.62	14.3	B	0.62	14.3	B	0.52	10.4	B
31	Camino Capistrano On-Ramp	Merge	0.61	24.6	C	0.61	24.6	C	0.57	23.3	C	0.58	23.7	C	0.58	23.5	C	0.44	18.6	B
32	Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	0.68	24.3	C	0.68	24.3	C	0.64	22.6	C	0.64	22.9	C	0.64	22.8	C	0.47	16.6	B
33	Camino Las Ramblas Off-Ramp	Diverge	0.75	19.6	B	0.75	19.6	B	0.55	12.0	B	0.72	18.4	B	0.55	12.1	B	0.39	13.8	B
34	Camino Las Ramblas Loop On-Ramp	Merge	0.61	21.4	C	0.61	21.4	C	0.61	21.5	C	0.57	20.1	C	0.57	20.0	C	0.41	14.4	B
35	Camino Las Ramblas Slip On-Ramp	Merge	0.61	21.5	C	0.61	21.5	C	0.61	21.5	C	0.58	20.5	C	0.58	20.4	C	0.59	18.2	B
36	Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.61	21.5	C	0.61	21.5	C	0.61	21.5	C	0.58	20.5	C	0.58	20.4	C	0.59	18.2	B
37	Camino De Estrella Off-Ramp	Diverge	0.61	21.5	C	0.61	21.5	C	0.61	21.5	C	0.58	20.5	C	0.58	20.4	C	0.59	18.2	B
38	Camino De Estrella On-Ramp	Merge	0.67	20.7	C	0.67	20.7	C	0.66	20.4	C	0.64	19.8	B	0.63	19.6	B	0.47	13.9	B
39	Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	0.76	28.3	D	0.76	28.3	D	0.79	29.5	D	0.75	27.7	D	0.73	26.6	D	0.52	18.5	C
40	Avenida Vista Hermosa Off-Ramp	Diverge	0.66	16.6	B	0.66	16.6	B	0.68	17.3	B	0.65	16.4	B	0.63	15.5	B	0.60	14.3	B
41	Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.58	21.9	C	0.58	21.9	C	0.59	22.4	C	0.57	21.8	C	0.54	20.6	C	0.37	13.0	B
42	Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.05	-	F	1.05	-	F	1.06	-	F	1.00	-	F	1.05	-	F	0.98	23.9	C
43	Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	0.66	23.6	C	0.62	21.8	C	0.59	21.0	C	0.58	20.6	C	0.56	19.8	C	0.34	11.9	B
44	Avenida Presidio On-Ramp	Weave	0.54	19.6	B	0.50	18.1	B	0.48	17.3	B	0.51	17.3	B	0.45	16.2	B	0.35	12.5	B
45	El Camino Real Off-Ramp	Weave	0.54	19.6	B	0.50	18.1	B	0.48	17.3	B	0.51	17.3	B	0.45	16.2	B	0.36	12.5	B
46	El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.51	19.0	B	0.47	17.4	B	0.46	16.8	B	0.46	16.7	B	0.43	15.7	B	0.37	13.9	B
47	Avenida Califia On-Ramp	Merge	0.51	20.4	C	0.47	19.0	B	0.46	18.4	B	0.46	18.4	B	0.43	17.5	B	0.31	12.9	B
48	Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.61	21.8	C	0.57	20.0	C	0.55	19.3	C	0.55	19.3	C	0.52	18.2	C	0.37	13.0	B
49	Cristianitos Rd Off-Ramp	Diverge	0.61	25.6	C	0.56	23.9	C	0.54	23.2	C	0.54	23.2	C	0.51	22.1	C	0.42	18.5	B
50	Cristianitos Rd On-Ramp	Merge	0.52	21.3	C	0.48	19.8	B	0.46	19.3	B	0.46	19.3	B	0.43	18.3	B	0.31	13.9	B
51	South of Cristianitos Rd	Basic	0.61	21.4	C	0.56	19.6	C	0.54	19.0	C	0.54	19.0	C	0.51	17.9	B	0.36	12.7	B

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 11B – Design Year 2050 Southbound I-5 Operations – AM Peak Hour (Part 4/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	0.75	27.6	D	0.75	27.6	D	0.78	29.2	D	0.72	26.2	D	0.73	26.8	D	0.78	29.2	D
28 Ortega Highway Off-Ramp	Diverge	0.75	-	F	0.75	-	F	0.78	29.2	D	0.72	26.2	D	0.73	26.8	D	0.78	29.2	D
29 Ortega Highway On-Ramp	Merge	0.69	26.8	C	0.69	26.8	C	0.72	27.7	C	0.70	27.0	C	0.70	26.9	C	0.72	28.0	D
30 Camino Capistrano Off-Ramp	Diverge	0.65	15.4	B	0.65	15.4	B	0.70	17.3	B	0.65	15.4	B	0.65	15.5	B	0.69	16.9	B
31 Camino Capistrano On-Ramp	Merge	0.61	24.6	C	0.61	24.6	C	0.65	26.0	C	0.61	24.6	C	0.61	24.7	C	0.65	26.1	C
32 Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	0.68	24.3	C	0.68	24.3	C	0.72	26.2	D	0.68	24.3	C	0.68	24.5	C	0.72	26.2	D
33 Camino Las Ramblas Off-Ramp	Diverge	0.75	19.6	B	0.75	19.6	B	0.62	14.6	B	0.75	19.5	B	0.75	19.7	B	0.62	14.6	B
34 Camino Las Ramblas Loop On-Ramp	Merge	0.61	21.4	C	0.61	21.4	C	0.66	23.4	C	0.61	21.4	C	0.61	21.6	C	0.65	23.2	C
35 Camino Las Ramblas Slip On-Ramp	Merge	0.61	21.5	C	0.61	21.5	C	0.66	23.5	C	0.61	21.5	C	0.61	21.6	C	0.65	23.2	C
36 Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.61	21.5	C	0.61	21.5	C	0.66	23.5	C	0.61	21.5	C	0.61	21.6	C	0.65	23.2	C
37 Camino De Estrella Off-Ramp	Diverge	0.61	21.5	C	0.61	21.5	C	0.66	23.5	C	0.61	21.5	C	0.61	21.6	C	0.65	23.2	C
38 Camino De Estrella On-Ramp	Merge	0.67	20.7	C	0.67	20.7	C	0.67	22.0	C	0.67	20.8	C	0.67	20.8	C	0.66	21.7	C
39 Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	0.76	28.3	D	0.76	28.3	D	0.78	28.9	D	0.77	28.4	D	0.77	28.5	D	0.77	28.5	D
40 Avenida Vista Hermosa Off-Ramp	Diverge	0.66	16.6	B	0.66	16.6	B	0.67	17.0	B	0.66	16.6	B	0.66	16.7	B	0.66	16.7	B
41 Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.58	21.9	C	0.58	21.9	C	0.61	23.1	C	0.58	22.0	C	0.58	22.0	C	0.60	22.9	C
42 Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.05	-	F	1.05	-	F	1.07	-	F	1.01	-	F	1.02	-	F	1.08	-	F
43 Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	0.66	23.6	C	0.62	21.8	C	0.61	21.7	C	0.66	23.6	C	0.66	23.6	C	0.62	21.9	C
44 Avenida Presidio On-Ramp	Weave	0.54	19.6	B	0.50	18.1	B	0.54	22.1	C	0.53	19.6	B	0.54	19.6	B	0.54	22.3	C
45 El Camino Real Off-Ramp	Weave	0.54	19.6	B	0.50	18.1	B	0.54	22.1	C	0.53	19.6	B	0.54	19.6	B	0.54	22.3	C
46 El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.51	19.0	B	0.47	17.4	B	0.52	19.5	B	0.51	19.1	B	0.51	19.0	B	0.52	19.5	B
47 Avenida Califia On-Ramp	Merge	0.51	20.4	C	0.47	19.0	B	0.48	19.1	B	0.51	20.4	C	0.51	20.4	C	0.48	19.2	B
48 Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.61	21.8	C	0.57	20.0	C	0.57	20.1	C	0.61	21.8	C	0.61	21.8	C	0.57	20.2	C
49 Cristianitos Rd Off-Ramp	Diverge	0.61	25.6	C	0.56	23.9	C	0.56	24.0	C	0.61	25.6	C	0.61	25.6	C	0.57	24.1	C
50 Cristianitos Rd On-Ramp	Merge	0.52	21.3	C	0.48	19.8	B	0.48	19.9	B	0.52	21.3	C	0.52	21.3	C	0.48	20.0	C
51 South of Cristianitos Rd	Basic	0.61	21.4	C	0.56	19.6	C	0.56	19.8	C	0.61	21.4	C	0.61	21.4	C	0.56	19.9	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12A – Design Year 2050 Northbound I-5 Operations – PM Peak Hour (Part 1/4)

Location		Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
			V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1	South of Cristianitos Rd	Basic	0.59	20.7	C	0.54	19.0	C	0.59	20.7	C	0.59	20.7	C	0.59	20.7	C	0.47	16.5	B
2	Cristianitos Rd Off-Ramp	Diverge	0.57	24.6	C	0.53	22.9	C	0.57	24.6	C	0.57	24.6	C	0.57	24.6	C	0.49	21.5	C
3	Cristianitos Rd On-Ramp	Merge	0.54	23.2	C	0.50	21.8	C	0.54	23.3	C	0.54	23.3	C	0.54	23.3	C	0.44	19.5	B
4	Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.61	21.5	C	0.56	19.7	C	0.56	19.7	C	0.56	19.6	C	0.54	19.1	C	0.49	17.1	B
5	Avenida Magdalena Off-Ramp	Diverge	0.59	25.1	C	0.54	23.4	C	0.54	23.4	C	0.54	23.3	C	0.53	22.8	C	0.50	21.9	C
6	Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.59	22.8	C	0.55	20.9	C	0.54	20.9	C	0.54	20.8	C	0.53	20.2	C	0.49	18.4	B
7	El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.61	24.6	C	0.56	22.4	C	0.54	22.7	C	0.54	22.2	C	0.59	22.1	C	0.51	20.0	B
8	Avenida Presidio On-Ramp	Merge	0.63	26.1	C	0.59	24.6	C	0.64	26.6	C	0.62	26.0	C	0.63	26.0	C	0.51	21.7	C
9	Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.70	25.3	C	0.65	23.1	C	0.65	23.2	C	0.64	22.7	C	0.64	22.6	C	0.56	19.9	C
10	Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.71	30.4	D	0.68	27.8	C	0.68	28.0	D	0.67	27.3	C	0.70	27.5	C	0.66	24.5	C
11	Avenida Pico On-Ramp	Merge	0.89	31.9	D	0.89	31.2	D	0.87	31.8	D	0.81	30.7	D	0.80	28.2	D	0.84	33.2	D
12	Avenida Vista Hermosa Off-Ramp	Diverge	0.89	31.9	D	0.89	31.2	D	0.87	31.8	D	0.81	30.7	D	0.80	28.2	D	0.84	33.2	D
13	Avenida Vista Hermosa Loop On-Ramp	Merge	0.71	30.1	D	0.67	28.8	D	0.64	29.0	D	0.69	29.2	D	0.65	27.9	C	0.56	24.7	C
14	Avenida Vista Hermosa Slip On-Ramp	Merge	0.79	31.1	D	0.77	30.3	D	0.73	30.0	D	0.78	30.7	D	0.77	29.6	D	0.63	25.3	C
15	Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.85	33.2	D	0.82	31.6	D	0.81	31.1	D	0.84	32.6	D	0.80	30.1	D	0.69	24.8	C
16	Camino De Estrella Off-Ramp	Diverge	0.83	34.7	D	0.80	33.8	D	0.79	33.4	D	0.76	32.2	D	0.78	33.0	D	0.68	29.2	D
17	Camino De Estrella Loop On-Ramp	Merge	0.72	29.7	D	0.68	28.6	D	0.68	28.3	D	0.64	26.8	C	0.66	27.6	C	0.55	23.8	C
18	Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	1.21	-	F	1.21	-	F	1.21	-	F	1.20	-	F	1.21	-	F	1.23	-	F
19	Camino Las Ramblas On-Ramp	Merge	0.73	28.8	D	0.70	27.9	C	0.71	27.9	C	0.67	26.9	C	0.67	26.9	C	0.58	24.8	C
20	Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.73	26.7	D	0.70	25.5	C	0.71	25.8	C	0.67	23.9	C	0.67	23.9	C	0.60	21.1	C
21	Stonehill Dr On-Ramp	Merge	0.89	32.2	D	0.87	31.5	D	0.85	30.6	D	0.85	30.4	D	0.84	30.4	D	0.75	27.0	C
22	Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	0.88	34.9	D	0.84	32.5	D	0.83	31.8	D	0.80	30.4	D	0.80	30.3	D	0.71	25.6	C
23	Camino Capistrano Off-Ramp	Diverge	0.91	37.1	E	0.87	35.5	E	0.86	35.2	E	0.83	34.3	D	0.83	34.2	D	0.74	30.9	D
24	Camino Capistrano/Valle Rd On-Ramp	Merge	0.74	30.5	D	0.72	29.8	D	0.71	29.4	D	0.69	28.8	D	0.69	28.7	D	0.56	24.2	C
25	Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	0.84	32.5	D	0.80	30.0	D	0.76	28.3	D	0.76	28.1	D	0.76	28.0	D	0.67	24.1	C
26	Ortega Highway Off-Ramp	Diverge	0.93	38.4	E	0.89	37.1	E	0.85	35.4	E	0.86	35.8	E	0.86	35.7	E	0.78	32.6	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12A – Design Year 2050 Northbound I-5 Operations – PM Peak Hour (Part 2/4)

Location		Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
			V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1	South of Cristianitos Rd	Basic	0.59	20.7	C	0.59	20.7	C	0.59	20.7	C	0.59	20.7	C	0.59	20.7	C	0.59	20.7	C
2	Cristianitos Rd Off-Ramp	Diverge	0.57	24.6	C	0.57	24.6	C	0.57	24.6	C	0.57	24.6	C	0.57	24.6	C	0.57	24.6	C
3	Cristianitos Rd On-Ramp	Merge	0.54	23.2	C	0.54	23.3	C	0.54	23.3	C	0.54	23.2	C	0.54	23.2	C	0.54	23.3	C
4	Cristianitos Rd On-Ramp to Avenida Magdalena Off-Ramp	Basic	0.61	21.5	C	0.61	21.5	C	0.55	19.5	C	0.61	21.5	C	0.61	21.5	C	0.54	19.1	C
5	Avenida Magdalena Off-Ramp	Diverge	0.59	25.1	C	0.54	23.4	C	0.54	23.2	C	0.59	25.1	C	0.59	25.1	C	0.53	22.8	C
6	Avenida Magdalena On-Ramp to El Camino Real Off-Ramp	Weave	0.59	22.8	C	0.55	20.9	C	0.54	20.7	C	0.59	23.2	C	0.59	23.2	C	0.53	20.3	C
7	El Camino Real On-Ramp to Avenida Presidio Off-Ramp	Weave	0.61	24.6	C	0.56	22.4	C	0.54	22.5	C	0.59	23.6	C	0.59	23.6	C	0.53	22.0	C
8	Avenida Presidio On-Ramp	Merge	0.63	26.1	C	0.59	24.6	C	0.58	24.5	C	0.63	26.0	C	0.63	26.0	C	0.58	24.3	C
9	Avenida Presidio On-Ramp to Avenida Palizada On-Ramp	Basic	0.70	25.3	C	0.65	23.1	C	0.64	23.0	C	0.70	25.2	C	0.70	25.1	C	0.64	22.6	C
10	Avenida Palizada On-Ramp to Avenida Pico Off-Ramp	Weave	0.71	30.4	D	0.68	27.8	C	0.69	27.9	C	0.70	30.0	D	0.70	30.0	D	0.69	27.5	C
11	Avenida Pico On-Ramp	Merge	0.89	31.9	D	0.89	31.2	D	0.89	31.9	D	0.88	31.0	D	0.90	31.1	D	0.93	31.8	D
12	Avenida Vista Hermosa Off-Ramp	Diverge	0.89	31.9	D	0.89	31.2	D	0.89	31.9	D	0.88	31.0	D	0.90	31.1	D	0.93	31.8	D
13	Avenida Vista Hermosa Loop On-Ramp	Merge	0.71	30.1	D	0.67	28.8	D	0.67	30.1	D	0.67	28.7	D	0.68	28.8	D	0.62	28.2	D
14	Avenida Vista Hermosa Slip On-Ramp	Merge	0.79	31.1	D	0.77	30.3	D	0.78	31.1	D	0.77	30.3	D	0.77	30.2	D	0.73	29.2	D
15	Avenida Vista Hermosa Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	0.85	33.2	D	0.82	31.6	D	0.85	33.2	D	0.82	31.5	D	0.82	31.4	D	0.79	29.6	D
16	Camino De Estrella Off-Ramp	Diverge	0.83	34.7	D	0.80	33.8	D	0.83	34.7	D	0.80	33.8	D	0.80	33.7	D	0.77	32.7	D
17	Camino De Estrella Loop On-Ramp	Merge	0.72	29.7	D	0.68	28.6	D	0.72	29.7	D	0.68	28.5	D	0.69	28.6	D	0.65	27.3	C
18	Camino De Estrella Slip On-Ramp to Camino Las Ramblas Off-Ramp	Weave	1.21	-	F	1.21	-	F	0.83	32.1	D	1.22	-	F	1.22	-	F	0.83	30.3	D
19	Camino Las Ramblas On-Ramp	Merge	0.73	28.8	D	0.70	27.9	C	0.69	28.8	D	0.70	27.9	C	0.70	28.0	C	0.66	27.5	C
20	Camino Las Ramblas On-Ramp to Stonehill Dr On-Ramp	Basic	0.73	26.7	D	0.70	25.5	C	0.73	26.7	D	0.70	25.4	C	0.71	25.6	C	0.69	24.8	C
21	Stonehill Dr On-Ramp	Merge	0.89	32.2	D	0.87	31.5	D	0.89	32.2	D	0.87	31.4	D	0.87	31.5	D	0.86	30.8	D
22	Stonehill Dr On-Ramp to Camino Capistrano Off-Ramp	Basic	0.88	34.9	D	0.84	32.5	D	0.88	34.9	D	0.84	32.3	D	0.84	32.5	D	0.83	32.1	D
23	Camino Capistrano Off-Ramp	Diverge	0.91	37.1	E	0.87	35.5	E	0.91	37.1	E	0.86	35.4	E	0.87	35.5	E	0.86	35.5	E
24	Camino Capistrano/Valle Rd On-Ramp	Merge	0.74	30.5	D	0.72	29.8	D	0.74	30.5	D	0.70	29.0	D	0.70	29.1	D	0.71	29.3	D
25	Camino Capistrano/Valle Rd On-Ramp to Ortega Highway Off-Ramp	Basic	0.84	32.5	D	0.80	30.0	D	0.84	32.5	D	0.78	29.4	D	0.79	29.5	D	0.80	30.1	D
26	Ortega Highway Off-Ramp	Diverge	0.93	38.4	E	0.89	37.1	E	0.93	38.4	E	0.88	36.6	E	0.88	36.7	E	0.89	37.0	E

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12A – Design Year 2050 Northbound I-5 Operations – PM Peak Hour (Part 3/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Ortega Highway Loop On-Ramp	Merge	0.84	33.1	D	0.79	31.4	D	0.78	30.8	D	0.77	30.4	D	0.77	30.4	D	0.67	27.1	C
28 Ortega Highway Slip On-Ramp	Merge	1.00	-	F	0.95	35.3	E	0.93	34.7	D	0.92	34.4	D	0.92	34.4	D	0.79	29.8	D
29 Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	0.76	28.1	D	0.75	27.4	D	0.73	26.6	D	0.72	26.2	D	0.72	26.1	D	0.65	23.3	C
30 Junipero Serra Rd Off-Ramp	Diverge	0.77	32.2	D	0.76	31.7	D	0.74	31.1	D	0.73	30.8	D	0.73	30.8	D	0.79	33.0	D
31 Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.72	26.4	D	0.59	20.9	C	0.69	24.9	C	0.68	24.5	C	0.68	24.5	C	0.63	22.2	C
32 SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.77	28.7	D	0.71	26.0	C	0.70	25.4	C	0.69	24.8	C	0.69	24.8	C	0.62	21.9	C
33 Avery Parkway Off-Ramp	Diverge	0.81	33.5	D	0.76	31.5	D	0.75	31.1	D	0.74	30.6	D	0.74	30.6	D	0.68	28.3	D
34 Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.58	23.4	C	0.56	21.3	C	0.81	20.8	C	0.82	28.8	D	0.82	28.8	D	0.59	19.7	B
35 Crown Valley Parkway Loop On-Ramp	Merge	0.63	25.8	C	0.54	19.0	C	0.59	24.6	C	0.58	24.2	C	0.59	24.3	C	0.58	23.9	C
36 Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.66	23.6	C	0.60	21.3	C	0.59	20.7	C	0.57	20.3	C	0.58	20.3	C	0.55	19.4	C
37 Oso Parkway Loop On-Ramp	Merge	0.59	25.3	C	0.56	24.2	C	0.55	23.7	C	0.54	23.5	C	0.54	23.6	C	0.49	21.8	C
38 Oso Parkway Slip On-Ramp	Merge	0.99	33.2	D	0.90	32.6	D	0.86	31.5	D	0.86	31.3	D	0.86	31.3	D	0.93	30.1	D
39 Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.99	33.2	D	0.90	32.6	D	0.86	31.5	D	0.86	31.3	D	0.86	31.3	D	0.93	30.1	D
40 La Paz Road Off Ramp	Diverge	0.99	33.2	D	0.90	32.6	D	0.86	31.5	D	0.86	31.3	D	0.86	31.3	D	0.93	30.1	D
41 La Paz Road Loop On Ramp	Merge	0.58	22.1	C	0.61	23.1	C	0.59	22.5	C	0.59	22.4	C	0.59	22.5	C	0.56	21.2	C
42 La Paz Road Slip On Ramp	Merge	0.63	23.8	C	0.65	24.8	C	0.60	22.8	C	0.60	22.8	C	0.60	22.8	C	0.64	28.1	D
43 Alicia Parkway Off Ramp	Diverge	0.63	23.8	C	0.65	24.8	C	0.60	22.8	C	0.60	22.8	C	0.60	22.8	C	0.64	28.1	D
44 Alicia Parkway Loop On Ramp	Merge	0.63	22.4	C	0.65	23.3	C	0.63	22.4	C	0.63	22.4	C	0.63	22.4	C	0.62	21.9	C
45 Alicia Parkway Slip On Ramp	Merge	0.70	26.1	C	0.71	26.6	C	0.69	25.7	C	0.71	26.5	C	0.69	25.7	C	0.62	23.3	C
46 Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.72	26.1	D	0.72	26.3	D	0.70	25.3	C	0.70	25.2	C	0.70	25.3	C	0.66	23.7	C
47 El Toro Road Off Ramp	Diverge	0.72	26.1	D	0.72	26.3	D	0.70	25.3	C	0.70	25.2	C	0.70	25.3	C	0.66	23.7	C
48 El Toro Road Loop On Ramp	Merge	0.77	28.9	D	0.78	29.2	D	0.75	28.2	D	0.75	28.1	D	0.74	28.0	D	0.66	25.1	C
49 El Toro Road Slip On Ramp	Merge	0.74	27.2	D	0.74	27.3	D	0.73	26.5	D	0.72	26.4	D	0.72	26.4	D	0.68	24.6	C
50 Lake Forest Drive Off Ramp	Diverge	0.95	38.2	E	0.95	38.2	E	0.93	37.3	E	0.93	37.2	E	0.93	37.1	E	1.01	-	F
51 Bake Parkway/Truck Bypass Off Ramp	Diverge	0.68	24.4	C	0.68	24.5	C	0.79	23.5	C	0.66	23.5	C	0.66	23.4	C	0.63	22.2	C
52 Bake Parkway to I-405 Off Ramp	Basic	0.62	22.1	C	0.64	22.8	C	0.60	21.1	C	0.61	21.5	C	0.60	21.2	C	0.57	20.0	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12A – Design Year 2050 Northbound I-5 Operations – PM Peak Hour (Part 4/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Ortega Highway Loop On-Ramp	Merge	0.84	33.1	D	0.79	31.4	D	0.81	33.1	D	0.76	30.3	D	0.77	30.5	D	0.77	31.5	D
28 Ortega Highway Slip On-Ramp	Merge	1.00	-	F	0.95	35.3	E	0.78	29.5	D	0.90	33.8	D	0.91	34.0	D	0.74	27.4	D
29 Ortega Highway Slip On-Ramp to Junipero Serra Rd Off-Ramp	Basic	0.76	28.1	D	0.75	27.4	D	0.76	28.1	D	0.72	26.1	D	0.72	26.2	D	0.75	27.8	D
30 Junipero Serra Rd Off-Ramp	Diverge	0.77	32.2	D	0.76	31.7	D	0.77	32.2	D	0.73	30.7	D	0.73	30.9	D	0.77	32.1	D
31 Junipero Serra Rd On-Ramp to SR-73 Off-Ramp	Basic	0.72	26.4	D	0.59	20.9	C	0.72	26.4	D	0.57	20.0	C	0.57	20.1	C	0.72	26.0	C
32 SR-73 Off Ramp to Avery Parkway Off-Ramp	Basic	0.77	28.7	D	0.71	26.0	C	0.77	28.7	D	0.71	25.9	C	0.71	25.8	C	0.74	27.3	D
33 Avery Parkway Off-Ramp	Diverge	0.81	33.5	D	0.76	31.5	D	0.81	33.5	D	0.76	31.3	D	0.75	31.2	D	0.79	32.6	D
34 Avery Parkway On-Ramp to Crown Valley Parkway Off-Ramp	Weave	0.58	23.4	C	0.56	21.3	C	0.82	33.1	D	0.64	22.2	C	0.62	22.1	C	0.82	31.6	D
35 Crown Valley Parkway Loop On-Ramp	Merge	0.63	25.8	C	0.54	19.0	C	0.63	25.8	C	0.62	25.5	C	0.61	25.2	C	0.61	25.1	C
36 Crown Valley Parkway Slip On-Ramp to Oso Parkway Off-Ramp	Basic	0.66	23.6	C	0.60	21.3	C	0.66	23.7	C	0.62	22.0	C	0.62	21.9	C	0.61	21.5	C
37 Oso Parkway Loop On-Ramp	Merge	0.59	25.3	C	0.56	24.2	C	0.57	25.3	C	0.57	24.6	C	0.57	24.5	C	0.57	24.5	C
38 Oso Parkway Slip On-Ramp	Merge	0.99	33.2	D	0.90	32.6	D	0.96	31.6	D	0.77	30.7	D	0.76	30.4	D	0.95	33.9	D
39 Oso Parkway On-Ramp to La Paz Road Off-Ramp	Basic	0.99	33.2	D	0.90	32.6	D	0.96	31.6	D	0.77	30.7	D	0.76	30.4	D	0.95	33.9	D
40 La Paz Road Off Ramp	Diverge	0.99	33.2	D	0.90	32.6	D	0.96	31.6	D	0.77	30.7	D	0.76	30.4	D	0.95	33.9	D
41 La Paz Road Loop On Ramp	Merge	0.58	22.1	C	0.61	23.1	C	0.58	22.1	C	0.62	23.2	C	0.61	23.2	C	0.62	23.4	C
42 La Paz Road Slip On Ramp	Merge	0.63	23.8	C	0.65	24.8	C	0.58	22.9	C	0.63	24.1	C	0.63	24.0	C	0.62	24.6	C
43 Alicia Parkway Off Ramp	Diverge	0.63	23.8	C	0.65	24.8	C	0.58	22.9	C	0.63	24.1	C	0.63	24.0	C	0.62	24.6	C
44 Alicia Parkway Loop On Ramp	Merge	0.63	22.4	C	0.65	23.3	C	0.63	22.4	C	0.66	23.5	C	0.66	23.4	C	0.65	23.2	C
45 Alicia Parkway Slip On Ramp	Merge	0.70	26.1	C	0.71	26.6	C	0.70	26.1	C	0.70	25.9	C	0.69	25.8	C	0.70	26.2	C
46 Alicia Parkway Slip On Ramp to El Toro Road Off Ramp	Basic	0.72	26.1	D	0.72	26.3	D	0.72	26.1	D	0.73	26.6	D	0.73	26.4	D	0.72	26.3	D
47 El Toro Road Off Ramp	Diverge	0.72	26.1	D	0.72	26.3	D	0.72	26.1	D	0.73	26.6	D	0.73	26.4	D	0.72	26.3	D
48 El Toro Road Loop On Ramp	Merge	0.77	28.9	D	0.78	29.2	D	0.77	28.9	D	0.79	29.5	D	0.78	29.3	D	0.78	29.2	D
49 El Toro Road Slip On Ramp	Merge	0.74	27.2	D	0.74	27.3	D	0.74	27.2	D	0.75	27.7	D	0.75	27.4	D	0.75	27.5	D
50 Lake Forest Drive Off Ramp	Diverge	0.95	38.2	E	0.95	38.2	E	0.95	38.2	E	0.96	38.5	E	0.96	38.3	E	0.95	38.1	E
51 Bake Parkway/Truck Bypass Off Ramp	Diverge	0.68	24.4	C	0.68	24.5	C	0.68	24.4	C	0.69	24.8	C	0.68	24.5	C	0.68	24.4	C
52 Bake Parkway to I-405 Off Ramp	Basic	0.62	22.1	C	0.64	22.8	C	0.62	22.1	C	0.65	23.2	C	0.64	22.9	C	0.62	21.9	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12B – Design Year 2050 Southbound I-5 Operations – PM Peak Hour (Part 1/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 I-405 On Ramp to Bake Pkwy	Basic	0.81	30.7	D	0.81	30.7	D	0.78	29.3	D	0.77	28.8	D	0.77	28.5	D	0.65	23.0	C
2 Bake Parkway/Truck Bypass On Ramp	Merge	0.81	31.0	D	0.82	31.1	D	0.79	29.9	D	0.78	29.4	D	0.78	29.2	D	0.68	24.3	C
3 Lake Forest Drive Loop On Ramp	Merge	0.71	26.9	C	0.71	27.0	C	0.68	26.1	C	0.67	25.7	C	0.67	25.5	C	0.50	19.3	B
4 Lake Forest Drive Slip On Ramp	Merge	0.76	29.3	D	0.76	29.4	D	0.74	28.4	D	0.72	28.0	D	0.72	27.8	C	0.56	22.0	C
5 Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.91	36.9	E	0.91	37.1	E	0.89	35.6	E	0.88	34.9	D	0.87	34.6	D	0.77	28.8	D
6 El Toro Road Off Ramp	Diverge	0.91	36.9	E	0.91	37.1	E	0.89	35.6	E	0.88	34.9	D	0.87	34.6	D	0.77	28.8	D
7 El Toro Road Loop On Ramp	Merge	1.05	-	F	1.06	-	F	0.99	-	F	0.98	-	F	0.97	-	F	0.81	30.5	D
8 El Toro Road Slip On Ramp	Merge	1.07	-	F	1.08	-	F	1.05	-	F	1.04	-	F	1.03	-	F	0.92	37.7	E
9 El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	1.07	-	F	1.08	-	F	1.05	-	F	1.04	-	F	1.03	-	F	0.92	37.7	E
10 Alicia Parkway Off Ramp	Diverge	1.07	-	F	1.08	-	F	1.05	-	F	1.04	-	F	1.03	-	F	0.92	37.7	E
11 Alicia Parkway Loop On Ramp	Merge	0.86	33.9	D	0.86	34.1	D	0.84	32.3	D	0.83	31.8	D	0.82	31.3	D	0.74	-	F
12 Alicia Parkway Slip On Ramp	Merge	0.81	30.9	D	0.81	31.2	D	0.78	30.2	D	0.78	29.8	D	0.77	29.5	D	0.49	-	F
13 La Paz Road Off Ramp	Diverge	0.97	-	F	0.97	-	F	0.95	-	F	0.94	-	F	0.93	-	F	0.83	32.0	D
14 La Paz Road Loop On Ramp	Merge	1.06	-	F	1.07	-	F	1.06	-	F	0.98	-	F	0.95	-	F	0.71	27.2	C
15 La Paz Road Slip On Ramp	Merge	1.08	-	F	1.08	-	F	1.06	-	F	1.05	-	F	1.04	-	F	0.91	37.1	E
16 La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	1.08	-	F	1.08	-	F	1.06	-	F	1.05	-	F	1.04	-	F	0.91	37.1	E
17 Oso Parkway Off-Ramp	Diverge	1.08	-	F	1.08	-	F	1.06	-	F	1.05	-	F	1.04	-	F	0.91	37.1	E
18 Oso Parkway Loop On-Ramp	Merge	0.94	-	F	0.95	-	F	0.91	-	F	0.89	34.7	D	0.88	34.2	D	0.73	28.7	D
19 Oso Parkway Slip On-Ramp	Merge	1.03	-	F	1.03	-	F	1.01	-	F	1.00	44.7	E	0.98	43.5	E	0.87	34.2	D
20 Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	1.03	-	F	1.03	-	F	1.01	-	F	1.00	44.7	E	0.98	43.5	E	0.87	34.2	D
21 Crown Valley Parkway Off-Ramp	Diverge	1.03	-	F	1.03	-	F	1.01	-	F	1.00	44.7	E	0.98	43.5	E	0.87	34.2	D
22 Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.79	34.9	D	0.79	35.1	E	0.78	40.6	E	0.77	39.9	E	0.76	39.4	E	0.66	31.1	D
23 Avery Parkway On-Ramp	Merge	1.12	-	F	1.12	-	F	1.07	-	F	1.03	-	F	1.00	-	F	0.72	28.8	D
24 Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	1.12	-	F	1.12	-	F	1.09	-	F	1.08	-	F	1.06	-	F	0.84	32.8	D
25 SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	1.12	-	F	1.12	-	F	1.09	-	F	1.08	-	F	1.06	-	F	0.84	32.8	D
26 Junipero Springs Road On-Ramp	Merge	1.14	-	F	1.14	-	F	1.05	-	F	1.02	-	F	1.00	-	F	0.70	24.8	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12B – Design Year 2050 Southbound I-5 Operations – PM Peak Hour (Part 2/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 I-405 On Ramp to Bake Pkwy	Basic	0.81	30.7	D	0.81	30.7	D	0.77	28.6	D	0.81	30.7	D	0.81	30.7	D	0.82	31.1	D
2 Bake Parkway/Truck Bypass On Ramp	Merge	0.81	31.0	D	0.82	31.1	D	0.78	29.2	D	0.81	31.0	D	0.81	31.0	D	0.82	31.4	D
3 Lake Forest Drive Loop On Ramp	Merge	0.71	26.9	C	0.71	27.0	C	0.67	25.5	C	0.71	26.9	C	0.71	26.9	C	0.72	27.3	C
4 Lake Forest Drive Slip On Ramp	Merge	0.76	29.3	D	0.76	29.4	D	0.73	28.1	D	0.76	29.3	D	0.76	29.4	D	0.77	29.7	D
5 Lake Forest Drive Slip On Ramp to El Toro Road Off Ramp	Basic	0.91	36.9	E	0.91	37.1	E	0.87	34.6	D	0.91	37.1	E	0.91	37.0	E	0.91	37.6	E
6 El Toro Road Off Ramp	Diverge	0.91	36.9	E	0.91	37.1	E	0.87	34.6	D	1.12	-	F	1.12	-	F	0.91	-	F
7 El Toro Road Loop On Ramp	Merge	1.05	-	F	1.06	-	F	1.02	-	F	1.07	-	F	1.06	-	F	1.10	-	F
8 El Toro Road Slip On Ramp	Merge	1.07	-	F	1.08	-	F	1.05	-	F	1.08	-	F	1.08	-	F	1.12	-	F
9 El Toro Riad Slip On Ramp to Alicia Parkway Off Ramp	Basic	1.07	-	F	1.08	-	F	1.05	-	F	1.08	-	F	1.08	-	F	1.12	-	F
10 Alicia Parkway Off Ramp	Diverge	1.07	-	F	1.08	-	F	1.05	-	F	1.08	-	F	1.08	-	F	1.12	-	F
11 Alicia Parkway Loop On Ramp	Merge	0.86	33.9	D	0.86	34.1	D	0.85	33.3	D	2.46	-	F	0.86	-	F	0.89	35.7	E
12 Alicia Parkway Slip On Ramp	Merge	0.81	30.9	D	0.81	31.2	D	0.70	27.0	C	0.82	31.3	D	0.81	31.2	D	0.74	28.5	D
13 La Paz Road Off Ramp	Diverge	0.97	-	F	0.97	-	F	0.88	34.9	D	0.98	-	F	0.97	-	F	0.98	-	F
14 La Paz Road Loop On Ramp	Merge	1.06	-	F	1.07	-	F	0.81	30.9	D	1.09	-	F	1.08	-	F	1.09	-	F
15 La Paz Road Slip On Ramp	Merge	1.08	-	F	1.08	-	F	0.96	41.4	E	1.09	-	F	1.08	-	F	1.11	-	F
16 La Paz Road Slip On-Ramp to Oso Parkway Off-Ramp	Basic	1.08	-	F	1.08	-	F	0.96	41.4	E	1.09	-	F	1.08	-	F	1.11	-	F
17 Oso Parkway Off-Ramp	Diverge	1.08	-	F	1.08	-	F	0.96	41.4	E	1.09	-	F	1.08	-	F	1.11	-	F
18 Oso Parkway Loop On-Ramp	Merge	0.94	-	F	0.95	-	F	0.82	31.9	D	0.97	-	F	0.95	-	F	1.03	-	F
19 Oso Parkway Slip On-Ramp	Merge	1.03	-	F	1.03	-	F	1.06	-	F	1.04	-	F	1.04	-	F	1.08	-	F
20 Oso Parkway Slip On-Ramp to Crown Valley Parkway Off Ramp	Basic	1.03	-	F	1.03	-	F	1.06	-	F	1.04	-	F	1.04	-	F	1.08	-	F
21 Crown Valley Parkway Off-Ramp	Diverge	1.03	-	F	1.03	-	F	1.06	-	F	1.04	-	F	1.04	-	F	1.08	-	F
22 Crown Valley Parkway On-Ramp to Avery Parkway Off-Ramp	Weave	0.79	34.9	D	0.79	35.1	E	0.79	35.0	D	0.80	35.5	E	0.79	35.1	E	0.83	37.6	E
23 Avery Parkway On-Ramp	Merge	1.12	-	F	1.12	-	F	1.08	-	F	1.14	-	F	1.13	-	F	1.23	-	F
24 Avery Parkway On-Ramp to SR-73 On-Ramp	Basic	1.12	-	F	1.12	-	F	1.09	-	F	1.13	-	F	1.12	-	F	1.17	-	F
25 SR-73 On-Ramp to Junipero Serra Road Off-Ramp	Basic	1.12	-	F	1.12	-	F	1.09	-	F	1.13	-	F	1.12	-	F	1.26	-	F
26 Junipero Springs Road On-Ramp	Merge	1.14	-	F	1.14	-	F	1.03	-	F	1.04	-	F	1.07	-	F	1.30	-	F

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12B – Design Year 2050 Southbound I-5 Operations – PM Peak Hour (Part 3/4)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	1.10	-	F	1.10	-	F	1.07	-	F	1.06	-	F	1.05	-	F	0.85	33.4	D
28 Ortega Highway Off-Ramp	Diverge	1.10	-	F	1.10	-	F	1.07	-	F	1.06	-	F	1.05	-	F	0.85	33.4	D
29 Ortega Highway On-Ramp	Merge	1.33	-	F	1.34	-	F	1.23	-	F	1.22	-	F	1.19	-	F	0.79	30.1	D
30 Camino Capistrano Off-Ramp	Diverge	1.39	-	F	1.40	-	F	1.30	-	F	1.28	-	F	1.25	-	F	0.85	22.8	C
31 Camino Capistrano On-Ramp	Merge	1.05	-	F	1.06	-	F	0.94	-	F	0.95	-	F	0.91	-	F	0.66	26.6	C
32 Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	1.08	-	F	1.09	-	F	0.92	38.2	E	1.04	-	F	1.02	-	F	0.78	29.2	D
33 Camino Las Ramblas Off-Ramp	Diverge	1.18	-	F	1.18	-	F	0.80	21.3	C	1.13	-	F	0.97	-	F	0.65	23.2	C
34 Camino Las Ramblas Loop On-Ramp	Merge	1.00	44.6	E	1.00	-	F	0.88	35.3	E	0.94	39.9	E	0.92	38.2	E	0.70	25.4	C
35 Camino Las Ramblas Slip On-Ramp	Merge	1.00	44.8	E	1.00	-	F	0.88	35.4	E	0.96	41.4	E	0.94	39.6	E	0.83	31.8	D
36 Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	1.00	44.8	E	1.00	-	F	0.88	35.4	E	0.96	41.4	E	0.94	39.6	E	0.83	31.8	D
37 Camino De Estrella Off-Ramp	Diverge	1.00	44.8	E	1.00	-	F	0.88	35.4	E	0.96	41.4	E	0.94	39.6	E	0.83	31.8	D
38 Camino De Estrella On-Ramp	Merge	1.08	-	F	1.10	-	F	0.88	28.2	D	0.98	-	F	0.92	-	F	0.67	20.7	C
39 Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	1.14	-	F	1.14	-	F	1.17	-	F	1.12	-	F	1.10	-	F	0.83	31.8	D
40 Avenida Vista Hermosa Off-Ramp	Diverge	1.22	-	F	1.23	-	F	1.29	-	F	1.20	-	F	1.14	-	F	0.82	22.5	C
41 Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.86	35.8	E	0.87	36.0	E	0.88	-	F	0.85	-	F	0.84	-	F	0.58	22.9	C
42 Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.20	-	F	1.20	-	F	1.20	-	F	1.19	-	F	1.23	-	F	1.13	-	F
43 Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	1.06	-	F	0.99	44.0	E	0.96	41.0	E	0.95	40.1	E	0.93	38.8	E	0.57	20.0	C
44 Avenida Presidio On-Ramp	Weave	0.84	-	F	0.79	30.4	D	0.79	30.7	D	0.84	-	F	0.74	28.4	D	0.58	20.6	C
45 El Camino Real Off-Ramp	Weave	0.84	-	F	0.79	30.4	D	0.79	30.7	D	0.84	-	F	0.74	28.4	D	0.59	20.7	C
46 El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.79	31.1	D	0.74	28.6	D	0.73	28.2	D	0.73	28.2	D	0.69	26.5	C	0.59	23.1	C
47 Avenida Califia On-Ramp	Merge	0.78	30.0	D	0.73	28.1	D	0.72	27.8	C	0.72	27.7	C	0.68	26.4	C	0.44	17.9	B
48 Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.94	39.6	E	0.87	34.8	D	0.86	34.1	D	0.86	34.0	D	0.82	31.3	D	0.58	20.5	C
49 Cristianitos Rd Off-Ramp	Diverge	0.91	37.0	E	0.85	34.7	D	0.84	34.3	D	0.83	34.3	D	0.79	32.7	D	0.60	25.5	C
50 Cristianitos Rd On-Ramp	Merge	0.83	32.3	D	0.77	30.4	D	0.76	30.1	D	0.76	30.0	D	0.73	28.7	D	0.49	20.3	C
51 South of Cristianitos Rd	Basic	0.96	40.9	E	0.89	35.8	E	0.88	35.1	E	0.88	35.0	D	0.83	32.1	D	0.59	20.9	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 12B – Design Year 2050 <u>Southbound</u> I-5 Operations – PM Peak Hour (Part 4/4)																			
Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
27 Junipero Springs Road On-Ramp to Ortega Highway Off-Ramp	Basic	1.10	-	F	1.10	-	F	1.06	-	F	1.06	-	F	1.08	-	F	1.03	-	F
28 Ortega Highway Off-Ramp	Diverge	1.10	-	F	1.10	-	F	1.06	-	F	1.06	-	F	1.08	-	F	1.03	-	F
29 Ortega Highway On-Ramp	Merge	1.33	-	F	1.34	-	F	1.26	-	F	1.27	-	F	1.30	-	F	1.18	-	F
30 Camino Capistrano Off-Ramp	Diverge	1.39	-	F	1.40	-	F	1.22	-	F	1.32	-	F	1.35	-	F	1.20	-	F
31 Camino Capistrano On-Ramp	Merge	1.05	-	F	1.06	-	F	0.91	35.3	E	1.00	-	F	1.02	-	F	0.92	-	F
32 Camino Capistrano On-Ramp to Camino Las Ramblas Off-Ramp	Basic	1.08	-	F	1.09	-	F	1.00	-	F	1.06	-	F	1.07	-	F	1.01	-	F
33 Camino Las Ramblas Off-Ramp	Diverge	1.18	-	F	1.18	-	F	0.94	-	F	1.15	-	F	1.16	-	F	0.96	-	F
34 Camino Las Ramblas Loop On-Ramp	Merge	1.00	44.6	E	1.00	-	F	0.86	33.8	D	0.97	42.1	E	0.98	42.9	E	0.89	35.7	E
35 Camino Las Ramblas Slip On-Ramp	Merge	1.00	44.8	E	1.00	-	F	0.86	33.9	D	0.97	42.3	E	0.98	43.0	E	0.89	35.8	E
36 Camino Las Ramblas Slip On-Ramp to Camino De Estrella Off-Ramp	Basic	1.00	44.8	E	1.00	-	F	0.86	33.9	D	0.97	42.3	E	0.98	43.0	E	0.89	35.8	E
37 Camino De Estrella Off-Ramp	Diverge	1.00	44.8	E	1.00	-	F	0.86	33.9	D	0.97	42.3	E	0.98	43.0	E	0.89	35.8	E
38 Camino De Estrella On-Ramp	Merge	1.08	-	F	1.10	-	F	0.84	27.2	C	1.03	-	F	1.05	-	F	0.86	28.1	D
39 Camino De Estrella On-Ramp to Avenida Vista Hermosa Off-Ramp	Basic	1.14	-	F	1.14	-	F	0.94	39.6	E	1.12	-	F	1.12	-	F	0.97	42.1	E
40 Avenida Vista Hermosa Off-Ramp	Diverge	1.22	-	F	1.23	-	F	0.81	22.4	C	1.19	-	F	1.20	-	F	0.87	24.4	C
41 Avenida Vista Hermosa On-Ramp to Avenida Pico Off-Ramp	Weave	0.86	35.8	E	0.87	36.0	E	0.90	-	F	0.85	35.6	E	0.85	35.5	E	0.89	-	F
42 Avenida Pico On-Ramp to Avenida Palizada Off-Ramp	Weave	1.20	-	F	1.20	-	F	1.22	-	F	1.19	-	F	1.20	-	F	1.23	-	F
43 Avenida Palizada Off-Ramp to Avenida Presidio On-Ramp	Basic	1.06	-	F	0.99	44.0	E	0.96	41.5	E	1.05	-	F	1.05	-	F	0.97	42.3	E
44 Avenida Presidio On-Ramp	Weave	0.84	-	F	0.79	30.4	D	0.87	39.3	E	0.84	-	F	0.84	-	F	0.87	39.4	E
45 El Camino Real Off-Ramp	Weave	0.84	-	F	0.79	30.4	D	0.87	39.3	E	0.84	-	F	0.84	-	F	0.87	39.4	E
46 El Camino Real On-Ramp to Avenida Califia Off-Ramp	Weave	0.79	31.1	D	0.74	28.6	D	0.84	35.8	E	0.79	31.2	D	0.79	31.1	D	0.84	35.9	E
47 Avenida Califia On-Ramp	Merge	0.78	30.0	D	0.73	28.1	D	0.72	27.9	C	0.78	30.0	D	0.78	30.0	D	0.73	28.0	C
48 Avenida Califia On-Ramp to Cristianitos Rd Off-Ramp	Basic	0.94	39.6	E	0.87	34.8	D	0.87	34.3	D	0.94	39.7	E	0.94	39.6	E	0.87	34.6	D
49 Cristianitos Rd Off-Ramp	Diverge	0.91	37.0	E	0.85	34.7	D	0.84	34.4	D	0.91	37.1	E	0.91	37.0	E	0.84	34.6	D
50 Cristianitos Rd On-Ramp	Merge	0.83	32.3	D	0.77	30.4	D	0.77	30.1	D	0.83	32.3	D	0.83	32.3	D	0.77	30.3	D
51 South of Cristianitos Rd	Basic	0.96	40.9	E	0.89	35.8	E	0.88	35.3	E	0.96	40.9	E	0.96	40.9	E	0.89	35.6	E
Notes: Bold font indicates unacceptable LOS E or F conditions.																			
Source: Fehr & Peers, 2017																			

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AM Peak Hour – Southbound I-5

Compared to northbound I-5, the Design Year (2050) traffic demand on southbound I-5 is relatively lower during the AM peak hour. Residual capacity on I-5 would allow the majority of the study locations continue operating at LOS D or better conditions under the No Build Alternative (no HOV scenario). Only two locations would operate with unacceptable LOS E or F, including the Ortega off-ramp and the short weaving segment between Avenida Pico on-ramp and Avenida Palizada off-ramp. Similar traffic operations would occur on southbound I-5 under the No Build with HOV scenario.

Due to the capacity adequacy along southbound I-5 in the AM peak hour, all the build alternatives would expect minimal operational benefits along southbound I-5 and improve 1-2 locations to operate at acceptable LOS D or better.

PM Peak Hour – Northbound I-5

Similar to the AM peak hour operations along southbound I-5, northbound I-5 would expect to have adequate capacity to accommodate the relatively low volumes during the PM peak hour. Under the No Build Alternative, majority of the study locations would continue operating acceptably except for five locations, including the weaving segment from Camino De Estrella slip on-ramp to Camino Las Ramblas off-ramp, Camino Capistrano off-ramp, Ortega Highway off-ramp, Ortega Highway on-ramp, and Lake Forest Drive off-ramp. Similar traffic operations would occur on northbound I-5 under the No Build with HOV scenario.

Due to the capacity adequacy along northbound I-5 in the PM peak hour, all the build alternatives would expect minimal operational benefits along northbound I-5 and improve 1-3 locations to operate at acceptable LOS D or better.

PM Peak Hour – Southbound I-5

Under the No Build Alternative (no HOV scenario), future traffic growth during the PM peak hour would result in operational deficiencies on southbound I-5, causing unacceptable LOS E or F conditions at 41 out of 51 study locations. The additional HOV lane proposed on I-5 between Avenida Pico and Countyline would improve operations on I-5 south of Avenida Pico, resulting in four locations to improve from LOS E or F to LOS D conditions. However, most of the deficient locations along southbound I-5 north of Avenida Pico would remain to operate under deficiency due to the unresolved capacity constraints.

Under Alternatives 13, 17, and 14, the proposed SR 241 connection at I-5 would provide additional north-south capacity and reduce traffic demand and improve traffic operations along southbound I-5 during the PM peak hour. Compared to the No Build Alternative, all three alternatives would improve operations at 88-96% of the study locations. Among the three SR 241 extension alignments, Alternative 14 shows the greatest traffic benefits on southbound I-5, and improves operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 24% of the locations on southbound I-5.

Both Alternatives 11 and 12 propose additional capacity along I-5 corridor and would expect sufficient traffic benefit to I-5 operations. Approximately 100% and 86% of the study locations along southbound I-

5 would expect improved conditions under Alternatives 11 and 12, respectively. In addition, Alternatives 11 and 12 would improve operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 78% and 41% of the locations on southbound I-5, respectively.

Under Alternatives 9 and 18, the proposed arterial improvements would provide negligible benefits to I-5 corridor. The deficient locations on southbound I-5 under the No Build Alternative would remain as deficient under Alternatives 9 and 18 during the PM peak hour.

Alternative 21 would provide sufficient operational benefits to I-5 between Avenida Vista Hermosa and SR 73 and improve traffic operations at 45% of the study locations along southbound I-5. In addition, Alternative 21 would improve operations from LOS E or F under the No Build Alternative to at least one better LOS grade at 16% of the locations on southbound I-5.

Combining the northbound and southbound directions, Alternative 11 shows the greatest benefit to I-5 operations among all alternatives. Alternatives 12, 14, 21, and 17 also show sufficient operational benefits to I-5. Alternatives 9 and 18 were proposed as arterial improvements and show the least traffic benefits to I-5 corridor as expected.

SR 241/Los Patrones Parkway Operations Analysis

Under the two No Build Alternatives and Alternatives 11, 12, 9, 18, and 21, SR 241 was referred to as Los Patrones Parkway, an un-tolled four-lane roadway connecting Oso Parkway and Cow Camp Road. Los Patrones Parkway is currently under construction and completion of the construction would extend Los Patrones Parkway from current terminus at Oso Parkway to Cow Camp Road with interchanges at Oso Parkway and Chiquita Canyon Drive. Under Alternatives 13, 17, and 14, SR 241 was assumed to be a 4-lane toll road from Oso Parkway to I-5 and would provide local access at various interchanges upon the build alternative.

Tables 13A and 13B show the AM peak hour density and LOS for the mainline segments and ramp junctions on northbound and southbound SR 241 under 2050 conditions, respectively. The PM peak hour results are shown in **Tables 14A and 14B**.

Under the two No Build Alternatives, Las Patrones Parkway would provide adequate capacity to accommodate the future demand and operate at LOS D or better conditions at all the study locations including mainline segments and ramp junctions.

Under the majority of build alternatives, SR 241/Los Patrones Parkway would provide sufficient capacity to accommodate the future demand during both AM and PM peak hours, with the exception of the following locations.

Alternative 14 Northbound 241 off-ramp at Oso Parkway would operate at LOS E in the AM peak hour

Alternative 18 Northbound Los Patrones Parkway between SR 73 on-ramp and Crown Valley Parkway off-ramp would operate at LOS E or F in the AM peak hour

Alternative 21 Northbound 241 off-ramp at Oso Parkway would operate at LOS E in the AM peak hour

Table 13A – Design Year 2050 Northbound SR 241/Los Patrones Parkway Operations – AM Peak Hour (Part 1/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 La Pata On-Ramp to I Street Off-Ramp	Basic																		
2 I-5 Mainline to Calle Del Cerro Off-Ramp	Basic													0.12	3.8	A			
3 Calle Del Cerro Off Ramp	Diverge													0.13	7.7	A			
4 Calle Del Cerro On-Ramp	Merge													0.24	10.0	A			
5 Calle Del Cerro On-Ramp to Calle Saluda	Basic													0.23	7.6	A			
6 Calle Saluda Off-Ramp	Diverge													0.25	12.4	B			
7 Calle Saluda On-Ramp	Merge													0.44	17.2	B			
8 Calle Saluda On-Ramp to I Street Off-Ramp	Basic													0.43	13.9	B			
9 I-5 Mainline to Camino De Los Mares Off-Ramp	Basic										0.14	4.4	A						
10 Camino De Los Mares Off-Ramp	Diverge										0.15	8.6	A						
11 Camino De Los Mares On-Ramp	Merge										0.36	14.1	B						
12 Camino De Los Mares On-Ramp to I Street Off-Ramp	Basic										0.34	10.9	A						
13 I-5 Mainline to Camino Las Ramblas Off-Ramp	Basic							0.11	3.5	A									
14 Camino De Las Ramblas Off-Ramp	Diverge							0.12	7.3	A									
15 Camino De Las Ramblas On-Ramp	Merge							0.20	8.7	A									
16 Camino Las Ramblas Off-Ramp to Cow Camp Road Off-Ramp	Basic							0.19	6.2	A									
17 I Street Off-Ramp	Diverge							0.21	10.7	B	0.38	17.2	B	0.46	20.3	C			
18 I Street Loop On-Ramp	Merge							0.18	8.2	A	0.32	13.1	B	0.38	15.5	B			
19 I Street Slip On-Ramp	Merge							0.40	15.8	B	0.53	20.4	C	0.60	22.9	C			
20 I Street Slip On-Ramp to Chiquita Canyon Road On-Ramp	Basic	0.38	12.2	B	0.38	12.2	B	0.38	12.6	B	0.51	16.6	B	0.57	18.9	C	0.37	12.0	B
21 Chiquita Canyon Road On-Ramp	Merge	0.77	28.7	D	0.77	28.7	D	0.69	26.0	C	0.79	29.6	D	0.85	31.7	D	0.74	27.6	C
22 Chiquita Canyon Road On-Ramp to SR-73 Off-Ramp	Basic																		
23 SR-73 Off-Ramp	Diverge																		
24 SR-73 On-Ramp	Merge																		
25 SR-73 On-Ramp to Crown Valley Parkway Off-Ramp	Basic																		
26 Crown Valley Parkway Off-Ramp	Diverge																		
27 Crown Valley Parkway On-Ramp	Merge																		
28 Chiquita Canyon Road On-Ramp to Oso Parkway Off-Ramp	Basic	0.74	26.1	D	0.74	26.1	D	0.66	22.5	C	0.76	27.0	D	0.82	31.5	D	0.71	24.7	C
29 Oso Parkway Off-Ramp	Diverge	0.81	33.4	D	0.81	33.4	D	0.72	30.2	D	0.83	34.2	D	0.89	36.5	E	0.78	32.3	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 13A – Design Year 2050 Northbound SR 241/Los Patrones Parkway Operations – AM Peak Hour (Part 2/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 La Pata On-Ramp to I Street Off-Ramp	Basic																0.48	15.4	B
2 I-5 Mainline to Calle Del Cerro Off-Ramp	Basic																		
3 Calle Del Cerro Off Ramp	Diverge																		
4 Calle Del Cerro On-Ramp	Merge																		
5 Calle Del Cerro On-Ramp to Calle Saluda	Basic																		
6 Calle Saluda Off-Ramp	Diverge																		
7 Calle Saluda On-Ramp	Merge																		
8 Calle Saluda On-Ramp to I Street Off-Ramp	Basic																		
9 I-5 Mainline to Camino De Los Mares Off-Ramp	Basic																		
10 Camino De Los Mares Off-Ramp	Diverge																		
11 Camino De Los Mares On-Ramp	Merge																		
12 Camino De Los Mares On-Ramp to I Street Off-Ramp	Basic																		
13 I-5 Mainline to Camino Las Ramblas Off-Ramp	Basic																		
14 Camino De Las Ramblas Off-Ramp	Diverge																		
15 Camino De Las Ramblas On-Ramp	Merge																		
16 Camino Las Ramblas Off-Ramp to Cow Camp Road Off-Ramp	Basic																		
17 I Street Off-Ramp	Diverge																0.51	22.1	C
18 I Street Loop On-Ramp	Merge																0.41	16.2	B
19 I Street Slip On-Ramp	Merge																0.63	23.9	C
20 I Street Slip On-Ramp to Chiquita Canyon Road On-Ramp	Basic	0.38	12.2	B	0.38	12.2	B	0.37	12.0	B	0.33	10.6	A	0.35	11.2	B	0.60	20.1	C
21 Chiquita Canyon Road On-Ramp	Merge	0.77	28.7	D	0.77	28.7	D	0.75	28.0	C	0.66	24.8	C	0.74	27.4	C	0.92	34.3	D
22 Chiquita Canyon Road On-Ramp to SR-73 Off-Ramp	Basic													0.71	24.4	C			
23 SR-73 Off-Ramp	Diverge													0.77	32.0	D			
24 SR-73 On-Ramp	Merge													1.00	-	F			
25 SR-73 On-Ramp to Crown Valley Parkway Off-Ramp	Basic													0.96	41.0	E			
26 Crown Valley Parkway Off-Ramp	Diverge													1.05	-	F			
27 Crown Valley Parkway On-Ramp	Merge													0.79	30.1	D			
28 Chiquita Canyon Road On-Ramp to Oso Parkway Off-Ramp	Basic	0.74	26.1	D	0.74	26.1	D	0.72	25.2	C	0.63	21.3	C	0.76	27.1	D	0.82	31.5	D
29 Oso Parkway Off-Ramp	Diverge	0.81	33.4	D	0.81	33.4	D	0.79	32.7	D	0.69	29.1	D	0.83	34.2	D	0.89	36.5	E

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 13B – Design Year 2050 Southbound SR 241/Los Patrones Parkway Operations – AM Peak Hour (Part 1/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 Oso Parkway On-Ramp	Merge	0.43	16.9	B	0.43	16.9	B	0.32	13.0	B	0.36	14.4	B	0.38	15.1	B	0.43	16.9	B
2 Oso Parkway On-Ramp to Crown Valley/Chiquita Canyon Off-Ramp	Basic	0.42	13.6	B	0.42	13.6	B	0.31	10.0	A	0.35	11.3	B	0.37	11.9	B	0.42	13.5	B
3 Crown Valley Parkway Off-Ramp	Diverge																		
4 Crown Valley Parkway On-Ramp	Merge																		
5 Crown Valley Parkway On-Ramp to SR-73 Off-Ramp	Basic																		
6 SR-73 Off-Ramp	Diverge																		
7 SR-73 On-Ramp	Merge																		
8 SR-73 On-Ramp to Chiquita Canyon Road Off-Ramp	Basic																		
9 Chiquita Canyon Road Off-Ramp	Diverge	0.45	20.0	C	0.45	20.0	C	0.33	15.6	B	0.38	17.1	B	0.40	17.9	B	0.45	20.0	B
10 Chiquita Canyon Road Off-Ramp to I Street Off-Ramp	Basic	0.24	7.9	A	0.24	7.9	A	0.19	6.4	A	0.23	7.7	A	0.25	8.3	A	0.24	7.8	A
11 I Street Off-Ramp	Diverge							0.21	10.8	B	0.25	12.5	B	0.27	13.2	B			
12 I Street On-Ramp	Merge							0.17	7.6	A	0.21	9.3	A	0.22	9.6	A			
13 Cow Camp Road On-Ramp to Camino Las Ramblas Off-Ramp	Basic							0.16	5.2	A									
14 Camino Las Ramblas Off_Ramp	Diverge							0.17	9.4	A									
15 Camino Las Ramblas On-Ramp	Merge							0.09	4.9	A									
16 Camino Las Ramblas On-Ramp to I-5	Basic							0.08	2.7	A									
17 I Street On-Ramp to Camino Las Ramblas Off-Ramp	Basic										0.21	6.7	A						
18 Camino De Los Mares Off-Ramp	Diverge										0.23	11.4	B						
19 Camino De Los Mares On-Ramp	Merge										0.11	5.9	A						
20 Camino De Los Mares On-Ramp to I-5	Basic										0.11	3.6	A						
21 I Street On-Ramp to Calle Saluda Off-Ramp	Basic													0.22	7.0	A			
22 Calle Saluda Off-Ramp	Diverge													0.24	12.0	B			
23 Calle Saluda On-Ramp	Merge													0.17	7.9	A			
24 Calle Saluda On-Ramp to Calle Del Cerro Off-Ramp	Basic													0.16	5.2	A			
25 Calle Del Cerro Off-Ramp	Diverge													0.17	9.5	A			
26 Calle Del Cerro On-Ramp	Merge													0.10	5.4	A			
27 Calle Del Cerro On-Ramp to I-5 Mainline	Basic													0.10	3.2	A			
28 I Street On-Ramp to La Pata Off-Ramp	Basic																		

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 13B – Design Year 2050 Southbound SR 241/Los Patrones Parkway Operations – AM Peak Hour (Part 2/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 Oso Parkway On-Ramp	Merge	0.43	16.9	B	0.43	16.9	B	0.44	17.0	B	0.55	21.0	C	0.46	17.8	B	0.5	20.9	C
2 Oso Parkway On-Ramp to Crown Valley/Chiquita Canyon Off-Ramp	Basic	0.42	13.6	B	0.42	13.6	B	0.42	13.7	B	0.53	17.3	B	0.44	14.3	B	0.53	17.2	B
3 Crown Valley Parkway Off-Ramp	Diverge													0.48	20.9	C			
4 Crown Valley Parkway On-Ramp	Merge													0.50	19.5	B			
5 Crown Valley Parkway On-Ramp to SR-73 Off-Ramp	Basic													0.48	15.6	B			
6 SR-73 Off-Ramp	Diverge													0.52	22.7	C			
7 SR-73 On-Ramp	Merge													0.39	15.9	B			
8 SR-73 On-Ramp to Chiquita Canyon Road Off-Ramp	Basic													0.38	12.3	B			
9 Chiquita Canyon Road Off-Ramp	Diverge	0.45	20.0	C	0.45	20.0	C	0.46	20.2	C	0.57	24.5	C	0.42	18.7	B	0.6	24.5	C
10 Chiquita Canyon Road Off-Ramp to I Street Off-Ramp	Basic	0.24	7.9	A	0.24	7.9	A	0.25	8.0	A	0.31	9.9	A	0.20	6.5	A	0.36	11.7	B
11 I Street Off-Ramp	Diverge																0.4	17.5	B
12 I Street On-Ramp	Merge																0.32	13.0	B
13 Cow Camp Road On-Ramp to Camino Las Ramblas Off-Ramp	Basic																		
14 Camino Las Ramblas Off_Ramp	Diverge																		
15 Camino Las Ramblas On-Ramp	Merge																		
16 Camino Las Ramblas On-Ramp to I-5	Basic																		
17 I Street On-Ramp to Camino Las Ramblas Off-Ramp	Basic																		
18 Camino De Los Mares Off-Ramp	Diverge																		
19 Camino De Los Mares On-Ramp	Merge																		
20 Camino De Los Mares On-Ramp to I-5	Basic																		
21 I Street On-Ramp to Calle Saluda Off-Ramp	Basic																		
22 Calle Saluda Off-Ramp	Diverge																		
23 Calle Saluda On-Ramp	Merge																		
24 Calle Saluda On-Ramp to Calle Del Cerro Off-Ramp	Basic																		
25 Calle Del Cerro Off-Ramp	Diverge																		
26 Calle Del Cerro On-Ramp	Merge																		
27 Calle Del Cerro On-Ramp to I-5 Mainline	Basic																		
28 I Street On-Ramp to La Pata Off-Ramp	Basic																0.31	9.9	A

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 14A – Design Year 2050 Northbound SR 241/Los Patrones Parkway Operations – PM Peak Hour (Part 1/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 La Pata On-Ramp to I Street Off-Ramp	Basic																		
2 I-5 Mainline to Calle Del Cerro Off-Ramp	Basic													0.11	3.6	A			
3 Calle Del Cerro Off Ramp	Diverge													0.12	7.5	A			
4 Calle Del Cerro On-Ramp	Merge													0.16	7.4	A			
5 Calle Del Cerro On-Ramp to Calle Saluda	Basic													0.16	5.1	A			
6 Calle Saluda Off-Ramp	Diverge													0.17	9.3	A			
7 Calle Saluda On-Ramp	Merge													0.20	9.0	A			
8 Calle Saluda On-Ramp to I Street Off-Ramp	Basic													0.20	6.3	A			
9 I-5 Mainline to Camino De Los Mares Off-Ramp	Basic										0.11	3.6	A						
10 Camino De Los Mares Off-Ramp	Diverge										0.12	7.5	A						
11 Camino De Los Mares On-Ramp	Merge										0.20	8.7	A						
12 Camino De Los Mares On-Ramp to I Street Off-Ramp	Basic										0.19	6.0	A						
13 I-5 Mainline to Camino Las Ramblas Off-Ramp	Basic							0.09	2.8	A									
14 Camino De Las Ramblas Off-Ramp	Diverge							0.09	6.4	A									
15 Camino De Las Ramblas On-Ramp	Merge							0.14	6.8	A									
16 Camino Las Ramblas Off-Ramp to Cow Camp Road Off-Ramp	Basic							0.14	4.5	A									
17 I Street Off-Ramp	Diverge							0.15	8.6	A	0.21	10.8	B	0.21	10.8	B			
18 I Street Loop On-Ramp	Merge							0.10	5.5	A	0.13	6.5	A	0.15	7.2	A			
19 I Street Slip On-Ramp	Merge							0.18	7.9	A	0.20	8.9	A	0.22	9.5	A			
20 I Street Slip On-Ramp to Chiquita Canyon Road On-Ramp	Basic	0.23	7.6	A	0.23	7.6	A	0.17	5.5	A	0.19	6.3	A	0.21	6.7	A	0.23	7.5	A
21 Chiquita Canyon Road On-Ramp	Merge	0.40	15.8	B	0.40	15.8	B	0.27	11.4	B	0.30	12.4	B	0.31	12.9	B	0.40	15.7	B
22 Chiquita Canyon Road On-Ramp to SR-73 Off-Ramp	Basic																		
23 SR-73 Off-Ramp	Diverge																		
24 SR-73 On-Ramp	Merge																		
25 SR-73 On-Ramp to Crown Valley Parkway Off-Ramp	Basic																		
26 Crown Valley Parkway Off-Ramp	Diverge																		
27 Crown Valley Parkway On-Ramp	Merge																		
28 Chiquita Canyon Road On-Ramp to Oso Parkway Off-Ramp	Basic	0.38	12.4	B	0.38	12.4	B	0.26	8.5	A	0.29	9.3	A	0.30	10.7	A	0.38	12.3	B
29 Oso Parkway Off-Ramp	Diverge	0.42	18.8	B	0.42	18.8	B	0.29	13.7	B	0.31	14.8	B	0.33	15.3	B	0.42	18.6	B

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 14A – Design Year 2050 Northbound SR 241/Los Patrones Parkway Operations – PM Peak Hour (Part 2/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 La Pata On-Ramp to I Street Off-Ramp	Basic																0.30	9.7	A
2 I-5 Mainline to Calle Del Cerro Off-Ramp	Basic																		
3 Calle Del Cerro Off Ramp	Diverge																		
4 Calle Del Cerro On-Ramp	Merge																		
5 Calle Del Cerro On-Ramp to Calle Saluda	Basic																		
6 Calle Saluda Off-Ramp	Diverge																		
7 Calle Saluda On-Ramp	Merge																		
8 Calle Saluda On-Ramp to I Street Off-Ramp	Basic																		
9 I-5 Mainline to Camino De Los Mares Off-Ramp	Basic																		
10 Camino De Los Mares Off-Ramp	Diverge																		
11 Camino De Los Mares On-Ramp	Merge																		
12 Camino De Los Mares On-Ramp to I Street Off-Ramp	Basic																		
13 I-5 Mainline to Camino Las Ramblas Off-Ramp	Basic																		
14 Camino De Las Ramblas Off-Ramp	Diverge																		
15 Camino De Las Ramblas On-Ramp	Merge																		
16 Camino Las Ramblas Off-Ramp to Cow Camp Road Off-Ramp	Basic																		
17 I Street Off-Ramp	Diverge																0.32	14.9	B
18 I Street Loop On-Ramp	Merge																0.18	8.2	A
19 I Street Slip On-Ramp	Merge																0.32	12.9	B
20 I Street Slip On-Ramp to Chiquita Canyon Road On-Ramp	Basic	0.23	7.6	A	0.23	7.6	A	0.24	7.6	A	0.20	6.4	A	0.16	5.2	A	0.30	10.0	A
21 Chiquita Canyon Road On-Ramp	Merge	0.40	15.8	B	0.40	15.8	B	0.40	15.9	B	0.36	14.2	B	0.36	14.2	B	0.47	18.2	B
22 Chiquita Canyon Road On-Ramp to SR-73 Off-Ramp	Basic													0.34	11.0	B			
23 SR-73 Off-Ramp	Diverge													0.37	17.0	B			
24 SR-73 On-Ramp	Merge													0.43	17.1	B			
25 SR-73 On-Ramp to Crown Valley Parkway Off-Ramp	Basic													0.41	13.4	B			
26 Crown Valley Parkway Off-Ramp	Diverge													0.45	20.0	B			
27 Crown Valley Parkway On-Ramp	Merge													0.36	14.6	B			
28 Chiquita Canyon Road On-Ramp to Oso Parkway Off-Ramp	Basic	0.38	12.4	B	0.38	12.4	B	0.39	12.5	B	0.34	11.0	B	0.34	11.2	B	0.45	14.5	B
29 Oso Parkway Off-Ramp	Diverge	0.42	18.8	B	0.42	18.8	B	0.42	18.9	B	0.37	17.0	B	0.38	17.1	B	0.49	21.3	C

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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Table 14B – Design Year 2050 Southbound SR 241/Los Patrones Parkway Operations – PM Peak Hour (Part 1/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 13			Alt 17			Alt 14			Alt 11		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 Oso Parkway On-Ramp	Merge	0.60	23.0	C	0.60	23.0	C	0.52	20.1	C	0.61	23.3	C	0.67	25.4	C	0.58	22.1	C
2 Oso Parkway On-Ramp to Crown Valley/Chiquita Canyon Off-Ramp	Basic	0.58	19.2	C	0.58	19.2	C	0.50	16.3	B	0.59	19.4	C	0.64	21.7	C	0.56	18.4	C
3 Crown Valley Parkway Off-Ramp	Diverge																		
4 Crown Valley Parkway On-Ramp	Merge																		
5 Crown Valley Parkway On-Ramp to SR-73 Off-Ramp	Basic																		
6 SR-73 Off-Ramp	Diverge																		
7 SR-73 On-Ramp	Merge																		
8 SR-73 On-Ramp to Chiquita Canyon Road Off-Ramp	Basic																		
9 Chiquita Canyon Road Off-Ramp	Diverge	0.63	26.7	C	0.63	26.7	C	0.54	23.4	C	0.63	26.9	C	0.70	29.3	D	0.61	25.8	C
10 Chiquita Canyon Road Off-Ramp to I Street Off-Ramp	Basic	0.34	11.0	B	0.34	11.0	B	0.33	10.7	A	0.41	13.5	B	0.47	15.4	B	0.33	10.6	A
11 I Street Off-Ramp	Diverge							0.35	16.2	B	0.44	19.7	B	0.51	22.1	C			
12 I Street On-Ramp	Merge							0.15	7.0	A	0.29	12.1	B	0.35	14.4	B			
13 Cow Camp Road On-Ramp to Camino Las Ramblas Off-Ramp	Basic							0.14	4.6	A									
14 Camino Las Ramblas Off_Ramp	Diverge							0.15	8.7	A									
15 Camino Las Ramblas On-Ramp	Merge							0.09	5.1	A									
16 Camino Las Ramblas On-Ramp to I-5	Basic							0.09	2.9	A									
17 I Street On-Ramp to Camino Las Ramblas Off-Ramp	Basic										0.28	9.1	A						
18 Camino De Los Mares Off-Ramp	Diverge										0.31	14.5	B						
19 Camino De Los Mares On-Ramp	Merge										0.13	6.3	A						
20 Camino De Los Mares On-Ramp to I-5	Basic										0.12	4.0	A						
21 I Street On-Ramp to Calle Saluda Off-Ramp	Basic													0.35	11.1	B			
22 Calle Saluda Off-Ramp	Diverge													0.38	17.3	B			
23 Calle Saluda On-Ramp	Merge													0.19	8.6	A			
24 Calle Saluda On-Ramp to Calle Del Cerro Off-Ramp	Basic													0.18	5.8	A			
25 Calle Del Cerro Off-Ramp	Diverge													0.20	10.3	B			
26 Calle Del Cerro On-Ramp	Merge													0.11	5.9	A			
27 Calle Del Cerro On-Ramp to I-5 Mainline	Basic													0.11	3.6	A			
28 I Street On-Ramp to La Pata Off-Ramp	Basic																		
Notes: Bold font indicates unacceptable LOS E or F conditions. Source: Fehr & Peers, 2017																			

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Table 14B – Design Year 2050 Southbound SR 241/Los Patrones Parkway Operations – PM Peak Hour (Part 2/2)

Location	Type	Alt 1 No Build (No HOV)			Alt 1 No Build (With HOV)			Alt 12			Alt 9			Alt 18			Alt 21		
		V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
1 Oso Parkway On-Ramp	Merge	0.60	23.0	C	0.60	23.0	C	0.59	22.5	C	0.39	15.5	B	0.65	24.6	C	0.8	29.4	D
2 Oso Parkway On-Ramp to Crown Valley/Chiquita Canyon Off-Ramp	Basic	0.58	19.2	C	0.58	19.2	C	0.57	18.8	C	0.38	12.3	B	0.62	20.8	C	0.76	27.0	D
3 Crown Valley Parkway Off-Ramp	Diverge													0.67	28.4	D			
4 Crown Valley Parkway On-Ramp	Merge													0.79	29.6	D			
5 Crown Valley Parkway On-Ramp to SR-73 Off-Ramp	Basic													0.76	27.1	D			
6 SR-73 Off-Ramp	Diverge													0.82	34.0	D			
7 SR-73 On-Ramp	Merge													0.58	22.5	C			
8 SR-73 On-Ramp to Chiquita Canyon Road Off-Ramp	Basic													0.56	18.3	C			
9 Chiquita Canyon Road Off-Ramp	Diverge	0.63	26.7	C	0.63	26.7	C	0.62	26.2	C	0.41	18.4	B	0.61	26.0	C	0.8	33.8	D
10 Chiquita Canyon Road Off-Ramp to I Street Off-Ramp	Basic	0.34	11.0	B	0.34	11.0	B	0.33	10.7	A	0.23	7.4	A	0.27	8.7	A	0.52	17.3	B
11 I Street Off-Ramp	Diverge																0.6	24.3	C
12 I Street On-Ramp	Merge																0.42	16.8	B
13 Cow Camp Road On-Ramp to Camino Las Ramblas Off-Ramp	Basic																		
14 Camino Las Ramblas Off_Ramp	Diverge																		
15 Camino Las Ramblas On-Ramp	Merge																		
16 Camino Las Ramblas On-Ramp to I-5	Basic																		
17 I Street On-Ramp to Camino Las Ramblas Off-Ramp	Basic																		
18 Camino De Los Mares Off-Ramp	Diverge																		
19 Camino De Los Mares On-Ramp	Merge																		
20 Camino De Los Mares On-Ramp to I-5	Basic																		
21 I Street On-Ramp to Calle Saluda Off-Ramp	Basic																		
22 Calle Saluda Off-Ramp	Diverge																		
23 Calle Saluda On-Ramp	Merge																		
24 Calle Saluda On-Ramp to Calle Del Cerro Off-Ramp	Basic																		
25 Calle Del Cerro Off-Ramp	Diverge																		
26 Calle Del Cerro On-Ramp	Merge																		
27 Calle Del Cerro On-Ramp to I-5 Mainline	Basic																		
28 I Street On-Ramp to La Pata Off-Ramp	Basic																0.41	13.2	B

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2017

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SR 241/Los Patrones Parkway Ramp Intersection Analysis

Table 15 shows the AM peak hour delay and LOS at the SR 241 ramp terminal intersections under 2050 conditions. The PM peak hour results are shown in **Table 16**.

Under the two No Build Alternatives and all the build alternatives, all the ramp terminal intersections along SR 241/Los Patrones Parkway would operate acceptably at LOS D or better conditions under both AM and PM peak hours.

Traffic control strategy at each ramp intersection is presented in the Intersection Control Evaluation (ICE) Stage I Memorandum (stand-alone document), in which different traffic control options were evaluated for each ramp intersection under the build alternatives. Recommended traffic control strategies as a result of the Stage I evaluation will be further studied during the Stage II analysis as part of the PA&ED phase.

For the purpose of the ramp intersection analysis for TEPA, one of the recommended traffic control options was used to conduct the operational analysis. However, the final traffic control strategy will be determined as a result of the Stage II analysis when information of other factors (such as right of way, cost estimates, etc.) become available.

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Table 15 – Design Year 2050 SR 241/Los Patrones Parkway Ramp Intersection Operations – AM Peak Hour																						
Intersection		Traffic Control	Alt 1 No Build (No HOV)		Alt 1 No Build (With HOV)		Alt 13		Alt 17		Alt 14		Alt 11		Alt 12		Alt 9		Alt 18		Alt 21	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	SR 241 SB Ramps & Oso Pkwy	Signal	4.1	A	4.0	A	4.1	A	4.2	A	4.3	A	4.1	A	4.1	A	4.4	A	9.3	A	5.1	A
2	SR 241 NB Ramps & Oso Pkwy	Signal	41.5	D	40.9	D	32.2	C	30.7	C	30.7	C	34.9	D	36.3	D	38.2	D	26.6	C	34.6	C
3	SR 241 SB Off-Ramp & Chiquita Canyon Road	Signal	26.8	C	27.0	C	14.9	B	15.4	B	15.6	B	23.0	C	24.9	C	19.4	B	20.9	C	19.4	B
4	SR 241 NB On-Ramp & Chiquita Canyon Road	Signal	38.2	D	38.8	D	14.0	B	10.7	B	9.8	A	29.6	C	31.3	C	19.3	B	34.7	C	14.7	B
5	SR 241 SB Ramps & I Street	Signal					11.6	B	9.4	A	9.4	A									24.2	C
6	SR 241 NB Ramps & I Street	Signal					6.0	A	10.9	B	11.5	B									13.4	B
7	SR 241 SB Ramps & Camino Las Ramblas	AWSC					10.6	B														
8	SR 241 NB Ramps & Camino Las Ramblas	AWSC					10.7	B														
9	SR 241 SB Ramps & Camino De Los Mares	AWSC							16.1	C												
10	SR 241 NB Ramps & Camino De Los Mares	SSSC							12.3	B												
11	SR 241 SB Ramps & Calle Saluda	AWSC									8.8	A										
12	SR 241 NB Ramps & Calle Saluda	SSSC									9.7	A										
13	SR 241 SB Ramps & Calle Calle Del Cerro	AWSC									9.3	A										
14	SR 241 NB Ramps & Calle Calle Del Cerro	SSSC									10.0	B										
15	SR 241 SB Ramps & Crown Valley Parkway	Signal																	21.1	C		
16	SR 241 NB Ramps & Crown Valley Parkway	Signal																	40.1	D		
17	SR 241 SB Ramps & SR 73	Signal																	20.1	C		
18	SR 241 NB Ramps & SR 73	Signal																	0.2	A		
Notes:	Bold font indicates unacceptable LOS E or F conditions.																					
Source:	Fehr & Peers, 2017																					

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Table 16 – Design Year 2050 SR 241/Los Patrones Parkway Ramp Intersection Operations – PM Peak Hour																						
Intersection		Traffic Control	Alt 1 No Build (No HOV)		Alt 1 No Build (With HOV)		Alt 13		Alt 17		Alt 14		Alt 11		Alt 12		Alt 9		Alt 18		Alt 21	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	SR 241 SB Ramps & Oso Pkwy	Signal	18.4	B	18.5	B	12.5	B	12.5	B	14.0	B	17.5	B	18.0	B	15.7	B	10.2	B	48.0	D
2	SR 241 NB Ramps & Oso Pkwy	Signal	15.7	B	15.7	B	17.5	B	17.6	B	23.5	C	15.6	B	15.7	B	14.2	B	17.9	B	18.9	B
3	SR 241 SB Off-Ramp & Chiquita Canyon Road	Signal	33.1	C	18.1	B	11.7	B	11.7	B	25.0	C	17.3	B	17.8	B	16.1	B	21.9	C	15.5	B
4	SR 241 NB On-Ramp & Chiquita Canyon Road	Signal	5.7	A	6.4	A	4.3	A	4.2	A	5.7	A	6.1	A	6.3	A	6.0	A	6.3	A	5.3	A
5	SR 241 SB Ramps & I Street	Signal					12.5	B	11.6	B	15.9	B									17.1	B
6	SR 241 NB Ramps & I Street	Signal					3.3	A	4.3	A	5.1	A									8.8	A
7	SR 241 SB Ramps & Camino Las Ramblas	AWSC					9.4	A														
8	SR 241 NB Ramps & Camino Las Ramblas	AWSC					9.3	A														
9	SR 241 SB Ramps & Camino De Los Mares	AWSC							13.2	B												
10	SR 241 NB Ramps & Camino De Los Mares	SSSC							15.8	C												
11	SR 241 SB Ramps & Calle Saluda	AWSC									27.7	D										
12	SR 241 NB Ramps & Calle Saluda	SSSC									14.3	B										
13	SR 241 SB Ramps & Calle Calle Del Cerro	AWSC									9.8	A										
14	SR 241 NB Ramps & Calle Calle Del Cerro	SSSC									10.2	B										
15	SR 241 SB Ramps & Crown Valley Parkway	Signal																17.0	B			
16	SR 241 NB Ramps & Crown Valley Parkway	Signal																22.9	C			
17	SR 241 SB Ramps & SR 73	Signal																12.7	B			
18	SR 241 NB Ramps & SR 73	Signal																0.3	A			
Notes:	Bold font indicates unacceptable LOS E or F conditions.																					
Source:	Fehr & Peers, 2017																					

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I-5 Weekend Analysis

The I-5 weekend peak hour traffic forecasts for the No Build Alternative were developed at the five mainline segments using the approach presented in Chapter 2. For Build Alternatives, the weekend peak hour volumes were developed based on the traffic demand changes between the build alternative and No Build Alternative during the weekday peak hours and applying the same traffic pattern changes to the No Build weekend peak hour volumes. The forecasted Design Year (2050) peak hour volumes are shown in **Table 17** for northbound I-5 during the Sunday peak hour and **Table 18** for southbound I-5 during the Saturday peak hour.

Traffic operations analysis was also conducted for the five I-5 mainline segments under all the project alternatives. **Table 19** show the Sunday peak hour density and LOS for northbound I-5 at the five mainline segments. The Saturday peak hour results for southbound I-5 are shown in **Table 20**.

Under the No Build Alternative, future growth in weekend traffic would exacerbate traffic operations and result in LOS E or F conditions at all the five segments on northbound I-5. Build Alternatives 14 and 21 would substantially improve weekend operations and result in acceptable LOS D conditions at 4 out of 5 locations on northbound I-5 during the Sunday peak hour. Build Alternatives 13, 17, 11, and 12 would also provide noticeable improvements to the weekend operations and improve 3 out of 5 deficient locations to LOS D during the Sunday peak hour. Build Alternatives 9 and 18 would provide the minimal benefits to northbound I-5 during the Sunday peak hour.

For southbound I-5 during the Saturday peak hour, future growth in weekend traffic would exacerbate traffic operations and result in LOS E or F conditions at the three segments south of Camino Capistrano. Build Alternatives 13, 14, 11, 12, and 21 would substantially improve weekend operations and result in acceptable LOS D conditions at all five locations on southbound I-5 during the Saturday peak hour. Build Alternative 17 would also provide noticeable improvements and improve 2 out of 3 deficient locations to LOS D during the Saturday peak hour. Build Alternatives 9 and 18 would provide the minimal benefits to southbound I-5 during the Saturday peak hour.



Table 17 – Design Year 2050 Weekend Peak Hour Forecasts (Northbound I-5 on Sunday)

Scenario/Alternative	Northbound I-5 (Sunday Peak Hour)				
	1. Cristinitos - Califia	2. Pico - Hermosa	3. Stonehill - Capistrano	4. Crown Valley - Oso	5. El Toro - Lake Forest
Design Year (2050) Alt 1 No Build (No HOV)	9,030	8,810	10,670	12,910	14,360
Design Year (2050) Alt 1 No Build (With HOV)	9,030	8,840	10,690	12,940	14,380
Design Year (2050) Alt 13	9,030	9,190	10,880	12,620	14,040
Design Year (2050) Alt 17	9,030	8,950	9,930	12,340	13,910
Design Year (2050) Alt 14	9,030	7,830	9,720	12,150	13,790
Design Year (2050) Alt 11	9,030	9,300	11,810	14,990	16,240
Design Year (2050) Alt 12	9,030	9,320	11,760	14,830	15,260
Design Year (2050) Alt 9	9,030	8,750	10,580	13,440	14,510
Design Year (2050) Alt 18	9,030	8,810	10,640	13,300	14,440
Design Year (2050) Alt 21	9,030	9,170	11,230	13,040	14,150

Source: Fehr & Peers, 2018.



Table 18 – Design Year 2050 Weekend Peak Hour Forecasts (Southbound I-5 on Saturday)

Scenario/Alternative	Southbound I-5 (Saturday Peak Hour)				
	1. Cristinitos - Califia	2. Pico - Hermosa	3. Stonehill - Capistrano	4. Crown Valley - Oso	5. El Toro - Lake Forest
Design Year (2050) Alt 1 No Build (No HOV)	8,330	8,450	9,330	10,010	12,050
Design Year (2050) Alt 1 No Build (With HOV)	8,330	8,500	9,370	10,040	12,070
Design Year (2050) Alt 13	8,330	8,670	9,220	9,830	11,810
Design Year (2050) Alt 17	8,330	8,570	8,920	9,730	11,710
Design Year (2050) Alt 14	8,330	7,870	8,780	9,630	11,670
Design Year (2050) Alt 11	8,320	8,540	10,090	11,270	13,390
Design Year (2050) Alt 12	8,330	8,730	10,140	11,160	12,860
Design Year (2050) Alt 9	8,330	8,350	9,170	10,130	12,050
Design Year (2050) Alt 18	8,330	8,360	9,230	10,060	12,060
Design Year (2050) Alt 21	8,330	8,610	9,830	10,210	12,130

Source: Fehr & Peers, 2018.



Table 19 – Design Year 2050 Weekend Peak Hour LOS (Northbound I-5 on Sunday)

Scenario/Alternative	Northbound I-5 (Sunday Peak Hour)														
	1. Cristianitos - Califa			2. Pico - Hermosa			3. Stonehill - Capistrano			4. Crown Valley - Oso			5. El Toro - Lake Forest		
	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS
Design Year (2050) Alt 1 No Build (No HOV)	1.13	-	F	0.89	35.5	E	0.99	44.1	E	0.93	39.1	E	0.89	35.8	E
Design Year (2050) Alt 1 No Build (With HOV)	0.93	38.7	E	0.89	35.6	E	0.99	44.2	E	0.94	39.4	E	0.89	35.8	E
Design Year (2050) Alt 13	0.82	31.1	D	0.81	30.6	D	0.89	36.0	E	0.91	37.1	E	0.87	34.2	D
Design Year (2050) Alt 17	0.82	31.1	D	0.84	32.7	D	0.93	38.4	E	0.89	35.5	E	0.86	33.6	D
Design Year (2050) Alt 14	0.82	31.1	D	0.79	29.5	D	0.90	36.8	E	0.87	34.4	D	0.85	33.1	D
Design Year (2050) Alt 11	0.91	37.0	E	0.75	27.5	D	0.88	34.9	D	0.94	39.3	E	0.87	34.7	D
Design Year (2050) Alt 12	0.82	31.1	D	0.82	31.3	D	0.90	36.3	E	0.91	37.5	E	0.84	32.8	D
Design Year (2050) Alt 9	1.13	-	F	0.88	35.0	E	0.98	43.1	E	0.97	42.4	E	0.90	36.6	E
Design Year (2050) Alt 18	1.13	-	F	0.89	35.5	E	0.99	43.7	E	0.96	41.4	E	0.89	35.8	E
Design Year (2050) Alt 21	0.82	31.1	D	0.81	30.6	D	0.87	34.4	D	0.95	40.6	E	0.88	34.9	D

Source: Fehr & Peers, 2017.



Table 20 – Design Year 2050 Weekend Peak Hour LOS (Southbound I-5 on Saturday)

Scenario/Alternative	Southbound I-5 (Saturday Peak Hour)														
	1. Cristianitos - Calafia			2. Pico - Hermosa			3. Stonehill - Capistrano			4. Crown Valley - Oso			5. El Toro - Lake Forest		
	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS	v/c	Density	LOS
Design Year (2050) Alt 1 No Build (No HOV)	1.06	-	F	0.89	35.8	E	0.88	35.4	E	0.77	28.6	D	0.76	27.9	D
Design Year (2050) Alt 1 No Build (With HOV)	0.90	36.4	E	0.90	36.2	E	0.89	35.6	E	0.77	28.8	D	0.76	28.0	D
Design Year (2050) Alt 13	0.79	29.8	D	0.80	30.4	D	0.75	27.8	D	0.75	27.8	D	0.74	27.1	D
Design Year (2050) Alt 17	0.79	29.8	D	0.88	35.1	E	0.85	32.9	D	0.75	27.5	D	0.73	26.8	D
Design Year (2050) Alt 14	0.79	29.8	D	0.83	31.8	D	0.83	32.1	D	0.74	27.1	D	0.73	26.6	D
Design Year (2050) Alt 11	0.84	32.8	D	0.72	26.2	D	0.64	22.8	C	0.74	27.1	D	0.74	27.0	D
Design Year (2050) Alt 12	0.79	29.8	D	0.81	30.7	D	0.82	31.2	D	0.79	29.5	D	0.73	26.5	D
Design Year (2050) Alt 9	1.06	-	F	0.88	35.1	E	0.87	34.2	D	0.78	29.1	D	0.76	28.0	D
Design Year (2050) Alt 18	1.06	-	F	0.88	35.1	E	0.87	34.6	D	0.77	28.7	D	0.76	28.0	D
Design Year (2050) Alt 21	0.79	29.8	D	0.80	30.1	D	0.83	31.7	D	0.80	30.1	D	0.76	28.3	D

Source: Fehr & Peers, 2017.

Arterial ADT

The Design Year (2050) daily traffic volumes for the key arterial segments are shown in **Table 21**. The ADT for each of the build alternatives was then compared to the No Build Alternative to understand the traffic patterns changes on the key arterials with the project in place.

Under Alternatives 13, 17, and 14, traffic patterns changes due to the SR 241 extension would result in noticeable reduction in traffic demand and consequently improve operations along Oso Parkway. Moderate reduction would also expect on Antonio Parkway north of Ortega Highway, Ortega Highway east of Antonio Parkway, and Avenida Vista Hermosa under Alternatives 17 and 14. Compared to the No Build Alternative, Alternatives 13, 17, and 14 would reduce the arterial ADT by 0.2-3.7% on an average.

Alternatives 11 and 12 would provide marginal benefits to the key arterial segments. The east-west arterials such as Oso Parkway, Crown Valley Parkway, Ortega Highway, Avenida Vista Hermosa, and Avenida Pico would expect increase in traffic demand due to more traffic would use those east-west corridor to access I-5 corridor when additional capacity becomes available. Compared to the No Build Alternative, Alternatives 11 and 12 would increase the arterial ADT by 0.8-1.3% on an average.

Under Alternatives 9 and 18, addition of east-west arterial capacity would reduce traffic demand on other east-west arterials such as Oso Parkway, Crown Valley Parkway, Avenida Vista Hermosa, and Avenida Pico. The roadway extension to Ortega Highway under Alternative 9 would result in an increase in volumes and exacerbate traffic congestion on Ortega Highway and Antonio Parkway. Overall, Alternative 18 shows greater benefits to the key arterial segments than Alternative 9.

Alternative 21 would reduce traffic demand at majority of the key arterial segments and improve operations at already congested segments along Ortega Highway and Antonio Parkway. Compared to the No Build Alternative, Alternative 21 would reduce the arterial ADT by 1.3% on an average.

Table 21 – Design Year 2050 Arterial ADT

Arterial Segments	Project Alternatives									
	Alt 1 No Build (No HOV)	Alt 1 No Build (With HOV)	Alt 13	Alt 17	Alt 14	Alt 11	Alt 12	Alt 9	Alt 18	Alt 21
1. Avenida Pico east of I-5	43,900	43,800	44,100	42,300	44,000	43,800	45,400	41,500	43,200	44,300
2. Avenida Pico west of Avenida La Pata	24,300	24,300	24,600	23,100	22,800	24,300	25,000	22,400	23,600	24,400
3. Avenida Vista Hermosa east of I-5	37,700	37,800	38,400	34,700	34,400	39,900	38,600	33,600	37,000	42,400
4. Avenida Vista Hermosa west of Avenida La Pata	31,700	31,700	32,100	27,800	28,300	31,500	31,900	26,500	30,700	37,400
5. Camino De Los Mares east of I-5	26,000	26,000	26,200	25,400	25,400	26,300	26,600	24,300	25,700	25,800
6. Camino Las Ramblas east of I-5	11,900	11,900	14,500	12,000	12,100	12,700	12,700	11,900	11,900	12,400
7. Ortega Highway east of I-5	72,600	72,800	74,600	73,700	73,900	74,900	73,700	60,800	63,800	71,100
8. Ortega Highway west of Antonio Parkway	54,100	54,300	56,500	55,400	55,700	55,300	54,100	78,300	43,500	51,600
9. Ortega Highway east of Antonio Parkway	47,700	47,700	47,800	44,900	44,800	47,800	47,700	50,500	45,200	42,300
10. SR 73 east of I-5	-	-	-	-	-	-	-	40,600	34,800	-
11. SR 73 west of SR 241	-	-	-	-	-	-	-	-	21,400	-
12. Avery Parkway east of I-5	30,500	30,500	30,400	30,500	30,500	30,800	31,100	50,700	45,000	30,900
13. Crown Valley Parkway east of I-5	69,100	69,500	68,800	69,000	68,800	70,600	71,700	61,200	62,300	69,600
14. Crown Valley Parkway west of Antonio Parkway	34,900	35,100	34,800	35,000	35,000	35,300	35,800	22,400	27,700	34,800
15. Crown Valley Parkway west of SR 241	-	-	-	-	-	-	-	-	16,300	-
16. Oso Parkway east of I-5	72,900	72,400	69,700	68,800	68,100	73,500	74,300	65,200	62,800	71,100
17. Oso Parkway west of Antonio Parkway	62,300	61,800	58,100	57,700	57,200	62,400	62,400	52,500	49,800	60,100
18. Oso Parkway west of SR 241	50,000	49,700	39,200	39,100	39,300	50,000	49,800	43,000	32,600	49,300
19. Avenida La Pata north of Avenida Vista Hermosa	29,900	29,900	30,400	26,700	29,100	28,500	30,100	26,200	28,600	39,100
20. Antonio Parkway north of Ortega Highway	60,500	60,700	62,500	58,600	58,800	59,500	60,400	66,900	63,600	47,700
21. Antonio Parkway north of Crown Valley Parkway	39,600	39,300	45,100	44,200	44,000	38,400	39,100	37,000	33,000	36,700
22. Antonio Parkway north of Oso Parkway	38,500	38,400	38,100	37,400	36,600	38,800	38,300	39,500	37,100	35,500

Note: Green font indicates ADT lower than No Build Alternative.

Source: Fehr & Peers, 2017.

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6. Conclusions

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The traffic operations analysis was prepared in accordance with Article 5 in Chapter 5 of Appendix S: Preparation Guidelines for Project Study Report/Project Development Support Project Initiation Documents of the Project Development Procedures Manual prepared by Caltrans. As specified in the guidelines, the intent of this TEPA report is to use readily-available information and apply macro-level analysis and evaluation techniques to provide a technical foundation for developing a preliminary purpose and need statement for the proposed project, and to outline the scope and magnitude of more detailed analyses to be conducted as part of subsequent project development efforts.

The traffic operations analysis was conducted for each of the project alternatives including the No Build Alternative under Design Year 2050 conditions. For the purpose of this TEPA, the traffic operations analysis was conducted for I-5 between I-405 and Countyline and SR 241 between Oso Parkway and I-5. The traffic metrics for all the alternatives are presented in **Table 22** with findings summarized below.

- ❖ For all roadways in the South Orange County study area (including I-5), Alternative 11 would result in the greatest daily delay savings (14,360 vehicle hours), followed by substantial delay savings for Alternative 21 (5,470 vehicle hours), Alternative 12 (4,970 vehicle hours), and Alternative 14 (2,350 vehicle hours). Alternatives 17, 9, and 18 would also result in moderate delay savings. Alternative 13 shows the lowest delay savings among all the alternatives. A similar trend is shown for the VHD savings along the I-5 corridor, except that Alternative 18 anticipates substantial delay savings to arterial/local roadways due to additional east-west capacity from SR-73 to Los Patrones Parkway.
- ❖ For the peak hour operations, Alternative 11 shows the most operational benefits to the peak directions of the I-5 corridor (northbound I-5 during the AM peak hour and southbound I-5 during the PM peak hour), with the most locations (77) operating at LOS D or better conditions and improving 56 percent of the deficient locations (LOS E or F) by at least one LOS grade. Alternatives 17, 14, 12, and 21 would also result in substantial benefits to the I-5 corridor, with improved conditions (either improved LOS, reduced vehicle density, or reduced volume/capacity) at 56-93% of study locations and improving more than 20% of the deficient locations by at least one LOS grade. Alternatives 9 and 18 show the least benefits to I-5 during the peak hour.
- ❖ A majority of the build alternatives would provide adequate capacity along SR 241/Los Patrones Parkway with acceptable LOS D or better at all segments between Oso Parkway and I-5, except for Alternatives 14 (at Oso Parkway off-ramp on northbound), 18 (between SR 73 on-ramp and Crown Valley off-ramp on northbound), and 21 (at Oso Parkway off-ramp on northbound), for which the higher demand along SR 241/Los Patrones Parkway would result in LOS E or F conditions during the AM peak hour.

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Table 22 – Traffic Metrics

Performance Measure	Project Alternatives									
	Alt 1 No Build (No HOV)	Alt 1 No Build (With HOV)	Alt 13	Alt 17	Alt 14	Alt 11	Alt 12	Alt 9	Alt 18	Alt 21
Daily VHD Change for All Arterials/Local Roadways in Study Area (compared to No Build)	-	-	200	-580	-730	-2760	-1250	-460	-1640	-1400
Daily VHD Change for I-5 (405 to County line) (compared to No Build)	-	-	-340	-1370	-1740	-11480	-3670	-1070	-610	-4330
Daily VHD Change for All Roadways ¹ in Study Area (compared to No Build)	-	-	-200	-1920	-2350	-14360	-4970	-1670	-2290	-5470
I-5 GP Peak Hour: Number of Locations with LOS D or better (NB AM & SB PM Combined)	34	41	47	45	54	77	59	36	33	42
I-5 GP Peak Hour: Number of Locations with LOS F (NB AM & SB PM Combined)	44	45	36	32	30	10	22	45	45	28
I-5 GP Peak Hour: % of Locations with Improved Operations (compared to No Build, NB AM & SB PM Combined)	-	-	86%	87%	93%	87%	85%	44%	47%	56%
I-5 GP Peak Hour: % of Locations Improved from E to D/better or from F to E/better (compared to No Build, NB AM & SB PM Combined)	-	-	18%	23%	30%	56%	42%	7%	2%	25%
Key Arterials: ADT Change % (compared to No Build)	-	-	-0.2%	-3.7%	-3.4%	0.8%	1.3%	2.1%	0.2%	-1.3%
SR-241/LPP Peak Hour: Mainline Locations with LOS D or better (%)	100%	100%	100%	100%	98%	100%	100%	100%	93%	97%
SR-241/LPP Peak Hour: Ramp Intersections with LOS D or better (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Additional Capacity for Emergency Evacuation (compared to No Build)	-	-	✓	✓	✓	✓	✓	✗	✗	✓
Alternate Capacity during Incidents on I-5 ² (compared to No Build)	-	-	✓	✓	✓	Partial	Partial	✗	✗	Partial
Weekend Peak Hour Operations (Two I-5 locations: Califia to Cristianitos; Hermosa to Pico)										
I-5 GP: Peak Hour Volumes Changes % (NB Sunday & SB Saturday Combined) (compared to No Build)	-	-	-19%	-17%	-19%	2%	-18%	-1%	0%	-19%
Weekend Peak Hour Operations (Two I-5 locations: Califia to Cristianitos; Hermosa to Pico)										
I-5 GP: Improve Peak Hour LOS from Deficient E/F to Acceptable D/better ³ (NB Sunday & SB Saturday Combined) (compared to No Build)	-	-	✓	Partial	✓	Partial	✓	✗	✗	✓

1. “All Roadways” includes all roadways south of the I-405/I-5 junction within Orange County, including freeways, toll roads, arterials, and local roadways.
2. “Partial” indicates that added lanes on I-5 may help if the incident is only blocking a portion of I-5, but not if the incident blocks all of I-5.
3. “Partial” indicates that only one of the two study segments would improve to acceptable LOS D or better conditions during the weekend peak hour.
Source: Fehr & Peers, 2018.

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- ❖ All the build alternatives would provide adequate capacity and result in LOS D or better conditions at the ramp terminal intersections along SR 241/Los Patrones Parkway between Oso Parkway and I-5.
- ❖ During emergency evacuations (such as fire, flood, other evacuations), Alternatives 13, 17, 14, 11, 12, and 21 would provide additional north-south capacity (e.g., additional capacity along I-5 and/or via access to SR-241) to I-5. Alternatives 9 and 18 would not provide any additional capacity to I-5 in case of emergency evacuations.
- ❖ During incidents on I-5 that block some of all lanes, Alternatives 13, 17, and 14 would provide alternate north-south capacity (e.g., additional capacity via access to SR-241) to I-5; Alternatives 11, 12, and 21 would provide partial alternate capacity (e.g., additional capacity on I-5); and Alternatives 9 and 18 would not provide any additional capacity to I-5.
- ❖ Under weekend conditions, Alternatives 13, 14, 12, and 21 would substantially improve weekend operations and result in acceptable conditions at the two I-5 segments south of Avenida Vista Hermosa. Alternatives 17 and 11 would also provide noticeable improvements to the weekend operations. Alternatives 9 and 18 would provide negligible benefits to I-5 during the weekend.
- ❖ Overview of all the performance measures indicates that substantial traffic benefits would result from Alternatives 11, 21, 12, and 14. Alternatives 9 and 18 would show the least traffic benefits. Other factors such as funding feasibility, environmental impacts, constructability, and etc. were also considered in alternative comparison analysis and contained in the PSR-PDS document.
- ❖ Since the intent of the TEPA is to use readily-available information and planning-level analysis, both existing traffic counts and design year 2050 traffic forecasts will be refined during the PA&ED phase. More detailed analysis (e.g., simulation) will also be conducted as part of the PA&ED phase to refine project alternatives and maximize their operational benefits.

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7. Transportation Scope for the PA&ED

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As noted above, this TEPA has been developed per the June 2012 draft Caltrans guidelines to support the PSR-PDS phase of this project. The next step will be to prepare a Transportation Analysis Report (TAR) for the PA&ED phase of the project. The scope of work and the technical approach for the TAR was described below.

Traffic Study Area

Prior to traffic data collection, Fehr & Peers will coordinate with the project team including TCA/CMG, Caltrans, OCTA, and involved cities to determine the project study area, which will include I-5 between I-405 and OC/SD Countyline, SR 241 between Oso Parkway and I-5, and major arterials in South Orange County. The following facilities will be evaluated during the PA&ED phase:

I-5 Corridor (between I-405 and OC/SD Countyline):

- General purpose segments
- HOV segments
- Managed lane segments (when applicable)
- On- and off-ramps
- Ramp terminal intersections
- Ramp metering

SR 241/Los Patrones Parkway Corridor (between Oso Parkway and I-5):

- Mainline segments
- On- and off-ramps
- Ramp terminal intersections

Major Arterials (in South Orange County):

- Major east-west arterial highways
- Major north-south arterial highways
- Roadway segments and intersections in the project limits

Data Collection

In addition to the existing available traffic data, additional data required for the PA&ED phase will be collected from the field and other different sources. The existing traffic data to collect is listed below:

- Weekday AM (7-9) and PM (4-6) peak period volumes and ADT on I-5 mainline segments between I-405 and County line (mixed flow and HOV lanes)
- Weekday AM (7-9) and PM (4-6) peak period volumes on I-5 on- and off-ramps at every interchange between I-405 and Countyline (mixed flow and HOV lanes)
- Weekend ADT on I-5 mainline segments between Ortega Highway and County line.
- Weekday ADT volumes with vehicle classifications at major arterial highways
- Weekday AM (7-9) and PM (4-6) peak period volumes at the I-5 ramp terminal intersections
- Weekday AM (7-9) and PM (4-6) peak period volumes at major arterial intersections
- GPS travel times along I-5 between I-405 and Countyline in both directions during weekday and weekend peak period conditions
- Heavy vehicle data from Caltrans
- Ramp meter timing plans from Caltrans
- Intersection timing plans from Caltrans and cities
- Most recent 3-year TASAS collision data for the I-5 study segment from Caltrans
- Existing and proposed pedestrian/bicycle facilities and transit service information for routes within the area
- Existing state freeway improvements plans or documents related to this project
- Field observations to confirm traffic operations and lane geometrics during both AM and PM peak periods

We will prepare a technical memorandum to summarize the existing traffic data inventory. A good understanding of the existing conditions is important not only to define the project alternatives, but to address potential traffic impacts on freeway mainline, ramps, and intersections.

Existing Conditions Analysis

As the first step of the existing conditions traffic analysis, we will prepare a technical memorandum that summarizes traffic forecasting and operations analysis methodologies and assumptions, and submit to TCA/CMG and Caltrans for approval.

A detailed assessment of existing transportation conditions analysis will be conducted during the PA&ED phase. The freeway segments, ramps, ramp terminal intersections, and adjacent intersections will be evaluated for the AM and PM peak hour using the VISSIM simulation software program, which is based on procedures outlined in the Transportation Research Board's *Highway Capacity Manual (HCM)* 6th Edition. The VISSIM models will take into account the effects of queuing spillback, ramp metering, interactions between freeway mainline and arterials, and upstream and downstream bottlenecks on I-5 traffic operations, and will be used to evaluate existing queuing, storage and delay for study intersections and travel time, density, and speed for the freeway corridor. The results will be based on the average of multiple runs using different random value seeds. The VISSIM models will be validated and calibrated to existing conditions using the criteria suggested in *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Micro-simulation Modeling Software* (FHWA - July 2004). These guidelines are consistent with state-of-the-practice for micro-simulation modeling. In addition, other local intersections will be analyzed using Synchro 10 (HCM 6th Edition).

The analysis results will contain existing AM and PM peak hour density/delay and levels of service at study freeway mainline segments, ramp junctions, and ramp terminal intersections. In addition, system-wide measures of effectiveness will also be reported for existing conditions, which include people throughput, travel times, speeds, vehicle miles traveled (VMT), vehicle-hours-delay (VHD), and fuel consumption.

Traffic Forecasts

The latest available Orange County Transportation Analysis Model (OCTAM) version 4.0 will be used to develop future year traffic forecasts for the PA&ED phase. We will prepare a technical memorandum that summarizes traffic forecasting methodologies and assumptions, and submit to TCA/CMG, Caltrans, and OCTA for approval. Both Opening Year and Design Year traffic forecasts will be developed for study facilities for use of traffic operations analysis. The following set of tasks is anticipated to produce traffic forecasts for the PA&ED phase of this project.

- *Review and Finalize the Model Assumptions in Study Area*

The model's accuracy within the study area will be reviewed and verified. Under this task the existing land use and roadway network within the study area in the base year model should be checked for accuracy and modified as necessary to best reflect base year conditions. The future year model will also be reviewed to ensure that it accurately reflects the proposed land use projections and roadway network improvements in the study area. These assumptions will be coordinated and concurred with the PDT before proceeding with the forecasting process.

- *Develop Design Year and Opening Year Traffic Forecasts*

Following the review process described above, The OCTAM Models will be used to develop traffic demand forecasts for the design year of 2050. The growth volumes projected by the model between the base year and the future year will be added to the existing volumes to determine design year 2050 volumes. Opening year 2025 traffic volume forecasts will be estimated through linear interpolation between the existing demand volumes and the design year forecasts. The design year and opening year forecasts will be documented in a Traffic Volume Report and submitted to the TCA/CMG and Caltrans for review and approval before the future year traffic operations analysis. Coordination with the stakeholders will be important to identify roadway network assumptions for Opening Year analysis.

- *Prepare VMT and VHT Data for PM Analysis*

In addition to traffic forecasts, the OCTAM Model will be used to determine the regional implications of the project by examining additional measures of effectiveness (MOEs) such as vehicle miles of travel (VMT) and vehicle hours of traveled (VHT) with and without the Project.

Future Year Operations Analysis

For both the opening year and design year, the VISSIM models will be updated to reflect the expected future conditions, including the forecasted future traffic volumes and any capital improvements anticipated

to occur. The models will be used to evaluate the intersection operations (LOS, average delay, and queuing characteristics) freeway operations (travel time, density, and speed), and systemwide performance (people throughput, VHD, VMT) of the No Build and Build alternatives. The simulation results will be presented to the stakeholders to visualize the traffic operations under each alternative and will be integral to refining the geometrics of each alternative.

A qualitative assessment of pedestrian, bicycle, and transit facilities will also be performed as part of the PA&ED phase of the project to determine if either of the proposed build alternatives hinder or eliminate existing or proposed bikeways, result in unsafe conditions for bicyclists or pedestrians, or cause a substantial delay in transit service. An assessment of how each build alternative would influence safety within the study area will also be performed. In addition, pedestrian delay impacts from signal timing will be assessed for future year conditions.

Deliverables

The following key deliverables will be prepared during the PA&ED phase:

- Existing Traffic Data Inventory Memorandum
- Traffic Forecasting and Operations Analysis Methodology Memorandum
- Intersection Control Evaluation (ICE) Stage II Memorandum
- Traffic Volume Report
- Transportation Analysis Report

The final document to support the PA&ED is Transportation Analysis Report, which will be prepared to summarize the results and findings from the analysis described above. The report shall be submitted to the PDT for review and approval.

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

STORM WATER DATA REPORT (SWDR)

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Dist-County-Route: 12-ORA-241, 12-ORA-73, 12-ORA-5, 11-SD-5
Post Mile Limits: 2.1/14.4; 10.34/11.28; 0.0/20.5; 71.3/72.4
Type of Work: HIGHWAY EXTENSION
Project ID (EA): 12-0Q680K
Program Identification:
Phase: ☒ PID ☐ PA/ED ☐ PS&E

Regional Water Quality Control Board(s): Santa Ana RWQCB (Region 8); San Diego RWQCB (Region 9)

Total Disturbed Soil Area: 400 - 1,400 acres PCTA: 54 - 330 acres

Alternative Compliance (acres): TBD ATA 2 (50% Rule)? Yes ☒ No ☐

Estimated Const. Start Date: January 2024 Estimated Const. Completion Date: Jan 2027

Risk Level: RL 1 ☐ RL 2 ☒ RL 3 ☒ WPCP ☐ Other: _____

Is MWELo applicable? Yes ☐ No ☒

Is the Project within a TMDL watershed? Yes ☒ No ☐

TMDL Compliance Units (acres): TBD

Notification of ADL reuse (if yes, provide date): Yes ☐ Date: N/A No ☒

This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the date upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E only.

Richard Bottcher, PE
Registered Project Engineer

[Name]
Caltrans Designated Oversight
Representative

Date

I have reviewed the stormwater quality design issues and find this report to be complete, current and accurate:

Farid Nowshiravan, Project Manager

Date

Richard Reed, Maintenance Representative

Date

Eric Dickson, Landscape Architect Representative

Date

[Stamp Required at PS&E only]

Grace Pina-Garrett, District Stormwater Coordinator

Date

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STORMWATER DATA INFORMATION

1. Project Description

- The Foothill/Eastern Transportation Corridor Agency (F/ETCA), in cooperation with the California Department of Transportation (Caltrans) District 12, proposes to extend State Route (SR) 241 to the Interstate (I-) 5. The project is referred to as the South County Traffic Relief Effort (SCTRE). This Storm Water Data Report evaluates eight build alternatives as described below.
- Viable Alternatives

Eight Build Alternatives were analyzed and are proposed for consideration prior to the PA&ED phase of the Project:

- *Alternative 1 – No-Build Alternative*
- *Alternative 13 – Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)*
- *Alternative 17 – Connect SR 241 to I-5 via Shore Cliffs (Local connection at Avenida Vaquero)*
- *Alternative 14 – Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)*
- *Alternative 11 – Add I-5 General Purpose Lanes From I-405 to San Diego County*
- *Alternative 12 – Add I-5 High-Occupancy/Toll (HOT) Lane From I-405 to San Diego County*
- *Alternative 9 – Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73*
- *Alternative 18 – Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241*
- *Alternative 21 – Los Patrones Parkway Extension and I-5 HOT Lanes*

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 13: Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline.

Alternative 13 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet Highway Design Manual (HDM) standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange on SR 241 at Camino Las Ramblas, including northbound and southbound connections;
- Add a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (between Avenida California and Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (South of Cow Camp Road to Avenida La Pata as well as between San Juan Hills High School to Camino Del Rio).

I-5 Improvements

- Modify ten existing interchanges along I-5 at Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Modify existing northbound on-ramp to I-5 at Stonehill Drive to accommodate the widening of I-5;
- Convert one HOV lane to one HOT and add one HOT lane in each direction on I-5 from La Novia Avenue to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino Las Ramblas to proposed SR 241/Camino Las Ramblas interchange; and
- Extend existing La Novia to proposed SR 241/Camino Las Ramblas interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, Americans with Disabilities Act (ADA) ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 13, twenty-seven bridges would be impacted by the Project. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 17: Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 3 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline.

Alternative 17, would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Camino De Los Mares, including northbound and southbound connections;

- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Camino De Los Mares to Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Ortega Highway as well as from Prima Deshecha Landfill to Camino Las Ramblas).

I-5 Improvements

- Modify eight existing interchanges along I-5 at Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Convert one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from Avenida Vaquero to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino De Los Mares to proposed SR 241/Camino De Los Mares interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 17, twenty-three bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 14: Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline.

Alternative 14 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Drive;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange at Calle Saluda, including northbound and southbound connections;
- Add one new interchange at Calle Del Cerro, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Calle Del Cerro to Prima Deshecha Landfill, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as from the Prima Deshecha Landfill to Camino Del Rio).

I-5 Improvements

- Modify seven existing interchanges along I-5 at Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real; Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Calle Saluda to proposed SR 241/Calle Saluda interchange, including a new roundabout; and
- Extend existing Calle Del Cerro to proposed SR 241/Calle Del Cerro interchange, including a new roundabout.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 14, twenty-two bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 11: Add I-5 General Purpose Lane (From I-405 to San Diego County)

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040.

Alternative 11 would include the following improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-three existing interchanges along I-5 at Lake Forest Drive, El Toro Road, Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 11, thirty-eight bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 12: Add I-5 High-Occupancy Toll (HOT) Lane from I-405 to San Diego County

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline.

Alternative 12 would include the following additional improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-one existing interchanges along I-5 at Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 12, thirty-four bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 9: Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

Alternative 9 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new intersection at the proposed arterial roadway and Antonio Parkway, including a signalized intersection; and
- Add one new intersection at the proposed arterial roadway and Ortega Highway, including a signalized intersection.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73, bicycles would not be permitted.

Structure Improvements

- Under Alternative 9, two bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 18: Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

Alternative 18 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new interchange at the proposed arterial roadway and Los Patrones Parkway, including northbound and southbound connections; and
- Extend Crown Valley Parkway and add one new interchange at the Los Patrones Parkway, including northbound and southbound connections.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to

SR 73 or a connection to a high-speed ramp to Los Patrones Parkway, bicycles would not be permitted.

Structure Improvements

- Under Alternative 18, three bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Alternative 21: Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Alternative 21 would include the following additional improvements to the identified portion of the corridor:

Los Patrones Parkway Improvements

- Construct a new interchange at 'I' Street and Los Patrones Parkway (the northern limit of this alternative is the limit of work required to construct the on- and off ramps at the 'I' Street interchange);
- Construct a grade separated interchange at the Vista Montana intersection to allow traffic on Avenida La Pata to proceed northbound and southbound without stopping, and provide on- and off- ramps for northbound and southbound access to Vista Montana; and
- Reconfigure the northbound access road from Prima Deshecha Landfill to provide grade separated "braided ramps" between the new northbound off ramp to Vista Montana and the existing northbound access road.
- Subject to further study, in the next phase of project development, this alternative may include the addition of tolling equipment along Los Patrones Parkway.

I-5 Improvements

- Modify sixteen existing interchanges along I-5 at SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Structure Improvements

- Under Alternative 21, thirty-two bridges are present within the project boundary. These bridges would be modified to aid in furthering the purpose of the Project. This bridge work includes widening of the existing bridge platforms, e.g. outside widening or median widening, of one or of both southbound (left) and/or northbound (right) sides of the bridge. New bridges would also be created or rebuilt to further the purpose of the Project.

Table 1 shows the estimated disturbed soil area (DSA) for each Project alternative. The DSA was calculated using CADD and includes the extent of the grading involved within the disturbance limits of the Project. The DSA would be refined during subsequent design phases to include drainage, maintenance access roads and easements. The proposed Project requires the preparation of a Storm Water Pollution Prevention Plan (SWPPP) as the DSA is greater than 1 acre.

Table 1. South County Mobility Improvement Project DSA

Alternative	DSA/Alternative (acres)	Los Patrones Parkway Extension (acres)	Los Patrones Parkway (acres)	I-5 (acres)	SR 241 (acres)	Total (acres)
9	400		0	0	0	400
11	1,080		0	0	0	1,080
12	-		0	920	0	920
13	-		297	450	653	1,400
14	-		297	203	589	1,089
17	-		297	296	528	1,121
18	555		0	0	0	555
21		15	34	685	-	734

- Table 2 displays the new impervious surface (NIS) for the Project alternatives. Overall, the NIS for the Project alternatives ranges from 54 to 260 acres.

Table 2. Project New Impervious Surface

Alternative	Net New Impervious Area (acres)	Replaced Impervious Surface (acres)	NIS (acres)	Total Exist Impervious Area (acres)	Total Post-Project Impervious Area (TPPIA) (acres)
9	54	0	54	0	54
11	80	180	260	403	663
12	70	140	210	276	486
13					
I-5	30	65	95	214	309
SR 241	90	0	90	0	90
Los Patrones Parkway	9	6	15	0	15
13 TOTAL	129	71	200	214	414
14					
I-5	59	33	92	70	162
SR 241	111	0	111	0	111
Los Patrones Parkway	9	6	15	34	49
14 TOTAL	179	39	218	104	322
17					
I-5	69	44	113	103	216
SR 241	115	0	115	0	115
Los Patrones Parkway	9	6	15	34	49
17TOTAL	193	50	243	137	380
18	82	0	82	0	82
21					
I-5	62	144	206	255	461
Los Patrones Parkway Extension	19	11	30	139	169
Los Patrones Parkway	9	6	15	297	312
21 TOTAL	90	161	251	691	942

- Post Construction Treatment Area
 - o The Post Construction Treatment Area (PCTA) is the sum of the NIS along with acreage associated with ATA conditions 1 and 2.
 - o ATA #1 is any existing Treatment BMP removed, or modified (contributing drainage area reduced) by the Project. The Project would not modify or remove any existing Treatment BMPs, therefore ATA #1 is 0 acres.
 - o ATA #2 is the area required when the NNI is 50 percent or greater than the total project impervious area. Table 3 summarizes the results for ATA #2 and the PCTA for each alternative.

Table 3. ATA Condition No. 2 and Post Construction Treatment Area

ALTERNATIVE	Net New Impervious (NNI) Area (acres)	Total Post-Project Impervious Area (TPPIA) (acres)	ATA 2 (%)	Post Construction Treatment Area (acres)
9	54	54	100	54
11	80	483	17	80
12	70	346	20	70
13	129	443	29	129
14	179	283	63	283
17	193	330	58	330
18	82	82	100	82
21	77	781	10	77

2. Site Data and Stormwater Quality Design Issues

- The Project is in Orange County and San Diego County. The Project area is located within the jurisdiction of Caltrans District 11, Caltrans District 12, the Santa Ana Regional Water Quality Control Board – Region 8 and the San Diego RWQCB – Region 9.
- The San Diego and Santa Ana RWQCB Basin Plans list the identified beneficial uses for the Project's receiving water bodies. These beneficial uses are displayed in Table 4 for inland surface waters and Table 5 for ground water.

Table 4. Beneficial Uses of Inland Surface Waters

Inland Surface Water	MUN	GWR	AGR	IND	REC1	REC2	WARM	COLD	WILD	RARE	SPWN
Arroyo Trabuco Creek	+	■	■		■	■	■	■	■	■	
Aliso Creek	■	■			■	■	■		■	■	
San Juan Creek	+		■	■	■	■	■	■	■		
Horno Creek	+		■	■	■	■	■	■	■		
Canada Gobernadora	+		■	■	■	■	■	■	■		
Cañada Chiquita	+		■	■	■	■	■	■	■		
Prima Deshecha Cañada	+		■		□	■	■		■		
Segunda Deshecha Cañada	+		■		□	■	■		■		
San Mateo Creek	+				□	■	■	■	■	■	■

+ = Exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board

Resolution 88-63, Sources of Drinking Water Policy

■ = Existing or Potential Beneficial Use

□ = Potential Beneficial Use

Agricultural Supply (AGR); Cold Fresh Water Habitat (COLD); Contact Water Recreation (REC 1); Industrial Service Supply (IND); Municipal and Domestic Supply (MUN); Non-Contact Water Recreation (REC 2); Rare, threatened or endangered species (RARE); Spawning, reproduction, and/or early development (SPWN); Warm Fresh Water Habitat (WARM) and Wildlife Habitat (WILD).

Table 5. Beneficial Uses of Ground Waters

Inland Surface Water	MUN	AGR	IND	PROC
Lower Santa Ana River Basin/Irvine	■	■	■	■
Gobernadora	■	■	■	
Middle San Juan	■	■	■	
Lower San ¹ Juan	■	■	■	
Ortega	■	■	■	
Prima Deshecha*	■	■		
Segunda Deshecha	+			
San Mateo Canyon*	■	■	■	

+ = Exempted by the Regional Board from the municipal use designation

■ = Existing Beneficial Use

Agricultural Supply (AGR); Industrial Service Supply (IND); Industrial Service Supply (PROC);
 Municipal and Domestic Supply (MUN)

¹These beneficial uses do not apply to all lands on the coastal side of the inland boundary of the right-of-way of Pacific Coast Highway 1 west of the San Juan Creek channel and this area is excepted from the sources of drinking water policy.

*These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy.

- In the northern part of the corridor, Alternative11 is located within the Santa Ana River hydrologic unit and the East Coastal Plain hydrologic sub-area. The remaining Project alternatives extend throughout the San Juan hydrologic unit and eight hydrologic sub-areas. These hydrologic sub-areas, listed by geographic locale from north to south are summarized in Table 6.

Table 6. Hydrologic Sub-Areas

Hydrologic Unit	Hydrologic Area	Hydrologic Sub-Area	Hydrologic Sub-Area No.	Planning Area No.
Santa Ana River	Lower Santa Ana River	East Coastal Plain	801.11	4801110000
San Juan	Laguna	Dana Point	901.14	4901140000
	Mission Viejo	Middle Trabuco	901.23	4901230000
	Mission Viejo	Oso	901.21	4901210000
	Mission Viejo	Gobernadora	901.24	4901240000
	Mission Viejo	Middle San Juan	901.26	4901260000
	Mission Viejo	Lower San Juan	901.27	4901270000
	Mission Viejo	Ortega	901.28	4901280000
	San Clemente	Prima Deshecha	901.31	4901310000
	San Clemente	Segunda Deshecha	901.32	4901320000
	San Mateo Canyon	Undefined	901.40	4901400000

- The receiving waters for the Project include an unnamed tributary to Cañada Gobernadora Creek; Cañada Chiquita Creek; and an unnamed tributary to San Juan Creek; Aliso Creek; San Juan Creek; Horno Creek; Prima Deshecha Creek; Segunda Deshecha Creek; Arroyo Trabuco Creek; Oso Creek (at Mission Viejo Golf Course); Oso Creek (lower) and San Mateo Creek (San Diego County). Receiving waterbodies that are listed as impaired in the Final 2014/2016 Integrated Report are summarized in Table 7.

Table 7. Impaired Receiving Waters

WATER BODY	POLLUTANT	STATUS
San Juan Creek	DDE (Dichlorodiphenyldichloroethylene)	TMDL required
	Indicator Bacteria	EPA Approved TMDL
	Phosphorus	TMDL required
	Benthic Community Effects	TMDL required
	Selenium	TMDL required
	Nitrogen	TMDL required
	Toxicity	TMDL required
San Mateo Creek (San Diego County)	Indicator Bacteria	TMDL required
	Invasive Species	TMDL required
Aliso Creek	Indicator Bacteria	EPA Approved TMDL
	Benthic Community Effects	TMDL required
	Nitrogen	TMDL required
	Malathion	TMDL required
Oso Creek (at Mission Viejo Golf Course)	Chloride	TMDL required
	Sulfates	TMDL required
	Total Dissolved Solids	TMDL required
Oso Creek (lower)	Selenium	TMDL required
	Toxicity	TMDL required
	Nitrogen	TMDL required
	Phosphorus	TMDL required
Arroyo Trabuco Creek	Toxicity	TMDL required
	Phosphorus	TMDL required
	Indicator Bacteria	TMDL required
	Malathion	TMDL required
	Nitrogen	TMDL required
	Benthic Community Effects	TMDL required
Prima Deshecha Creek	Cadmium	TMDL required
	Malathion	TMDL required
	Nitrogen	TMDL required
	Selenium	TMDL required
	Indicator Bacteria	TMDL required
	Phosphorus	TMDL required
	Turbidity	TMDL required
Segunda Deshecha Creek	Indicator Bacteria	TMDL required
	Malathion	TMDL required
	Benthic Community Effects	TMDL required
	Nitrogen	TMDL required
	Selenium	TMDL required
	Phosphorus	TMDL required
	Toxicity	TMDL required
	Turbidity	TMDL required

- It is anticipated that surface waters under the jurisdiction of the United States Army Corps of Engineers, (Corps), along the Project alignment may be avoided through Project Design Features (i.e., bridges) and thus avoid federal jurisdictional impacts. Therefore, the Project may not require Corps issuance of a Clean Water Act §404 Permit.
- Environmentally Sensitive Areas (ESAs) will be identified on the design plans during the PS&E phase. All ESAs will be protected with ESA fencing during construction.
- According to the District 11 Work Plan and the District 12 Work Plan, there are no municipal or domestic water supply reservoirs or groundwater percolation facilities within the project limits.
- Other than the impairments and the TMDL status, there are no Santa Ana RWQCB or San Diego RWQCB special requirements/concerns for the receiving water bodies associated with the Project alternatives.
- Within the northern Project limits, Orange County Copermittees are identified as an urban MS4 per Order No. R8-2009-0030, amended by Order No. R8-2010-0062 within the Santa Ana RWQCB basin. Within the southern Project limits, San Diego County Copermittees and Orange County Copermittees are identified as an urban MS4 area per Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100, NPDES No. CAS0109266. Per the NPDES permits, the SCTRE Project would comply with storm water discharge requirements for roadway runoff associated with improvements on local streets that are outside of the Caltrans right-of-way.
- Within the Caltrans right-of-way, the Project will comply with the Caltrans NPDES Permit, Order No. 2012-0011-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans). Order No. 2012-0011-DWQ has been amended by the following Orders: Water Quality Order 2014-0006-EXEC, Water Quality Order 2014-0077-DWQ, and Water Quality Order 2015-0036-EXEC.
- Encroachment permits for local street improvements outside of the Caltrans right-of-way would be obtained during subsequent design phases.
- There are no regulatory agency seasonal construction or construction exclusion dates or other restrictions required by federal, state or local agencies.
- If there will be any widening of a creek at any of the creek crossings, then Waste Discharge Requirements (Individual Order) may be required from the San Diego or Santa Ana RWQCB. If an Individual Order is required, it would be prepared and submitted during the plans, specifications and estimates (PS&E) phase.
- If a Section 1602 Agreement would be required from the California Department of Fish and Wildlife, it would be prepared and submitted during the PS&E phase.
- The Project area has a Mediterranean-type climate, characterized by long, dry summers and mild winters. The average annual precipitation is approximately 13 inches within the Project limits. Most of the precipitation occurs between November and March, with little or no rainfall from May through October. Three types of storms produce precipitation in the area: general winter storms, thunderstorms and tropical cyclones. Flooding is most often caused by high intensity rainfall associated with general winter storms. Storm flows can rise from a dry stream bed to flood stage in a matter of hours.
- According to the Natural Resources Conservation Service Web Soil Survey, approximately 90 percent of the soils underlying most of the Los Patrones Parkway corridor are low permeability soil types (hydrologic soil classification of C or D). The remaining areas are Capistrano sandy loam soils which exhibit adequate infiltration/permeability characteristics (i.e. hydrologic soil

group A). The Custom Soil Resource Report completed for the SCTRE Project alternatives 13, 14 and 17 indicates that most of the soil material is associated with low permeability soil types (hydrologic soil group classification C or D). The remaining areas, which equate to approximately 2 percent, are Capistrano sandy loam and Corralitos loamy sand. For SCTRE project alternative 12, most of the soils exhibit moderate to high infiltration rates and the remaining soils (i.e., 11 percent) have low permeability soil types. For alternative 9 and alternative 18 it was determined that soils were predominantly characterized as HSG D soils with relatively low permeability. For most of the project corridor along Interstate 5, soils have been classified as soil type B, C and D by the County of San Diego for those sections within San Diego County. The maximum infiltration rate for Soil Type D is less than 0.20 inch/hour. Soil Types B and C have slow to moderate infiltration rates when thoroughly wetted and consist of sandy or silty loam soil with slow to moderate rates of water transmission. Maximum infiltration rates for Soil Types B and C are 0.30 inch/hour and 0.25 inches per hour (iph), respectively.

- According to the District 11 Work Plan and the District 12 Work Plan, there are no slopes in the Project area that are prone to erosion or sediment discharge
- The SCTRE Project area traverses eight groundwater basins. Usable groundwater in the San Juan Creek Basin exists in shallow alluvial deposits in the bottoms of the canyons in San Juan Creek and its tributaries: Trabuco Creek, Oso Creek, La Paz Creek, Canada Gobernadora, Canada Chiquita and numerous other smaller canyons. Groundwater in these shallow alluvial aquifers is unconfined in all areas of the San Juan Basin. According to the Department of Water Resources, Water Data Library, depth to groundwater at three wells (MW-04, MW-05 and MW-06) within the San Juan Creek basin ranged from 14 feet below ground surface (bgs) to 28 feet bgs based on monitoring conducted in December 2016. Prima Deshecha Canada and Segunda Deshecha Canada share groundwater characteristics. Groundwater in the shallow alluvial deposits along the bottoms of the Prima Deshecha and Segunda Deshecha canyons is unconfined. Usable groundwater in the San Mateo Creek Basin exists in the valley fill alluvium of Cristianitos and San Mateo creek valleys. Infiltration of stream flow into the underlying permeable sand and gravel provides most of the recharge to the aquifers in the San Mateo Basin. To the north along the I-5 corridor, Project alternatives traverse the Coastal Plain of Orange County groundwater basin. The depth to groundwater for Prima Deshecha Canada, Segunda Deshecha Canada and the San Mateo basin would be determined during the subsequent design phase.
- At this PID phase of the Project, the reuse of soil containing Aerially Deposited Lead (ADL) is not proposed. Before any construction activities occur in unpaved areas, soil samples should be collected and analyzed for lead to ensure that soils are managed properly in accordance with Caltrans Standard Special Provisions 14-11-08 and 14-11-09A.
- The Project alternatives are set in gently rolling terrain to level terrain. The natural gradient through the alternatives is generally from north to south. Elevations for the alternatives in the Santa Ana River hydrologic unit range from sea level at the outfall of the watershed to nearly 1,800 feet in the headwater areas. Slopes and grades are moderate to steep and range from 6 to 32 percent. Streams and drainages and canyons are somewhat abundant in the higher elevation regions of the watershed, with residential drainage improvements primarily existing elsewhere. Elevations in the hydrologic sub-area (HSA) of San Juan Creek range from sea level at the ocean outfall to nearly 5,000 feet in the headwater areas. Slopes and grades are generally steep and range from five percent to upwards of 65 percent in some areas. In the Prima Deshecha HSA elevations range from sea level at the ocean outfall to 1,000 feet in the headwater areas. Slopes and grades are moderate and range from 15 to 26 percent. Elevations range from sea level at the ocean outfall to nearly 800 feet in the headwater areas

of the Segunda Deshecha HSA. Slopes and grades are moderate and range from 13 to 25 percent. In the undefined HSA of the San Mateo Canyon hydrologic area, elevations range from sea level at the ocean outfall to 3,000 feet in the headwater areas. Slopes and grades range from 2 to 19 percent.

- Right-of-Way (R/W) requirements are currently under investigation. During delineation of the Disturbance Limit Line (DLL), consideration was given to the need for temporary and permanent BMPs to accommodate R/W needs.
- For the alternatives along the I-5 corridor, land use is characterized as having a combination of residential and transportation land uses. For the alternatives to the east of the I-5, most of the existing land use is characterized as open space near Los Patrones Parkway, and for the remaining project area the land use is characterized as having a combination of residential and transportation land uses.
- There are no sources of dry weather flows within the Project area.
- All work in creeks and waterways would be scheduled per regulatory requirements and will be detailed in the Project's special provisions during the subsequent design phases. For ease of maintenance, pullouts would be considered for the Project, and side slopes would be specified to be as flat as possible. Concentrated flows would be collected into stabilized drains and channels.

3. Construction Site BMPs to be used on Project

- According to the Construction General Permit, for any site that spans two or more planning watersheds, a separate risk level may be calculated for each planning watershed. Therefore, this storm water data report determined a construction risk level for each of the planning watersheds within the Project area.

Sediment Risk Factor

- The R factor for the construction sediment risk factor was calculated using the EPA Erosivity Factor Calculator for Small Construction Sites. Table 8 displays the R Factor for the planning watersheds. The R Factor was calculating using an estimated construction time frame of January 2, 2024 through to January 29, 2027.
- Going from north to south, the Project corridor was evaluated as eleven separate Planning Watersheds using the State Water Resources Control Board's interactive GIS tools and the Caltrans Water Quality Planning Tool. The K factor was determined from the RUSLE K Factor GIS tool and ranged from 0.20 to 0.43. The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. The length of sheet flow and slope were determined using the State Water Resources Control Board's interactive GIS tool. The LS factor was determined from the RUSLE LS Factor GIS tool and ranged from 2.7 to 5.6. The product of these values, per the Planning Watershed, are summarized in Table 8. The sediment risk factor input values are provided as an exhibit in the Required Attachments.

Table 8. Summary of Sediment Risk Factors

Planning Watershed No.	R Factor	K Factor	LS Factor	Tons/Acre	Sediment Risk
4801100000	140	0.32	2.58	115.58	High
4901140000	129	0.32	5.63	232.41	High
4901210000	129	0.32	4.73	195.25	High
4901230000	129	0.32	4.33	178.74	High
4901240000	140	0.43	5.10	307.02	High
4901260000	129	0.32	5.16	213.00	High
4901270000	129	0.32	5.53	228.28	High
4901280000	130	0.32	5.53	230.05	High
4901310000	129	0.32	5.29	218.37	High
4901320000	120	0.20	2.93	70.32	Medium
4901400000	113	0.20	2.72	61.47	Medium

Receiving Water Risk

- Based on the SWRCB Receiving Water Risk GIS tool, seven of the Planning Watersheds are considered as having a Low Receiving Water Risk and four Planning Watersheds discharge to a 303(d)-listed water body impaired by turbidity and/or sedimentation/siltation, and are therefore considered High Receiving Water Risk areas. An exhibit displaying the Project area and the high risk receiving watershed is provided as a Required Attachment.
- The Sediment and Receiving Water risk factors are displayed in Table 9. The Risk Level 2 areas shall comply with the requirements included in Attachment D of the Construction General Permit (CGP). Activities conducted within Planning Watershed 480110000, 4901140000 and 4901310000 shall comply with the requirements included in Attachment E of the CGP.

Table 9. Project Risk Level

Planning Watershed No.	Sediment Risk	Receiving Water Risk	Risk Level
4801100000	High	High	3
4901140000	High	High	3
4901210000	High	Low	2
4901230000	High	Low	2
4901240000	High	Low	2
4901260000	High	Low	2
4901270000	High	Low	2
4901280000	High	Low	2
4901310000	High	High	3
4901320000	Medium	High	2
4901400000	Medium	Low	2

- A Project Risk Level Determination Report is provided as a Required Attachment.
- The Project DSA ranges from 400 to 1,400 acres based on the selected alternative. A Storm Water Pollution Prevention Plan (SWPPP) would be prepared prior to the start of construction.
- The construction work for this project is scheduled to cover 3 years. Whenever possible, the scheduling of earth-disturbing construction activities should not be made during anticipated rain events. To mitigate any potential runoff or run-on within the Project area, construction site BMPs should be installed prior to the start of construction or as early as feasibly possible during construction.
- Several measures would be taken to avoid or reduce potential storm water impacts. As described in the Caltrans Project Planning and Design Guide and the Statewide Storm Water Management Plan, best management practices (BMPs) would be designed and implemented to reduce the discharge of pollutants from the Caltrans storm drain system. Erosion control measures would be used to address site soil stabilization and reduce the deposition of sediments in adjacent surface waters. Typical measures would include the application of soil stabilizers such as rock slope protection, velocity dissipation devices and flared end sections for culverts.
- The lists below identify Construction Site BMPs that are anticipated to be necessary for this project. Construction Site BMPs identified as either separate Bid-Line Items or those considered as lump sum, include:

Construction Site BMPs Identified as Separate Bid-Line Items:

Temporary Silt Fence (BEES Item No. 130680)
 Temporary Check Dams (BEES Item No. 130610)
 Temporary Fiber Rolls (BEES Item No. 130640)
 Temporary Drainage Inlet Protection (BEES Item No. 130620)
 Temporary Construction Entrance (BEES Item No. 130710)
 Temporary Cover (Plastic Covers) (BEES Item No. 130570)

Temporary Hydraulic Mulch (Bonded Fiber Matrix) (BEES Item No. 130530)

Temporary Hydroseed (BEES Item No. 130550)

Temporary Soil Binder (BEES Item No. 130560)

Storm Water Sampling and Analysis Day (BEES Item No. 130320)

Rain Event Action Plan (BEES Item No. 130310)

Storm Water Annual Report (BEES Item No. 130330)

Construction Site BMPs to be paid as a Lump Sum:

Job Site Management (BEES Item No. 130610)

Prepare SWPPP (BEES Item No. 130300)

Supplemental Work Items to be paid as Lump Sum:

Water Pollution Control Maintenance Sharing (BEES Item No. 066595)

Additional Water Pollution Control (BEES Item No. 066596)

Storm Water Sampling and Analysis (BEES Item No. 066597)

Construction General Permit Fees (Bees Item No. 066916)

- Planned monitoring locations would be provided during the final PS&E phase.
- If this Project requires dewatering, then dewatering effluent that is discharged from the construction site to a storm drain or receiving water would be subject to the appropriate dewatering permit from the jurisdictional Regional Water Quality Control Board.
- A cost estimate for all Construction Site BMP items has been developed and is provided as a Supplemental Attachment. The total costs of these items are included as a Supplemental Attachment, but is for internal Caltrans use only. The costs of stormwater BMPs were calculated using the Project Initiation Cost Estimate Method as described in Appendix F of the PPDG (Caltrans 2017).

4. Maintenance BMPs

- Drain inlets would be stenciled in areas accessible to pedestrian and bicycle traffic, generally at the ramps and frontage roads. Design standards and exact locations for drain inlet stenciling will be developed during subsequent design phases. Other types of Maintenance BMPs would also be considered and coordinated with the Caltrans Maintenance Area Manager.
- If a Build Alternative is selected, after Project completion, and once the build facilities are adopted into the State Highway System, Caltrans will be responsible for maintenance of facilities within existing and newly dedicated State right-of-way limits.

5. Other Water Quality Requirements and Agreements

- To date there are no key negotiated understandings or agreements with the Santa Ana or San Diego RWQCB. The project would comply with local requirements as referenced in the South Orange County Hydromodification Plan.

6. Permanent BMPs

Rapid Stability Assessment

- Rapid stream assessments for Arroyo Trabuco Creek, Oso Creek, San Juan Creek, Prima Deshecha Creek, Canada Chiquita Creek, Horno Creek and San Mateo Creek are provided as a Supplemental Attachment. Based on the assessment, stream stability was characterized as good at all the crossings.

Design Pollution Prevention (DPP) BMP Strategy

Downstream Effects Related to Potentially Increased Flow, Checklist DPP-1, Parts 1 and 2

- The Project would result in an increase in impervious surface. Therefore, the velocity and volume of downstream flow is expected to increase. The Project will incorporate low impact development (LID) features to maintain or restore pre-project hydrology, as well as provide overall water quality improvement of discharges. The LID features would be incorporated into the development and placement of permanent BMPs during the subsequent design phases to the maximum extent practicable. Potential LID measures that will be considered for the Project to improve water quality include:
 - o Minimizing impervious surface area and using pervious material for hardened surfaces outside of the roadway prism;
 - o Grading slopes to blend with the natural terrain and decreasing the need for dikes, promoting sheet flow to vegetated areas that can provide water quality benefits and promote infiltration;
 - o Designing permanent drainage facilities that mimic the existing drainage pattern of the area using permanent check dams and detention basins for attenuation of flow and disconnected drainage facilities;
 - o Constructing permanent vegetated drainage ditches to decrease the velocity of discharge, plus decreasing the volume of discharge by promoting infiltration and allowing for pollutant removal; and
 - o Maintaining existing vegetated areas.
- To examine the effectiveness of these LID features, the pre- and post-hydrology will be compared during the subsequent design phases.

Slope/Surface Protection Systems, Checklists DPP-1, Parts 1 and 3

- Areas of cut and fill are required throughout the Project to satisfy the Project geometry. Cut and fill areas will be developed further during the subsequent design phases and will be shown on the contract plans.
- The Project will create new slopes and modify existing slopes. Various slope and surface protection measures will be used to address site soil stabilization and reduce deposition of sediments in the adjacent surface waters. Typical measures include application of soil stabilizers, rock slope protection, velocity dissipation devices, flared end sections for culverts and others.
- To minimize erosion during Project implementation, existing slopes would only be disturbed when necessary; cut and fill areas would be minimized to reduce slope lengths; cut and fill slopes would be flat enough to allow re-vegetation and limit erosion to pre-construction rates; slopes would be rounded and shaped to reduce concentration of flows; and the construction schedule would consider minimizing soil disturbing work during the rainy season. Erosion

control measures also would be used to address site soil stabilization and reduce deposition of sediments in adjacent surface waters. Typical measures would include the application of soil stabilizers such as soil binders. Permanent landscaping plans would be provided during subsequent PS&E stages.

- Some of the proposed strategies for disturbed constructed slopes would include intensive soil treatments to treat and remediate growth-limiting conditions. The soil treatments would address infiltration restrictions; rooting restrictions; low plant available moisture; nutrient/soil chemistry limitations; and nitrogen deposition from pollution. Implementation of the proposed strategies would provide immediate as well as long-term erosion control using native vegetation.
- The Project would be constructed to minimize erosion, including use of cut and fill slopes flat enough to allow re-vegetation and limit erosion to pre-construction rates; and collection of concentrated flows in stabilized drains and channels. Energy dissipaters in the form of riprap, impact basins, or velocity control rings would be provided at storm drain outlets to control erosion. Riprap sizes and thicknesses will be shown on plans, and stone gradation/placement methods would be defined in the Project specifications.

Concentrated Flow Conveyance Systems, Checklists DPP-1, Parts 1 and 4

- Because it will be necessary to direct or intercept surface runoff, risks due to erosion or washout would be minimized using rock slope protection, ground cover, mulch, longitudinal ditches, and/or down drains. Velocity dissipation devices, flared end outlets, headwalls, transition structures, and/or splash walls would be incorporated into the design, where necessary, at culvert inlets and outlets to prevent erosion. Lined longitudinal ditches will be incorporated at the uphill side of the transportation corridor to intercept sheet flow, where necessary, and to convey it to culverts or bridges that cross under the roadway. Culvert outlets will be equipped with appropriate energy dissipating devices. To minimize the sizing of hydromodification facilities such as detention basins, flow conveyance of impervious and pervious surfaces has been separated where hydromodification facilities are required.

Preservation of Existing Vegetation, Checklists DPP-1, Parts 1 and 4

The preservation of desirable existing vegetation will be maximized for erosion and sediment control. Existing desirable vegetation to remain in place will be protected with temporary ESA fencing during construction and will be shown on plan.

Treatment BMP Strategy

- The proposed Treatment BMP strategy for the Project alternatives is to infiltrate 90% of the net NIS area by using Natural Infiltration Areas (NIAs) located within existing state R/W. At this PID phase, it was determined that opportunities exist within Caltrans R/W to implement NIAs. The NIAs are depicted in the attached corridor layouts and are summarized in Table 10.

Table 10. Natural Infiltration Area

Alternative	Approximate Station No.	BMP ID	Impervious Tributary Area (acres)	Water Quality Volume (ft ³)
11	A 364+04	I5-4	0.86	2,337
	A 59+16	I5-10	0.41	1,128
12	A 364+04	I5-4	0.86	2,337
	A 59+16	I5-10	0.41	1,128
13	A 364+04	I5-4	0.86	2,337
	A 59+16	I5-10	0.41	1,128
14	3860+75	I5-10	0.41	1,083
9	562+00	09-35	1.64	4,231
	610+00	09-36	0.38	967
	635+00	09-37	1.22	3,132
	654+00	09-38	0.89	2,291
17	59+16	I5-10	0.41	1,113
18	562+00	18-35	1.64	4,231
	610+00	18-36	0.38	967
	635+00	18-37	1.22	3,132
	654+00	18-38	0.89	2,291
	692+00	18-39	2.34	6,031
	727+00	18-40	2.50	6,446
21	A 364+04	I5-4	0.86	2,337
	A 59+16	I5-10	0.41	1,128

- The NIAs identified in Table 10 can only treat a portion of the post construction treatment area for each alternative and are therefore not capable of infiltrating 100 percent of the WQV. Using the prioritization referenced in Checklist T-1 Part 1, the Project alternatives were evaluated to determine if opportunities exist for the implementation of infiltration devices, detention basins and then biofiltration devices. The potential Treatment BMP locations have been identified and are summarized in the following sections. The feasibility, design and watersheds for these treatment locations will be further developed during later phases of the project.
- All proposed Treatment BMPs would be designed with proper access for maintenance crews and would be shown on plans during the final PS&E phase. The exact locations would be determined during final design, but would be within the project footprint analyzed in the environmental documents.
- This Project is required to consider Treatment BMPs because it will involve direct and indirect discharges to surface waters, some of which have pollution control requirements.
- Based on current available soil information, at this phase of the Project, to be conservative, it is assumed that the estimated overall infiltration ranking will be less than 90 percent for biofiltration and detention devices without the use of soil amendments. Preliminary studies

using the infiltration tool indicate, however, that approximately 20% of the WQV will be infiltrated with the use of amendments.

- Pollution control requirements have been established for surface waters within the Project area and are summarized in Table 7. It will be necessary to coordinate BMPs with the District Stormwater Coordinator to discuss any Caltrans obligations under the pollution control requirements. These coordination efforts will be conducted at later phases of the Project. The potential BMP locations have been identified and are listed below.
- A cost estimate (for internal Caltrans use only) for each individual Treatment BMP and NIA that is being used for post construction treatment is provided as a Supplemental Attachment. Per Appendix F of the PPDG, only the total BMP costs are provided.

Biofiltration Devices, Checklist T-1, Part 3

- Vegetated biofiltration devices (i.e., swales and strips) were considered at locations along the alignment where longitudinal slopes were consistent with Caltrans design criteria and where right-of-way requirements would not conflict with other environmental mitigation.
- The vegetated trapezoidal biofiltration devices will be at a slope of less than three percent, with 4:1 to 5:1 side slopes, bottom widths between four and 12 feet, and lengths ranging from 80 to 600 feet. Vegetated biofiltration devices will be designed to Caltrans standards, which require water quality flow velocities (equal to the flow generated from the 85th percentile storm) to be low enough to keep hydraulic residence times in the swale greater than five minutes with a Manning's 'n' of 0.2 used for mowed grass at flow depths less than 0.5 foot. The swales will be vegetated with native grasses. The downstream ends of the vegetated biofiltration swales will connect to grated inlet structures which outlet to adjacent offsite storm drainage systems. All the proposed vegetated biofiltration devices will meet Caltrans Traffic Operations requirements with side slopes of 5:1 at Clear Recovery Zones. Where possible, the biofiltration devices shall be amended and lengthened to enable infiltration of 50% or more of the WQV.
- The sizing criteria for biofiltration devices is based on the WQF, as identified in the PPDG (Caltrans, 2017). This would be used as the basis for designing the approved filtration-type Treatment BMPs. For the project area, the WQF is calculated using the Rational Method and a precipitation rate of 0.2 iph. This rate is designated in the Basin Sizer program for RWQCB Region 9 (San Diego). Individual tributary areas and flows to each of the proposed biofiltration devices are summarized in Table 11. The feasibility and design for these treatment locations will be further developed during later phases of the project.

Table 11. Biofiltration Devices

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)
9	Bioswale	534+00	09-05	1.83	0.37
	Bioswale	547+50 (Left)	09-06	3.47	0.69
	Bioswale	547+50 (Right)	09-07	3.47	0.69
	Bioswale	589+00	09-08	4.88	0.98
	Bioswale	593+00	09-09	3.61	0.72
	Bioswale	608+00	09-10	1.93	0.39
	Bioswale	614+00	09-11	1.77	0.35
	Bioswale	628+00	09-12	3.28	0.66
	Bioswale	645+50	09-13	1.45	0.29
	Bioswale	616+00	9-18-15	3.63	0.73
	Bioswale	616+00	09-15	3.63	0.73
	Bioswale	627+00	09-16	1.33	0.27
	Bioswale	644+00	09-17	1.39	0.28
	Bioswale	649+80	09-18	1.09	0.22
	Bioswale	661+50	09-19	2.53	0.51
Total				35.66	7.15
11	Bioswale	A 425+52	I5-1	9.39	1.88
	Bioswale	A 464+69	I5-1A	2.50	0.50
	Bioswale	A 472+03	I5-1B	0.99	0.20
	Bioswale	A 484+43	I5-1C	10.79	2.16
	Bioswale	578+34	I5-1D	2.52	0.50
	Biostrip	583+06	I5-1E	1.65	0.33
	Biostrip	583+81	I5-1F	1.38	0.28
	Biostrip	591+50	I5-1G	1.75	0.35
	Biostrip	590+69	I5-1H	1.24	0.25
	Bioswale	682+40	I5-1I	2.36	0.47

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)
	Bioswale	702+04	I5-1J	4.27	0.85
	Bioswale	849+52	I5-1K	2.25	0.45
	Bioswale	864+54	I5-1L	1.52	0.30
	Bioswale	918+04	I5-1M	4.47	0.89
	Bioswale	A 391+81	I5-3	4.93	0.99
	Bioswale	A 300 + 94	I5-6	5.20	1.04
	Bioswale	A 249 + 23	I5-7	1.51	0.30
	Bioswale	A 211 + 05	I5-8	1.50	0.30
	Bioswale	3799+48	I5-9	2.60	0.52
	Total			62.82	12.56
12	Bioswale	A 425+52	I5-1	9.39	1.88
	Bioswale	A 464+78	I5-1A	2.50	0.50
	Bioswale	A 472+03	I5-1B	0.99	0.20
	Bioswale	A 484+43	I5-1C	10.79	2.16
	Bioswale	578+34	I5-1D	2.52	0.50
	Biostrip	583+06	I5-1E	1.65	0.33
	Biostrip	583+81	I5-1F	1.38	0.28
	Biostrip	591+50	I5-1G	1.75	0.35
	Biostrip	590+69	I5-1H	1.24	0.25
	Bioswale	682+40	I5-1I	2.36	0.47
	Bioswale	702+03	I5-1J	4.27	0.85
	Bioswale	849+52	I5-1K	2.25	0.45
	Bioswale	864+54	I5-1L	1.52	0.30
	Bioswale	918+04	I5-1M	4.47	0.89
	Bioswale	A 391+81	I5-3	4.93	0.99
	Bioswale	A 300 + 94	I5-6	5.20	1.04
	Bioswale	A 249 + 23	I5-7	1.51	0.30
	Bioswale	A 211 + 05	I5-8	1.50	0.30

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)
	Bioswale	3799+48	I5-9	2.60	0.52
	Total			62.82	12.56
13	Bioswale	73+97	BMP-13	4.30	0.86
	Bioswale	A 425+52	I5-1	9.39	1.88
	Bioswale	A 391+81	I5-3	4.93	0.99
	Bioswale	A 300 + 94	I5-6	5.20	1.04
	Bioswale	A 249 + 23	I5-7	1.51	0.30
	Bioswale	A 211 + 05	I5-8	1.50	0.30
	Bioswale	3799+48	I5-9	2.60	0.52
	Total			29.43	5.89
14	Bioswale	400+00	BMP5	4.20	0.84
	Bioswale	275+00	BMP11	7.30	1.46
	Bioswale	255+00	BMP12	4.90	0.98
	Bioswale	202+27	BMP15	4.50	0.90
	Bioswale	193+59	BMP16	3.70	0.74
	Bioswale	3799+48	I5-9	2.60	0.52
	Total			27.20	5.44
17	Bioswale	81+85	BMP11	14.60	2.92
	Bioswale	249 + 23	I5-7	1.51	0.30
	Bioswale	211 + 05	I5-8	1.50	0.30
	Bioswale	3799+48	I5-9	2.60	0.52
	Total			20.21	4.04
18	Bioswale	534+00	18-05	1.83	0.37
	Bioswale	547+50 (Left)	18-06	3.47	0.69
	Bioswale	547+50 (Right)	18-07	3.47	0.69
	Bioswale	589+00	18-08	4.88	0.98
	Bioswale	593+00	18-09	3.09	0.62
	Bioswale	616+00	18-15	3.63	0.73

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)
	Bioswale	627+00	18-16	1.33	0.27
	Bioswale	644+00	18-17	1.39	0.28
	Bioswale	649+80	18-18	1.09	0.22
	Bioswale	661+50	18-19	2.53	0.51
	Bioswale	682+00	18-21	1.92	0.38
	Bioswale	702+00	18-22	1.16	0.23
	Bioswale	706+00	18-23	1.37	0.27
	Bioswale	718+50	18-24	1.87	0.37
	Bioswale	773+00	18-27	4.40	0.88
	Bioswale	15+20	18-30	1.01	0.20
	Bioswale	30+00	18-31	0.88	0.18
	Total			39.32	7.87
21	BSW	A 425+52	I5-1	9.39	1.88
	BSW	A 464+78	I5-1A	2.50	0.50
	BSW	A 472+03	I5-1B	0.99	0.20
	BSW	A 484+43	I5-1C	10.79	2.16
	BSW	578+34	I5-1D	2.52	0.50
	BST	583+06	I5-1E	1.65	0.33
	BST	583+81	I5-1F	1.38	0.28
	BST	591+50	I5-1G	1.75	0.35
	BST	590+69	I5-1H	1.24	0.25
	BSW	682+40	I5-1I	2.36	0.47
	BSW	A 391+81	I5-3	4.93	0.99
	BSW	A 300+94	I5-6	5.20	1.04
	BSW	A 249+23	I5-7	1.51	0.30
	BSW	A 211+05	I5-8	1.50	0.30
	BSW	3799+48	I5-9	2.60	0.52
	BSW	170+63	BMP-03	3.99	0.80

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)
	BSW	141+99	BMP-04	1.78	0.36
	BSW	117+62	BMP-05	9.23	1.85
	BSW	180+67	BMP-09	4.56	0.91
	Total			69.87	13.99

Detention Devices, Checklist T-1, Part 5

- The proposed detention devices would be designed to attenuate storm flows (hydromodification control) as well as treatment of the WQV. Therefore, these devices would be considered dual purpose facilities. The detention basins would incorporate low impact design (LID) features to reduce the rate of runoff, filter pollutants out of runoff and facilitate the infiltration of water into the ground.
- The detention basins for the SCTRE alternatives would be designed as hydromodification control facilities to mitigate the potential for increased runoff volumes and flows in the smaller generally first and second order tributaries located between the tollway and the creeks. These controls are necessary only where outflow is directed to erosive hillside channels and are not necessary where outflow is directed to creeks where discharge velocities will remain below erosive levels.

The sizing criteria for the detention devices is based on hydromodification control requirements and the WQV, as identified in the PPDG (Caltrans, 2017). For the Project area, the WQV was calculated by multiplying the amount of impervious surface (in acres) by the water quality depth of 0.72 inches. The water quality depth is an approximate depth for the Orange County area as determined using the Basin Sizer program (CSUS, 2017).

- The potential BMP locations for proposed Detention Devices for the SCTRE alternatives are displayed in Table 12. The feasibility and design for these treatment locations will be further developed during later phases of the project.

Table 12. Detention Devices

Alternative	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Volume (ft ³)
9	477+00	09-01	4.34	11,183
	492+50	09-02	3.95	10,189
	526+00	09-03	3.37	8,698
	528+50	09-04	5.01	12,920
	652+00	09-14	1.42	3,663
	672+00	09-20	1.47	3,777
	TOTAL		19.56	50,428
11	1071+63	I5-1N	1.58	4,310
	397+86	I5-2	3.10	8,433
	3784+24	I5-11	23.30	63,434
	Total		27.98	76.177
12	397+86	I5-2	3.10	8,433
	3784+24	I5-11	23.30	63,434
	Total		26.4	71,867
13	393+00	BMP-1	9.70	26,408
	368+00	BMP-2	9.30	25,319
	304+00	BMP-3	5.90	16,063
	283+00	BMP-4	6.90	18,785
	268+00	BMP-5	6.60	17,969
	258+00	BMP-6	3.40	9,257
	245+00	BMP-7	2.60	7,079
	235+00	BMP-8	10.80	29,403
	195+00	BMP-9	5.70	15,518
	160+00	BMP-10	2.30	7,569
	129+00	BMP-11	11.40	31,037

Alternative	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Volume (ft³)
	85+00	BMP-12	11.80	32,126
	397+86	I5-2	3.10	8,433
	3784+24	I5-11	23.30	63,434
	Total		112.80	308,400
14	550+00	BMP1	12.30	32,147
	510+00	BMP2	7.40	19,341
	465+00	BMP3	14.00	36,590
	425+00	BMP4	7.10	18,557
	375+00	BMP6	7.90	20,647
	360+00	BMP7	7.30	19,079
	335+00	BMP8	2.70	7,057
	315+00	BMP9	2.30	6,011
	305+00	BMP10	3.60	14,270
	240+00	BMP13	2.80	7,318
	223+00	BMP14	6.50	21,693
	3784+24	I5-11	23.30	60,897
	Total		97.20	263,607
17	393+00	BMP1	13.20	35,458
	368+00	BMP2	9.20	24,713
	325+00	BMP3	4.90	13,162
	295+00	BMP4	6.80	18,266
	285+00	BMP5	14.00	37,607
	245+00	BMP6	10.00	26,862
	207+50	BMP7	5.60	15,043
	185+00	BMP8	7.60	21,382
	155+00	BMP9	5.50	14,935

Alternative	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Volume (ft³)
	115+00	BMP10	11.20	30,085
	3784+23	I5-11	23.30	62,588
	Total		111.30	300,101
18	477+00	18-01	4.34	11,183
	492+50	18-02	3.95	10,189
	526+00	18-03	3.37	8,698
	528+50	18-04	5.01	12,920
	672+00	18-20	1.47	3,777
	737+00	18-25	3.34	8,598
	758+00	18-26	3.08	7,927
	787+00	18-28	1.50	3,872
	787+00	18-29	1.39	3,571
	44+00	18-32	4.56	11,754
	56+00	18-33	3.10	7,988
	780+00	18-34	0.97	2,492
	Total		36.08	92,969
21	397+86	I5-2	3.10	8,433
	3784+24	I5-11	23.30	63,434
	200+29	BMP-01	9.20	25,038
	186+97	BMP-02	3.44	9,371
	198+65	BMP-06	1.09	2,969
	192+00	BMP-07	4.16	11,324
	187+30	BMP-08	1.32	3,604
	Total		45.61	124,173

Table E-1. Overall Project Treatment Summary Table¹ – 9

		PCTA (ac) ²	A = 54
Total Area to be Treated		Treated Impervious Area (CT RW) (ac)	B = 59
		Treated Impervious Area (Outside CT RW) (ac) ³	C = 0
		PCTA Balance (ac) ⁴	D = (B+C) – A 5 = (59 + 0) – 54

Table E-1. Overall Project Treatment Summary Table¹ – 11

		PCTA (ac) ²	A = 80
Total Area to be Treated		Treated Impervious Area (CT RW) (ac)	B = 92.07
		Treated Impervious Area (Outside CT RW) (ac) ³	C = 0
		PCTA Balance (ac) ⁴	D = (B+C) – A 12.07 = (92.07 + 0) - 80

Table E-1. Overall Project Treatment Summary Table – 12

		Post Construction Treatment Area (ac)	70
Total Treated Area		Treated Impervious Area (CT RW) (ac)	90.49
		Treated Impervious Area (Outside CT RW) (ac)	0
		Post Construction Treatment Balance (ac)	D = (B+C) – A 20.49 = (90.49 + 0) – 70

Table E-1. Overall Project Treatment Summary Table – 13

		Post Construction Treatment Area (ac)	129
Total Treated Area		Treated Impervious Area (CT RW) (ac)	143.50
		Treated Impervious Area (Outside CT RW) (ac)	0
		Post Construction Treatment Balance (ac)	14.5 = (143.50 + 0) – 129

Table E-1. Overall Project Treatment Summary Table – 14

		Post Construction Treatment Area (ac)	283
Total Treated Area		Treated Impervious Area (CT RW) (ac)	124.81
		Treated Impervious Area (Outside CT RW) (ac)	0
		Post Construction Treatment Balance (ac) ³	-158.9 = (124.81+0) – 283

Table E-1. Overall Project Treatment Summary Table – 17

		Post Construction Treatment Area (ac)	330
Total Treated Area		Treated Impervious Area (CT RW) (ac)	131.92
		Treated Impervious Area (Outside CT RW) (ac)	0
		Post Construction Treatment Balance (ac)	-198.08 = (131.92+0) – 330

Table E-1. Overall Project Treatment Summary Table¹ – 18

		PCTA (ac) ²	A = 82
Total Area to be Treated	Treated Impervious Area (CT RW) (ac)	B = 84	
	Treated Impervious Area (Outside CT RW) (ac) ³	C = 0	
		PCTA Balance (ac) ⁴	D = (B+C) – A 2 = (84 + 0) – 82

Table E-1. Overall Project Treatment Summary Table¹ – 21

		PCTA (ac) ²	A = 77
Total Area to be Treated	Treated Impervious Area (CT RW) (ac)	B = 117	
	Treated Impervious Area (Outside CT RW) (ac) ³	C = 0	
		PCTA Balance (ac) ⁴	D = (B+C) – A 40 = (117 + 0) – 77

- ¹ This table is provided as an example. The table may be edited, altered, or removed as applicable or as directed by the District/Regional Design Stormwater Coordinator.
- ² Provide treatment for ATA 1 even if NIS is less than 1 acre.
- ³ Requires Regional Board approval. Coordinate with District/Regional NPDES Coordinator.
- ⁴ If less than 0, additional treatment must be identified.

Required Attachments

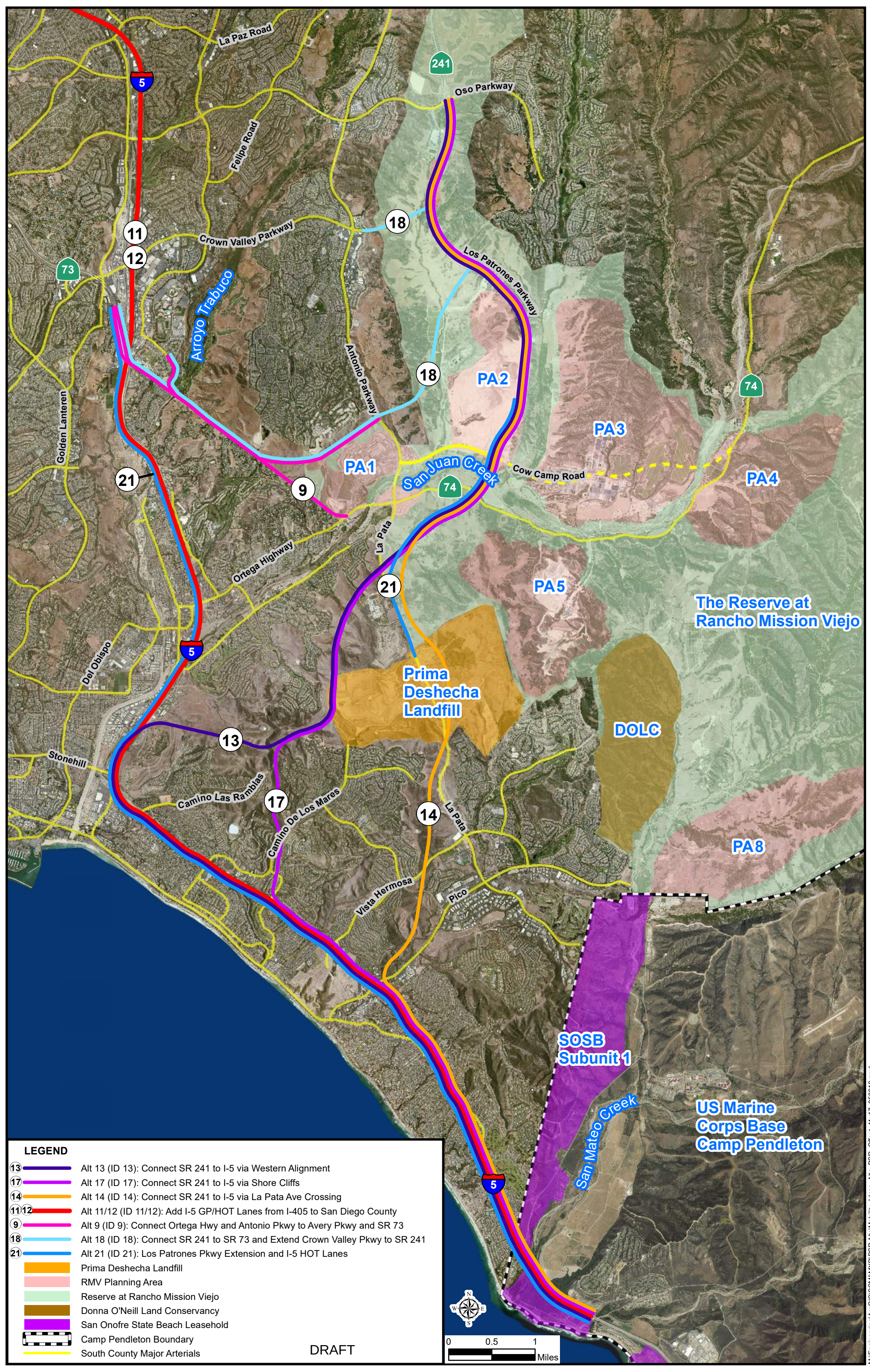
- Vicinity Map
- Evaluation Documentation Form (EDF)
- Risk Level Determination Documentation

Supplemental Attachments

- Calculations and supporting information for sizing Treatment BMPs or DPP BMPs or claiming post construction treatment or CUs
- Plans showing BMP deployment (e.g., Layout Sheets, Drainage Sheets, Water Pollution Control Sheets)
- SWDR Summary Spreadsheet
- Documentation of Rapid Stability Assessment findings

REQUIRED ATTACHMENTS

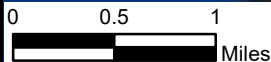
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LEGEND

- Alt 13 (ID 13): Connect SR 241 to I-5 via Western Alignment
- Alt 17 (ID 17): Connect SR 241 to I-5 via Shore Cliffs
- Alt 14 (ID 14): Connect SR 241 to I-5 via La Pata Ave Crossing
- Alt 11/12 (ID 11/12): Add I-5 GP/HOT Lanes from I-405 to San Diego County
- Alt 9 (ID 9): Connect Ortega Hwy and Antonio Pkwy to Avery Pkwy and SR 73
- Alt 18 (ID 18): Connect SR 241 to SR 73 and Extend Crown Valley Pkwy to SR 241
- Alt 21 (ID 21): Los Patrones Pkwy Extension and I-5 HOT Lanes
- Prima Deshecha Landfill
- RMV Planning Area
- Reserve at Rancho Mission Viejo
- Donna O'Neill Land Conservancy
- San Onofre State Beach Leasehold
- Camp Pendleton Boundary
- South County Major Arterials

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DATE: August 2018

Project ID (EA): 12-0Q680K

No.	Criteria	Yes ✓	No ✓	Supplemental Information for Evaluation
1.	Begin Project evaluation regarding requirement for implementation of Treatment BMPs	✓		See Figure 4-1, Project Evaluation Process for Consideration of Treatment BMPs. Continue to 2.
2.	Is the scope of the Project to install Treatment BMPs (e.g., Alternative Compliance or TMDL Compliance Units)?		✓	If Yes , go to 8. If No , continue to 3.
3.	Is there a direct or indirect discharge to surface waters?	✓		If Yes , continue to 4. If No , go to 9.
4.	As defined in the WQAR or ED, does the project: a. discharge to areas of Special Biological Significance (ASBS), or b. discharge to a TMDL watershed where Caltrans is named stakeholder, or c. have other pollution control requirements for surface waters within the project limits?		✓	If Yes to any , contact the District/Regional Design Stormwater Coordinator or District/Regional NPDES Coordinator to discuss the Department's obligations, go to 8 or 5. _____(Dist./Reg. Coordinator initials) If No to all, continue to 5.
		✓		
		✓		
5.	Are any existing Treatment BMPs partially or completely removed? (ATA condition #1, Section 4.4.1)		✓	If Yes , go to 8 AND continue to 6. If No , continue to 6.
6.	Is this a Routine Maintenance Project?		✓	If Yes , go to 9. If No , continue to 7.
7.	Does the project result in an increase of <u>one acre or more</u> of new impervious surface (NIS)?	✓		If Yes , go to 8. If No , go to 9.
8.	Project is required to implement Treatment BMPs.	Complete Checklist T-1, Part 1.		
9.	Project is not required to implement Treatment BMPs. _____(Dist./Reg. Design SW Coord. Initials) _____(Project Engineer Initials) _____(Date)	Document for Project Files by completing this form and attaching it to the SWDR.		

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	A	B	C
1	Sediment Risk Factor Worksheet - Los Patrones Parkway		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		129
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.43
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.1
14			
15	Watershed Erosion Estimate (=R_xK_xLS) in tons/acre		282.897
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet		Entry	Score
LOS PATRONES PARKWAY			
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ?: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		no	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix		
LOS PATRONES PARKWAY		
<u>Receiving Water Risk</u>	<u>Sediment Risk</u>	
	Low	Medium
	High	High
Low	Level 1	Level 2
High	Level 2	Level 3

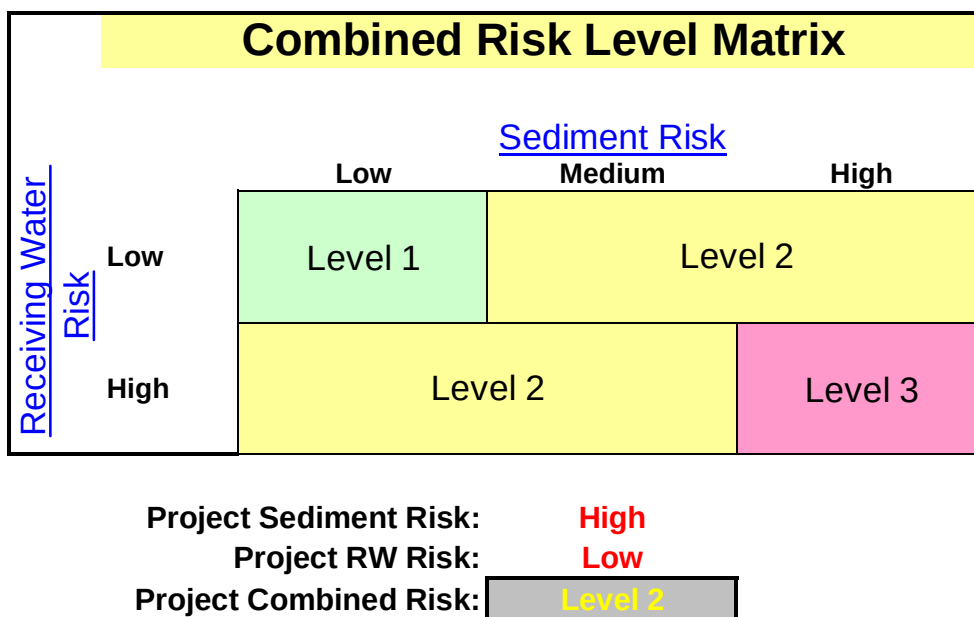
Project Sediment Risk:
High

Project RW Risk:
Low

Project Combined Risk:
Level 2

	A	B	C
1	Sediment Risk Factor Worksheet - 4901240000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		140
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.43
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.1
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		307.02
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901240000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			



	A	B	C
1	Sediment Risk Factor Worksheet - 4901260000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		129
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.16
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		213.0048
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901260000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix			
<u>Receiving Water Risk</u>	<u>Sediment Risk</u>		
	Low	Medium	High
	Low	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **High**
 Project RW Risk: **Low**
 Project Combined Risk: **Level 2**

	A	B	C
1	Sediment Risk Factor Worksheet - 4901260000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		129
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.16
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		213.0048
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901260000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix			
<u>Receiving Water Risk</u>	<u>Sediment Risk</u>		
	Low	Medium	High
	Low	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **High**
 Project RW Risk: **Low**
 Project Combined Risk: **Level 2**

	A	B	C
1	Sediment Risk Factor Worksheet - 4901270000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		129
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.53
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		228.2784
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

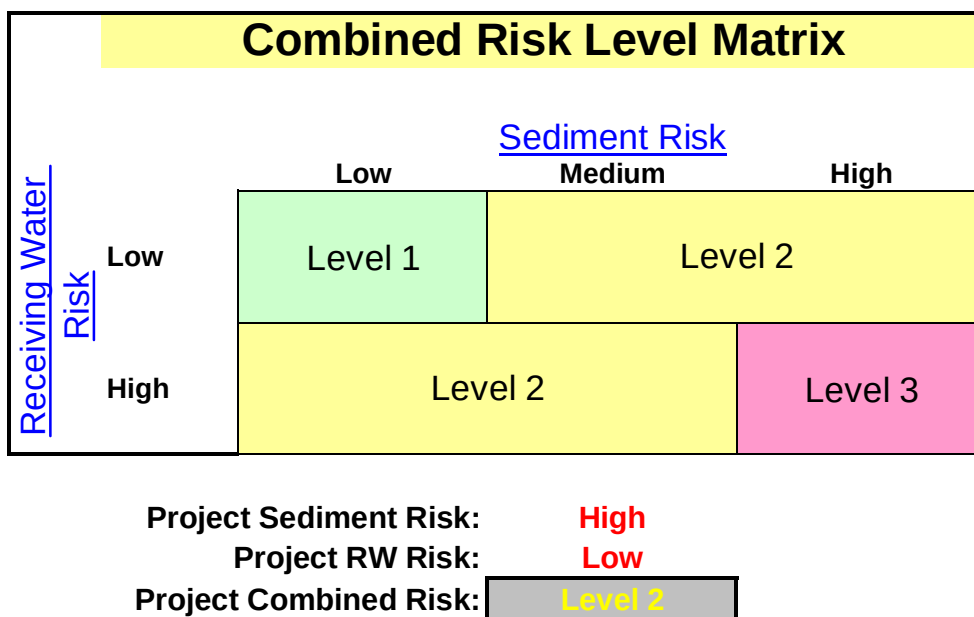
Receiving Water (RW) Risk Factor Worksheet - 4901270000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix			
<u>Receiving Water Risk</u>	<u>Sediment Risk</u>		
	Low	Medium	High
	Low	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **High**
 Project RW Risk: **Low**
 Project Combined Risk: **Level 2**

	A	B	C
1	Sediment Risk Factor Worksheet - 4901280000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		130
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.53
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		230.048
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901280000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			



	A	B	C
1	Sediment Risk Factor Worksheet - 4901310000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		129
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		5.29
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		218.3712
16	Site Sediment Risk Factor		High
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

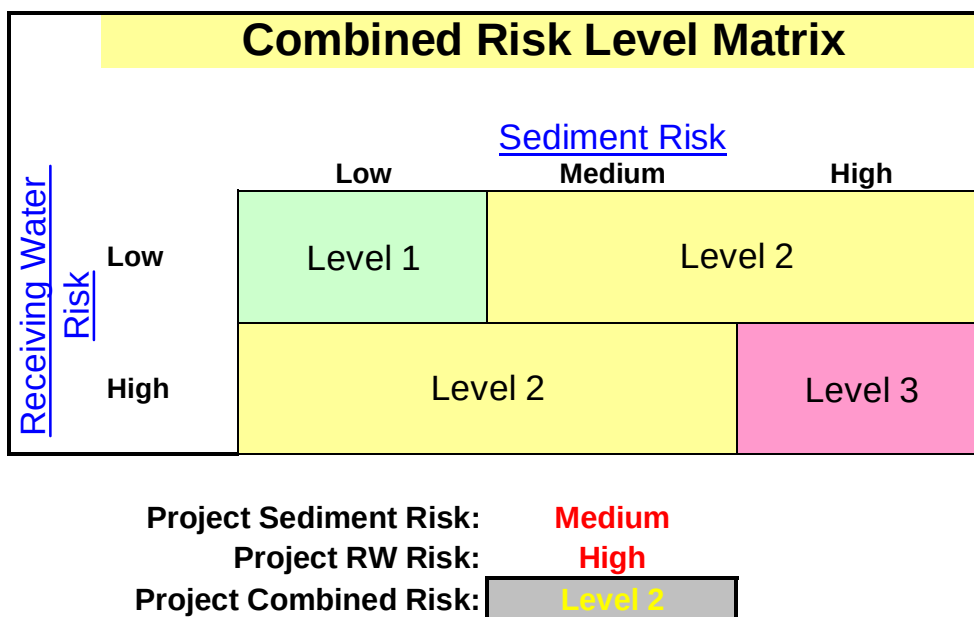
Receiving Water (RW) Risk Factor Worksheet - 4901310000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		YES	High
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix			
<u>Receiving Water Risk</u>	<u>Sediment Risk</u>		
	Low	Medium	High
	Low	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **High**
 Project RW Risk: **High**
 Project Combined Risk: **Level 3**

	A	B	C
1	Sediment Risk Factor Worksheet - 4901320000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		120
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.2
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		2.93
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		70.32
16	Site Sediment Risk Factor		Medium
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901320000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		YES	High
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			



	A	B	C
1	Sediment Risk Factor Worksheet - 4901400000		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		113
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.2
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		2.72
14			
15	Watershed Erosion Estimate (=RxKxLS) in tons/acre		61.472
16	Site Sediment Risk Factor		Medium
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet - 4901400000		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		NO	Low
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix				
4901400000				
		<u>Sediment Risk</u>		
		Low	Medium	High
<u>Receiving Water Risk</u>	Low	Level 1	Level 2	
	High	Level 2		Level 3

Project Sediment Risk: **Medium**
 Project RW Risk: **Low**
 Project Combined Risk: **Level 2**

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Facility Information – Los Patrones Parkway

- Start Date: 01/02/2024
- End Date: 01/29/2027
- Latitude: 33.552777777778
- Longitude: -117.59611111111

Erosivity Index Calculator Results

An erosivity index value of **129** has been determined for the construction period of **01/02/2024 - 01/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information

- Start Date: 1/2/2024
- End Date: 1/29/2027
- Latitude: 33.585833333333
- Longitude: -117.61166666667

Erosivity Index Calculator Results

An erosivity index value of **140** has been determined for the construction period of **1/2/2024 - 1/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information - 4901260000

- Start Date: 1/2/2024
- End Date: 1/29/2027
- Latitude: 33.516111111111
- Longitude: -117.61027777778

Erosivity Index Calculator Results

An erosivity index value of **129** has been determined for the construction period of **1/2/2024 - 1/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information

- Start Date: 1/2/2024
- End Date: 1/29/2027
- Latitude: 33.481666666667
- Longitude: -117.66916666667

Erosivity Index Calculator Results

An erosivity index value of **129** has been determined for the construction period of **1/2/2024 - 1/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information

- Start Date: 01/02/2024
- End Date: 1/31/2027
- Latitude: 33.505833333333
- Longitude: -117.625

Erosivity Index Calculator Results

An erosivity index value of **130** has been determined for the construction period of **01/02/2024 - 1/31/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information

- Start Date: 1/2/2024
- End Date: 1/29/2027
- Latitude: 33.451944444444
- Longitude: -117.64277777778

Erosivity Index Calculator Results

An erosivity index value of **129** has been determined for the construction period of **1/2/2024 - 1/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

Facility Information

- Start Date: 1/2/2024
- End Date: 1/29/2027
- Latitude: 33.4386111111111
- Longitude: -117.622777777778

Erosivity Index Calculator Results

An erosivity index value of **120** has been determined for the construction period of **1/2/2024 - 1/29/2027**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction.

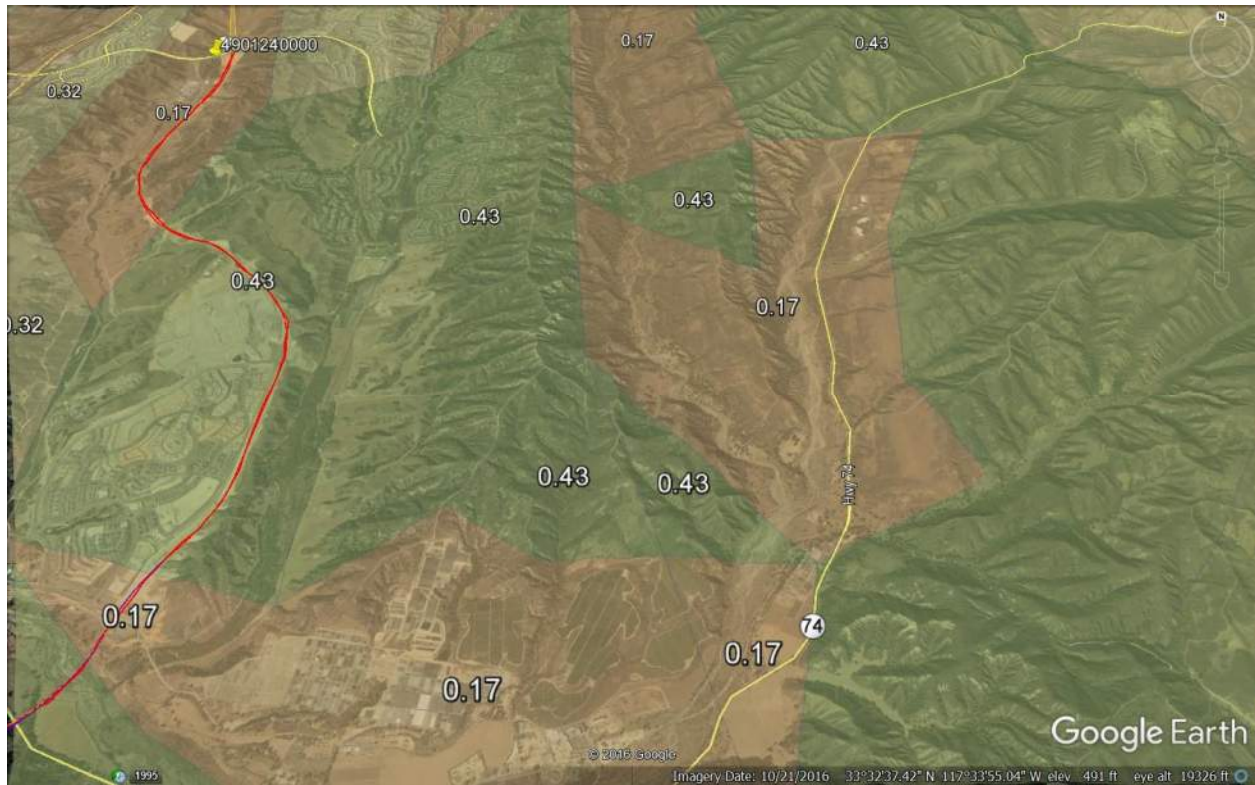
4901400000

Facility Information

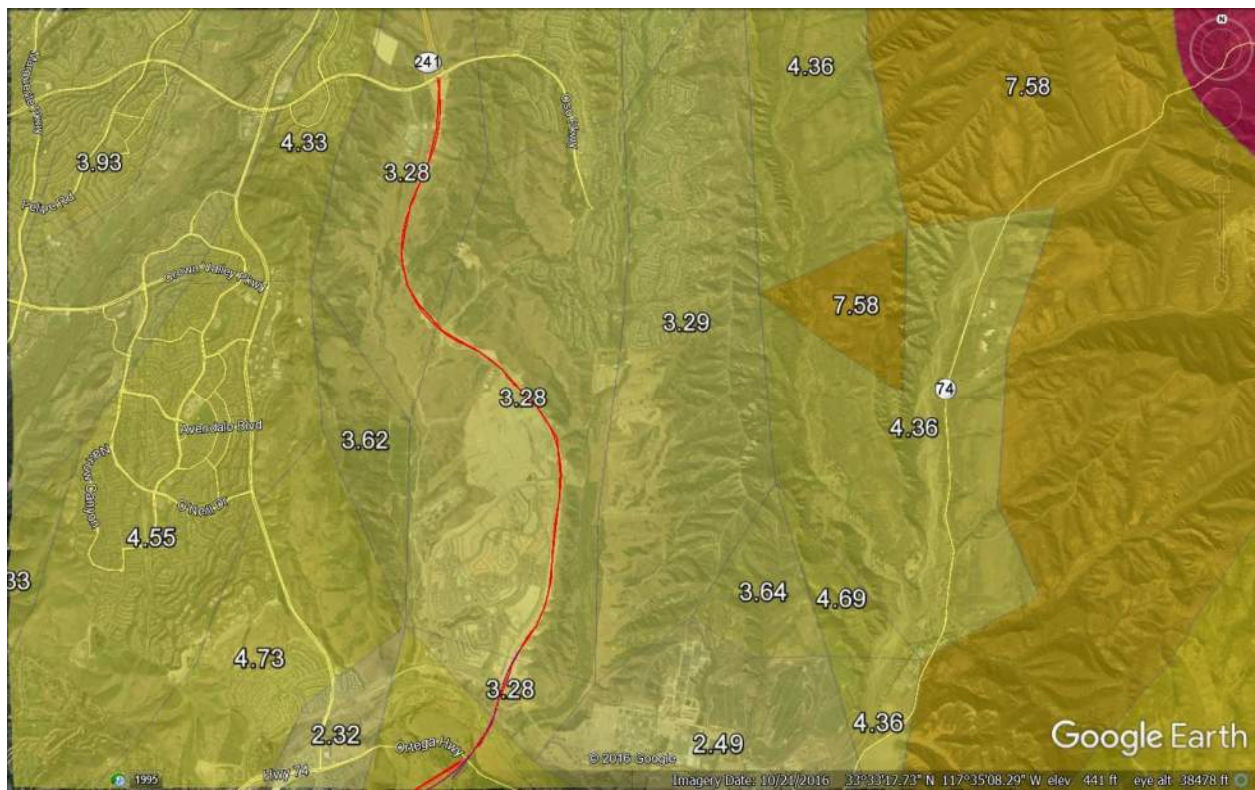
- Start Date: 01/02/2024
- End Date: 01/29/2027
- Latitude: 33.3886111111111
- Longitude: -117.588055555556

Erosivity Index Calculator Results

An erosivity index value of **113** has been determined for the construction period of **01/02/2024** - **01/29/2027**.



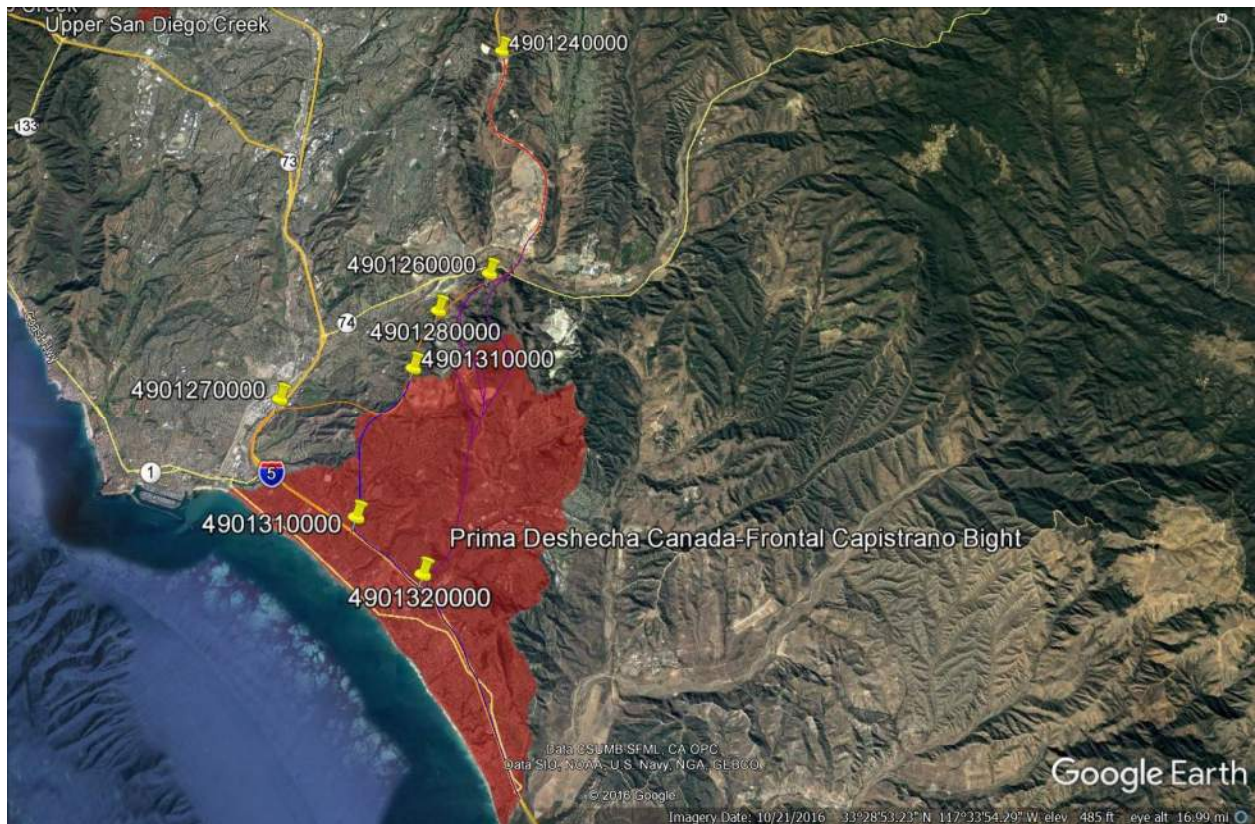
K Factor – Los Patrones Parkway



LS Factor – Los Patrones Parkway



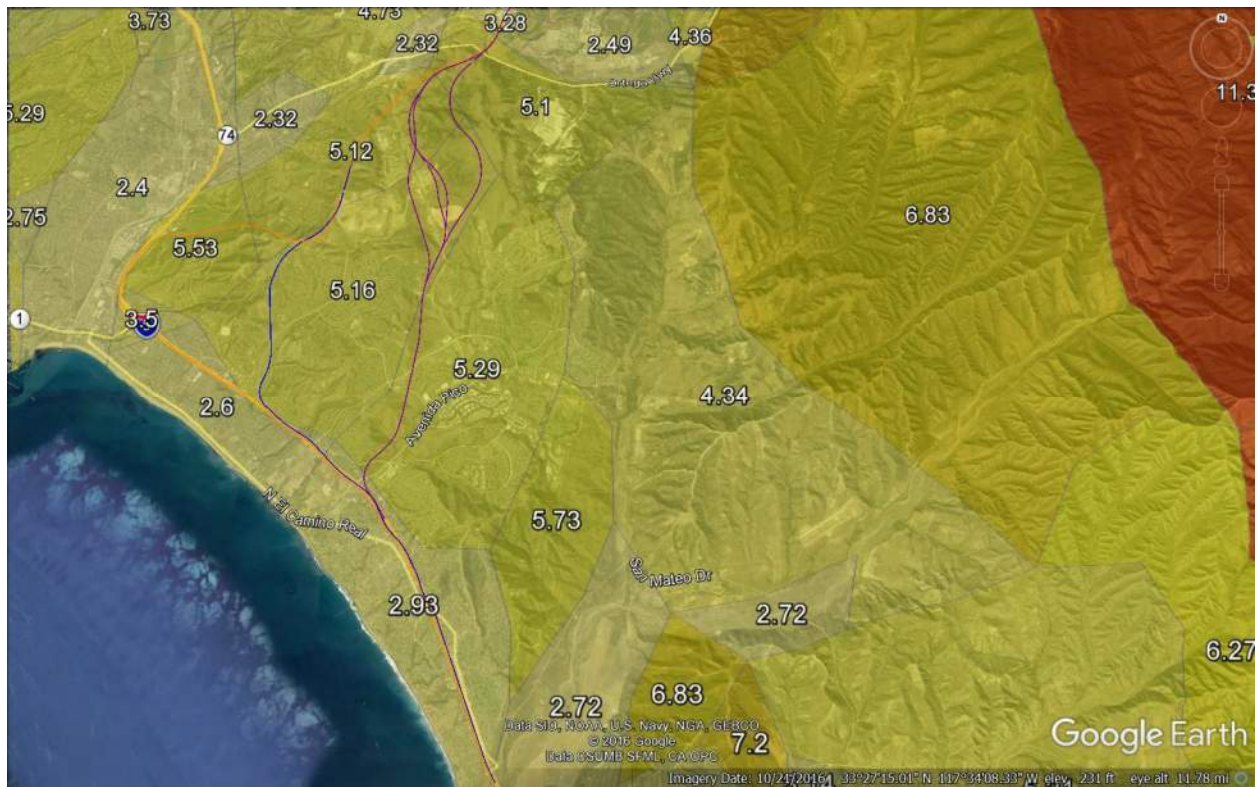
Receiving Water Risk Factor – Los Patrones Parkway



Planning Watersheds



K FACTOR



LS FACTOR



HIGH RISK RECEIVING WATERSHED WITHIN PROJECT AREA



San Mateo Watershed – K factor



San Mateo Watershed – LS Factor

DRAFT



San Mateo Watershed – Receiving Water Risk

SUPPLEMENTAL ATTACHMENTS

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Created By: MAGDate: 1/4/2018

Checked By: MSMDate: 1/4/2018

BMP CALCULATIONS FOR
ALTERNATIVE 11

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
A 425+52	I5-1	BSW	409178	9.39	9.39	0.00	1.00	1.88	25574	0.42	0.38	5	TRUE	18.00	130.00	1.00	2.00	10	4.00
A 464+78	I5-1A	BSW	108859	2.50	2.50	0.00	1.00	0.50	6804	0.26	0.35	25	TRUE	12.00	390.00	1.00	1.00	4	4.00
A 472+03	I5-1B	BSW	43067	0.99	0.99	0.00	1.00	0.20	2692	0.20	0.21	23	TRUE	12.00	270.00	1.00	1.00	4	4.00
A 484+43	I5-1C	BSW	470049	10.79	10.79	0.00	1.00	2.16	29378	0.49	0.38	10	TRUE	18.00	280.00	1.00	2.75	10	4.00
578+34	I5-1D	BSW	109806	2.52	2.52	0.00	1.00	0.50	6863	0.26	0.35	6	TRUE	12.00	100.00	1.00	1.00	4	4.00
583+06	I5-1E	BST	72023	1.65	1.65	0.00	1.00	0.33	4501					10.00	659.00				4.00
583+81	I5-1F	BST	60107	1.38	1.38	0.00	1.00	0.28	3757					10.00	551.00				4.00
591+50	I5-1G	BST	76048	1.75	1.75	0.00	1.00	0.35	4753					10.00	700.00				4.00
590+69	I5-1H	BST	54169	1.24	1.24	0.00	1.00	0.25	3386					10.00	500.00				4.00
682+40	I5-1I	BSW	102611	2.36	2.36	0.00	1.00	0.47	6413	0.26	0.34	6	TRUE	12.00	100.00	1.00	1.00	4	4.00
702+03	I5-1J	BSW	185947	4.27	4.27	0.00	1.00	0.85	11622	0.36	0.42	6	TRUE	12.00	125.00	1.00	1.50	4	4.00
849+52	I5-1K	BSW	98179	2.25	2.25	0.00	1.00	0.45	6136	0.25	0.33	7	TRUE	12.00	100.00	1.00	1.00	4	4.00
864+54	I5-1L	BSW	66093	1.52	1.52	0.00	1.00	0.30	4131	0.22	0.27	5	TRUE	12.00	65.00	1.00	1.00	4	4.00
918+04	I5-1M	BSW	194700	4.47	4.47	0.00	1.00	0.89	12169	0.36	0.43	5	TRUE	12.00	105.00	1.00	1.50	4	4.00
1071+63	I5-1N	DB	68966	1.58	1.58	0.00	1.00		4310					44.00	128.00	0.77			3.00
397+86	I5-2	DB	134925	3.10	3.10	0.00	1.00		8433					78.00	153.00	0.71			3.00
A 391+81	I5-3	BSW	214591	4.93	4.93	0.00	1.00	0.99	13412	0.36	0.30	6	TRUE	16.00	120.00	1.00	2.00	8	4.00
A 364+04	I5-4	DPP	37384	0.86	0.86	0.00	1.00		2337					175.00	200.00	0.07			3.00
A 300+94	I5-6	BSW	226326	5.20	5.20	0.00	1.00	1.04	14145	0.49	0.24	7	TRUE	16.00	200.00	1.00	5.00	8	4.00
A 249+23	I5-7	BSW	65795	1.51	1.51	0.00	1.00	0.30	4112	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
A 211+05	I5-8	BSW	65498	1.50	1.50	0.00	1.00	0.30	4094	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	7090	0.18	0.31	9	TRUE	16.00	100.00	1.00	0.50	8	4.00
A 59+16	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1128					30.00	120.00	0.31			3.00
3784+24	I5-11	DB	1014948	23.30	23.30	0.00	1.00		63434					70.00	400.00	2.27			3.00
Total				92.07	92.07	0.00													

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Created By: MAG Date: 1/4/2018
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BMP CALCULATIONS FOR ALTERNATIVE 12

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
A 425+52	I5-1	BSW	409178	9.39	9.39	0.00	1.00	1.88	25574	0.42	0.38	5	TRUE	18.00	130.00	1.00	2.00	10	4.00
A 464+78	I5-1A	BSW	108859	2.50	2.50	0.00	1.00	0.50	6804	0.26	0.35	25	TRUE	12.00	390.00	1.00	1.00	4	4.00
A 472+03	I5-1B	BSW	43067	0.99	0.99	0.00	1.00	0.20	2692	0.20	0.21	23	TRUE	12.00	270.00	1.00	1.00	4	4.00
A 484+43	I5-1C	BSW	470049	10.79	10.79	0.00	1.00	2.16	29378	0.49	0.38	10	TRUE	18.00	280.00	1.00	2.75	10	4.00
578+34	I5-1D	BSW	109806	2.52	2.52	0.00	1.00	0.50	6863	0.26	0.35	6	TRUE	12.00	100.00	1.00	1.00	4	4.00
583+06	I5-1E	BST	72023	1.65	1.65	0.00	1.00	0.33	4501					10.00	659.00				4.00
583+81	I5-1F	BST	60107	1.38	1.38	0.00	1.00	0.28	3757					10.00	551.00				4.00
591+50	I5-1G	BST	76048	1.75	1.75	0.00	1.00	0.35	4753					10.00	700.00				4.00
590+69	I5-1H	BST	54169	1.24	1.24	0.00	1.00	0.25	3386					10.00	500.00				4.00
682+40	I5-1I	BSW	102611	2.36	2.36	0.00	1.00	0.47	6413	0.26	0.34	6	TRUE	12.00	100.00	1.00	1.00	4	4.00
702+03	I5-1J	BSW	185947	4.27	4.27	0.00	1.00	0.85	11622	0.36	0.42	6	TRUE	12.00	125.00	1.00	1.50	4	4.00
849+52	I5-1K	BSW	98179	2.25	2.25	0.00	1.00	0.45	6136	0.25	0.33	7	TRUE	12.00	100.00	1.00	1.00	4	4.00
864+54	I5-1L	BSW	66093	1.52	1.52	0.00	1.00	0.30	4131	0.22	0.27	5	TRUE	12.00	65.00	1.00	1.00	4	4.00
918+04	I5-1M	BSW	194700	4.47	4.47	0.00	1.00	0.89	12169	0.36	0.43	5	TRUE	12.00	105.00	1.00	1.50	4	4.00
397+86	I5-2	DB	134925	3.10	3.10	0.00	1.00		8433					78.00	153.00	0.71			3.00
A 391+81	I5-3	BSW	214591	4.93	4.93	0.00	1.00	0.99	13412	0.36	0.30	6	TRUE	16.00	120.00	1.00	2.00	8	4.00
A 364+04	I5-4	DPP	37384	0.86	0.86	0.00	1.00		2337					175.00	200.00	0.07			3.00
A 300+94	I5-6	BSW	226326	5.20	5.20	0.00	1.00	1.04	14145	0.49	0.24	7	TRUE	16.00	200.00	1.00	5.00	8	4.00
A 249+23	I5-7	BSW	65795	1.51	1.51	0.00	1.00	0.30	4112	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
A 211+05	I5-8	BSW	65498	1.50	1.50	0.00	1.00	0.30	4094	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	7090	0.18	0.31	9	TRUE	16.00	100.00	1.00	0.50	8	4.00
A 59+16	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1128					30.00	120.00	0.31			3.00
3784+24	I5-11	DB	1014948	23.30	23.30	0.00	1.00		63434					70.00	400.00	2.27			3.00
Total				90.49	90.49	0.00													

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BMP CALCULATIONS
FOR ALTERNATIVE 13

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
393+00	1	DB	422532	9.70	9.70	0.00	1.00		26408					175.00	250.00	0.60			3.00
368+00	2	DB	405108	9.30	9.30	0.00	1.00		25319					80.00	340.00	0.93			3.00
304+00	3	DB	257004	5.90	5.90	0.00	1.00		16063					80.00	220.00	0.91			3.00
283+00	4	DB	300564	6.90	6.90	0.00	1.00		18785					80.00	280.00	0.84			3.00
268+00	5	DB	287496	6.60	6.60	0.00	1.00		17969					80.00	250.00	0.90			3.00
258+00	6	DB	148104	3.40	3.40	0.00	1.00		9257					80.00	140.00	0.83			3.00
245+00	7	DB	113256	2.60	2.60	0.00	1.00		7079					80.00	110.00	0.80			3.00
235+00	8	DB	470448	10.80	10.80	0.00	1.00		29403					100.00	350.00	0.84			3.00
195+00	9	DB	248292	5.70	5.70	0.00	1.00		15518					80.00	240.00	0.81			3.00
160+00	10	DB	135036	3.10	2.30	0.80	0.90		7569					80.00	125.00	0.76			3.00
129+00	11	DB	496584	11.40	11.40	0.00	1.00		31037					80.00	460.00	0.84			3.00
85+00	12	DB	514008	11.80	11.80	0.00	1.00		32126					80.00	440.00	0.91			3.00
73+97	13	BSW	187308	4.30	4.30	0.00	1.00	0.86	11707	0.21	0.37	50	TRUE	18.00	625.00	1.00	0.50	10.00	4.00
Total				91.50	90.70	0.80													

BMP Calculations along I-5

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
A 425+52	I5-1	BSW	409178	9.39	9.39	0.00	1.00	1.88	25574	0.42	0.38	5	TRUE	18.00	130.00	1.00	2.00	10	4.00
397+86	I5-2	DB	134925	3.10	3.10	0.00	1.00		8433					78.00	153.00	0.71			3.00
A 391+81	I5-3	BSW	214591	4.93	4.93	0.00	1.00	0.99	13412	0.36	0.30	6	TRUE	16.00	120.00	1.00	2.00	8	4.00
A 364+04	I5-4	DPP	37384	0.86	0.86	0.00	1.00		2337					175.00	200.00	0.07			3.00
A 300+94	I5-6	BSW	226326	5.20	5.20	0.00	1.00	1.04	14145	0.49	0.24	7	TRUE	16.00	200.00	1.00	5.00	8	4.00
A 249+23	I5-7	BSW	65795	1.51	1.51	0.00	1.00	0.30	4112	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
A 211+05	I5-8	BSW	65498	1.50	1.50	0.00	1.00	0.30	4094	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	7090	0.18	0.31	9	TRUE	16.00	100.00	1.00	0.50	8	4.00
A 59+16	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1128					30.00	120.00	0.31			3.00
3784+24	I5-11	DB	1014948	23.30	23.30	0.00	1.00		63434					70.00	400.00	2.27			3.00
Total				52.80	52.80	0.00													

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BMP CALCULATIONS FOR ALTERNATIVE 21

Station	BMP	TYPE	A (SQFT)	A _{TOTAL} (Ac)	A _{IMP} (Ac)	A _{LANDSCAPE} (Ac)	C _{COMP}	Q _{WOF} (cfs)	Vol _{WOF} (CF)	V _{WOF} (fps)	D _{WOF} (ft)	HRT (min)	CRITERIA	>C	W (ft)	L (ft)	D (ft)	S _L (%)	Bottom Width (ft)	Side Slope
A 425+52	I5-1	BSW	409178	9.39	9.39	0.00	1.00	1.88	25574	0.42	0.38	5	1939.372	TRUE	18.00	130.00	1.00	2.00	10	4.00
A 464+78	I5-1A	BSW	108859	2.50	2.50	0.00	1.00	0.50	6804	0.26	0.35	25	16483.52	TRUE	12.00	390.00	1.00	1.00	4	4.00
A 472+03	I5-1B	BSW	43067	0.99	0.99	0.00	1.00	0.20	2692	0.20	0.21	23	32142.86	TRUE	12.00	270.00	1.00	1.00	4	4.00
A 484+43	I5-1C	BSW	470049	10.79	10.79	0.00	1.00	2.16	29378	0.49	0.38	10	3068.897	TRUE	18.00	280.00	1.00	2.75	10	4.00
578+34	I5-1D	BSW	109806	2.52	2.52	0.00	1.00	0.50	6863	0.26	0.35	6	4226.543	TRUE	12.00	100.00	1.00	1.00	4	4.00
583+06	I5-1E	BST	72023	1.65	1.65	0.00	1.00	0.33	4501						10.00	659.00				4.00
583+81	I5-1F	BST	60107	1.38	1.38	0.00	1.00	0.28	3757						10.00	551.00				4.00
591+50	I5-1G	BST	76048	1.75	1.75	0.00	1.00	0.35	4753						10.00	700.00				4.00
590+69	I5-1H	BST	54169	1.24	1.24	0.00	1.00	0.25	3386						10.00	500.00				4.00
682+40	I5-1I	BSW	102611	2.36	2.36	0.00	1.00	0.47	6413	0.26	0.34	6	4350.853	TRUE	12.00	100.00	1.00	1.00	4	4.00
397+86	I5-2	DB	134925	3.10	3.10	0.00	1.00		8433						78.00	153.00	0.71			3.00
A 391+81	I5-3	BSW	214591	4.93	4.93	0.00	1.00	0.99	13412	0.36	0.30	6	3086.42	TRUE	16.00	120.00	1.00	2.00	8	4.00
A 364+04	I5-4	DPP	37384	0.86	0.86	0.00	1.00		2337						175.00	200.00	0.07			3.00
A 300+94	I5-6	BSW	226326	5.20	5.20	0.00	1.00	1.04	14145	0.49	0.24	7	3470.776	TRUE	16.00	200.00	1.00	5.00	8	4.00
A 249+23	I5-7	BSW	65795	1.51	1.51	0.00	1.00	0.30	4112	0.18	0.32	9	9645.062	TRUE	12.00	100.00	1.00	0.50	4	4.00
A 211+05	I5-8	BSW	65498	1.50	1.50	0.00	1.00	0.30	4094	0.18	0.32	9	9645.062	TRUE	12.00	100.00	1.00	0.50	4	4.00
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	7090	0.18	0.31	9	9956.193	TRUE	16.00	100.00	1.00	0.50	8	4.00
A 59+16	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1128						30.00	120.00	0.31			3.00
3784+24	I5-11	DB	1014948	23.30	23.30	0.00	1.00		63434						70.00	400.00	2.27			3.00
200+29	BMP-01	DB	400601	9.20	9.20	0.00	1.00		25038						120.00	240.00	0.87			3.00
186+97	BMP-02	DB	149931	3.44	3.44	0.00	1.00		9371						75.00	100.00	1.25			3.00
170+63	BMP-03	BSW	173819	3.99	3.99	0.00	1.00	0.80	10864	0.36	0.31	5	2489.048	TRUE	14.00	100.00	1.00	2.00	6	4.00
141+99	BMP-04	BSW	77369	1.78	1.78	0.00	1.00	0.36	4836	0.34	0.22	5	3932.054	TRUE	12.00	100.00	1.00	3.00	4	4.00
117+62	BMP-05	BSW	401872	9.23	9.23	0.00	1.00	1.85	25117	0.49	0.33	5	1766.941	TRUE	18.00	140.00	1.00	3.20	10	4.00
"LP" 198+65	BMP-06	DB	47505	1.09	1.09	0.00	1.00		2969						100.00	100.00	0.30			3.00
"LP" 192+00	BMP-07	DB	181188	4.16	4.16	0.00	1.00		11324						100.00	100.00	1.13			3.00
"LP" 187+30	BMP-08	DB	57660	1.32	1.32	0.00	1.00		3604						100.00	50.00	0.72			3.00
"LP" 180+67	BMP-09	BSW	198445	4.56	4.56	0.00	1.00	0.91	12403	0.46	0.36	5	1837.849	TRUE	12.00	140.00	1.00	3.00	4	4.00
Total				116.74	116.74	0.00														

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BMP CALCULATIONS FOR ALTERNATIVE 9

BMP No.	BMP STA	BMP Type	Imp Area (SF)	Imp Area (AC)	WQF (CFS)	WQV (CF)	Vwq	WQD	HRT (MINUTE S)	CRITERIA	>C	BW(Ft)	W(Ft)	L(Ft)	D (Ft)	S(%)
09-01	477+00	DB	189,000	4.34		11183							60	120	3.0	
09-02	492+50	DB	172,200	3.95		10189							40	200	2.6	
09-03	526+00	DB	147,000	3.37		8698							50	100	3.4	
09-04	528+50	DB	218,359	5.01		12920							100	200	1.8	
09-05	534+00	BSW	79,800	1.83	0.37	4722	0.29	0.15	5.75	7927.071	TRUE	8	9.19	100	1.0	3
09-06	547+50 (L)	BSW	151,200	3.47	0.69	8946	0.36	0.22	5.56	4208.754	TRUE	8	9.72	120	1.0	3
09-07	547+50 R	BSW	151,200	3.47	0.69	8946	0.36	0.22	5.56	4208.754	TRUE	8	9.72	120	1.0	3
09-08	589+00	BSW	212,520	4.88	0.98	12574	0.41	0.26	5.69	3203.222	TRUE	8	10.12	140	1.0	3
09-09	593+00	BSW	157,080	3.61	0.72	9294	0.37	0.22	5.41	3984.328	TRUE	8	9.77	120	1.0	3
09-10	608+00	BSW	84,000	1.93	0.39	4970	0.29	0.15	5.75	7927.071	TRUE	8	9.23	100	1.0	3
09-11	614+00	BSW	77,280	1.77	0.35	4572	0.29	0.15	5.75	7927.071	TRUE	8	9.16	100	1.0	3
09-12	628+00	BSW	142,800	3.28	0.66	8449	0.36	0.21	5.56	4409.171	TRUE	8	9.68	120	1.0	3
09-13	645+50	BSW	63,000	1.45	0.29	3728	0.26	0.13	6.41	11379.15	TRUE	8	9	100	1.0	3
09-14	652+00	DB	61,908	1.42		3663							50	100	1.9	
09-15	616+00	BSW	157,920	3.63	0.73	9,344	0.37	0.22	5.41	3984.328	TRUE	8	9.78	120	1.0	3
09-16	627+00	BSW	57,960	1.33	0.27	3,429	0.28	0.15	5.95	8503.401	TRUE	6	7.17	100	1.0	3
09-17	644+00	BSW	60,480	1.39	0.28	3,578	0.28	0.15	5.95	8503.401	TRUE	6	7.19	100	1.0	3
09-18	649+80	BSW	47,460	1.09	0.22	2,808	0.27	0.14	6.17	9798.158	TRUE	6	7.04	100	1.0	3
09-19	661+50	BSW	110,040	2.53	0.51	6,511	0.32	0.18	5.21	5425.347	TRUE	8	9.44	100	1.0	3
09-20	672+00	DB	63,840	1.47		3777							50	100	1.9	
09-35	562+00	NIA	71,507	1.64		4231							100	120	1.5	
09-36	610+00	NIA	16,350	0.38		967							40	80	1.4	
09-37	635+00	NIA	52,931	1.22		3132							70	140	1.4	
09-38	654+00	NIA	38,725	0.89		2291							60	120	1.4	
TOTAL FOR ID 9			2,584,560	59.33	7.13	152,920										

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BMP CALCULATIONS FOR
ALTERNATIVE 14 CONNECTOR

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
550+00	1	DB	535788	12.30	12.30	0.00	1.00		32147					175.00	200.00	0.92			
510+00	2	DB	322344	7.40	7.40	0.00	1.00		19341					80.00	280.00	0.86			
465+00	3	DB	609840	14.00	14.00	0.00	1.00		36590					80.00	550.00	0.83			
425+00	4	DB	309276	7.10	7.10	0.00	1.00		18557					80.00	290.00	0.80			
400+00	5	BSW	182952	4.20	4.20	0.00	1.00	0.84	10977	0.41	0.19	24	TRUE	18.00	600.00	1.00	4.50	10.00	4.00
375+00	6	DB	344124	7.90	7.90	0.00	1.00		20647					80.00	325.00	0.79			
360+00	7	DB	317988	7.30	7.30	0.00	1.00		19079					80.00	300.00	0.79			
335+00	8	DB	117612	2.70	2.70	0.00	1.00		7057					80.00	120.00	0.74			
315+00	9	DB	100188	2.30	2.30	0.00	1.00		6011					80.00	100.00	0.75			
305+00	10	DB	291852	6.70	3.60	3.10	0.81		14270					80.00	150.00	1.19			
275+00	11	BSW	317988	7.30	7.30	0.00	1.00	1.46	19079	0.37	0.30	50	TRUE	20.00	1100.00	1.00	2.00	12.00	4.00
255+00	12	BSW	213444	4.90	4.90	0.00	1.00	0.98	12807	0.43	0.18	31	TRUE	20.00	800.00	1.00	5.00	12	4.00
240+00	13	DB	121968	2.80	2.80	0.00	1.00		7318					80.00	120.00	0.76			
223+00	14	DB	413820	9.50	6.50	3.00	0.87		21693					95.00	200.00	1.14			
202+27	15	BSW	196020	4.50	4.50	0.00	1.00	0.90	11761	0.21	0.37	52	TRUE	18.00	650.00	1.00	0.50	10	4.00
193+59	16	BSW	161172	3.70	3.70	0.00	1.00	0.74	9670	0.20	0.33	46	TRUE	18.00	550.00	1.00	0.50	10	4.00
Total				104.60	98.50	6.10													

BMP Calculations along I-5

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)			(ft)	(ft)	(ft)	(%)		
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	6806	0.18	0.31	9	TRUE	16.00	100.00	1.00	0.50	8	4.00
3860+75	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1083					30.00	120.00	0.30			3.00
3784+24	I5-11	DB	1014948	23.30	23.30	0.00	1.00		60897					70.00	400.00	2.17			3.00
Total				26.32	26.32	0.00													

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BMP CALCULATIONS
FOR ALTERNATIVE 17

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S _L	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
393+00	1	DB	574992	13.20	13.20	0.00	1.00		35458					150.00	250.00	0.95			3.00
368+00	2	DB	400752	9.20	9.20	0.00	1.00		24713					80.00	330.00	0.94			3.00
325+00	3	DB	213444	4.90	4.90	0.00	1.00		13162					80.00	200.00	0.82			3.00
295+00	4	DB	296208	6.80	6.80	0.00	1.00		18266					80.00	275.00	0.83			3.00
285+00	5	DB	609840	14.00	14.00	0.00	1.00		37607					80.00	510.00	0.92			3.00
245+00	6	DB	435600	10.00	10.00	0.00	1.00		26862					80.00	400.00	0.84			3.00
207+50	7	DB	243936	5.60	5.60	0.00	1.00		15043					80.00	225.00	0.84			3.00
185+00	8	DB	357192	8.20	7.60	0.60	0.97		21382					125.00	200.00	0.86			3.00
155+00	9	DB	243936	5.60	5.50	0.10	0.99		14935					80.00	250.00	0.75			3.00
115+00	10	DB	487872	11.20	11.20	0.00	1.00		30085					80.00	400.00	0.94			3.00
81+85	11	BSW	635976	14.60	14.60	0.00	1.00	2.92	39219	0.43	0.49	47	TRUE	20.00	1200.00	1.00	1.50	12.00	4.00
Total				103.30	102.60	0.70													

BMP Calculations along I-5

Station	BMP	TYPE	A	A _{TOTAL}	A _{IMP}	A _{LANDSCAPE}	C _{COMP}	Q _{WQF}	Vol _{WQV}	V _{WQF}	D _{WQF}	HRT	>C	W	L	D	S	Bottom Width	Side Slope
			(SQFT)	(Ac)	(Ac)	(Ac)		(cfs)	(CF)	(fps)	(ft)	(min)		(ft)	(ft)	(ft)	(%)	(ft)	
249+23	I5-7	BSW	65795	1.51	1.51	0.00	1.00	0.30	4057	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
211+05	I5-8	BSW	65498	1.50	1.50	0.00	1.00	0.30	4039	0.18	0.32	9	TRUE	12.00	100.00	1.00	0.50	4	4.00
3799+48	I5-9	BSW	113435	2.60	2.60	0.00	1.00	0.52	6995	0.18	0.31	9	TRUE	16.00	100.00	1.00	0.50	8	4.00
59+16	I5-10	DPP	18049	0.41	0.41	0.00	1.00		1113					30.00	120.00	0.31			3.00
3784+23	I5-11	DB	1014948	23.30	23.30	0.00	1.00		62588					70.00	400.00	2.24			3.00
Total				29.33	29.33	0.00													

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BMP CALCULATIONS FOR ALTERNATIVE 18

BMP No.	BMP STA	BMP Type	Imp Area (AC)	WQF (CFS)	WQV (CF)	Vwq	WQD	HRT (MINUTE S)	CRITERIA	>C	BW(Ft)	W(Ft)	L(Ft)	D (Ft)	S(%)
18-01	477+00	DB	4.34		11,183							60	120	3.0	
18-02	492+50	DB	3.95		10,189							40	200	2.6	
18-03	526+00	DB	3.37		8,698							50	100	3.4	
18-04	528+50	DB	5.01		12,920							100	200	1.8	
18-05	534+00	BSW	1.83	0.37	4,722	0.29	0.15	5.75	7927.071	TRUE	8	9.19	100	1.0	3
18-06	547+50 (L)	BSW	3.47	0.69	8,946	0.36	0.22	5.56	4208.754	TRUE	8	9.72	120	1.0	3
18-07	547+50 R	BSW	3.47	0.69	8,946	0.36	0.22	5.56	4208.754	TRUE	8	9.72	120	1.0	3
18-08	589+00	BSW	4.88	0.98	12,574	0.41	0.26	5.69	3203.222	TRUE	8	10.12	140	1.0	3
18-09	593+00	BSW	3.09	0.62	7,952	0.35	0.2	5.71	4897.959	TRUE	8	9.62	120	1.0	3
18-15	616+00	BSW	3.63	0.73	9,344	0.37	0.22	5.41	3984.328	TRUE	8	9.78	120	1.0	3
18-16	627+00	BSW	1.33	0.27	3,429	0.28	0.15	5.95	8503.401	TRUE	6	7.17	100	1.0	3
18-17	644+00	BSW	1.39	0.28	3,578	0.28	0.15	5.95	8503.401	TRUE	6	7.19	100	1.0	3
18-18	649+80	BSW	1.09	0.22	2,808	0.27	0.14	6.17	9798.158	TRUE	6	7.04	100	1.0	3
18-19	661+50	BSW	2.53	0.51	6,511	0.32	0.18	5.21	5425.347	TRUE	8	9.44	100	1.0	3
18-20	672+00	DB	1.47		3,777							50	100	1.9	
18-21	682+00	BSW	1.92	0.38	4,945	0.29	0.15	5.75	7927.071	TRUE	8	9.21	100	1.0	3
18-22	702+00	BSW	1.16	0.23	2,982	0.27	0.14	6.17	9798.158	TRUE	6	7.12	100	1.0	3
18-23	706+00	BSW	1.37	0.27	3,529	0.26	0.13	6.41	11379.15	TRUE	8	9.06	100	1.0	3
18-24	718+50	BSW	1.87	0.37	4,821	0.29	0.15	5.75	7927.071	TRUE	8	9.23	100	1.0	3
18-25	737+00	DB	3.34		8,598							50	100	3.4	
18-26	758+00	DB	3.08		7,927							50	100	3.1	
18-27	773+00	BSW	4.40	0.88	11,330	0.46	0.32	7.97	3249.055	TRUE	6	7.90	220	1.0	3
18-28	787+00	DB	1.50		3,872							50	100	1.9	
18-29	787+00	DB	1.39		3,571							50	100	1.9	
18-30	15+20	BSW	1.01	0.20	2,609	0.26	0.13	6.41	11379.15	TRUE	8	9.06	100	1.0	3
18-31	30+00	BSW	0.88	0.18	2,281	0.36	0.21	5.56	4409.171	TRUE	8	9.70	120	1.0	3
18-32	44+00	DB	4.56		11,754							60	120	3.1	
18-33	56+00	DB	3.10		7,988							50	100	3.2	
18-34	780+00	DB	0.97		2,492							50	100	1.6	
18-35	562+00	NIA	1.64		4,231							100	120	1.5	
18-36	610+00	NIA	0.38		967							40	80	1.4	
18-37	635+00	NIA	1.22		3,132							70	140	1.4	
18-38	654+00	NIA	0.89		2,291							60	120	1.4	
18-39	692+00	NIA	2.34		6,031							100	162	1.5	
18-40	727+00	NIA	2.50		6,446							100	175	1.5	
TOTAL			84.34	7.86	217,371										

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**BMP SUMMARY FOR
 ALTERNATIVE 9 AND
 ALTERNATIVE 18**

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
9	DB	477+00	09-01	4.34		11,183
	DB	492+50	09-02	3.95		10,189
	DB	526+00	09-03	3.37		8,698
	DB	528+50	09-04	5.01		12,920
	BSW	534+00	09-05	1.83	0.37	4,722
	BSW	547+50 (Left)	09-06	3.47	0.69	8,946
	BSW	547+50 (Right)	09-07	3.47	0.69	8,946
	BSW	589+00	09-08	4.88	0.98	12,574
	BSW	593+00	09-09	3.61	0.72	9,294
	BSW	608+00	09-10	1.93	0.39	4,970
	BSW	614+00	09-11	1.77	0.35	4,572
	BSW	628+00	09-12	3.28	0.66	8,449
	BSW	645+50	09-13	1.45	0.29	3,728
	DB	652+00	09-14	1.42		3,663
	BSW	616+00	09-15	3.63	0.73	9,344
	BSW	627+00	09-16	1.33	0.27	3,429
	BSW	644+00	09-17	1.39	0.28	3,578
	BSW	649+80	09-18	1.09	0.22	2,808
	BSW	661+50	09-19	2.53	0.51	6,511
	DB	672+00	09-20	1.47		3,777
	NIA	562+00	09-35	1.64		4,231
	NIA	610+00	09-36	0.38		967
	NIA	635+00	09-37	1.22		3,132
	NIA	654+00	09-38	0.89		2,291
			Total	59.35	7.15	152,922
	DB	477+00	18-01	4.34		11,183

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Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
18	DB	492+50	18-02	3.95		10,189
	DB	526+00	18-03	3.37		8,698
	DB	528+50	18-04	5.01		12,920
	BSW	534+00	18-05	1.83	0.37	4,722
	BSW	547+50 (Left)	18-06	3.47	0.69	8,946
	BSW	547+50 (Right)	18-07	3.47	0.69	8,946
	BSW	589+00	18-08	4.88	0.98	12,574
	BSW	593+00	18-09	3.09	0.62	7,952
	BSW	616+00	18-15	3.63	0.73	9,344
	BSW	627+00	18-16	1.33	0.27	3,429
	BSW	644+00	18-17	1.39	0.28	3,578
	BSW	649+80	18-18	1.09	0.22	2,808
	BSW	661+50	18-19	2.53	0.51	6,511
	DB	672+00	18-20	1.47		3,777
	BSW	682+00	18-21	1.92	0.38	4,945
	BSW	702+00	18-22	1.16	0.23	2,982
	BSW	706+00	18-23	1.37	0.27	3,529
	BSW	718+50	18-24	1.87	0.37	4,821
	DB	737+00	18-25	3.34		8,598
	DB	758+00	18-26	3.08		7,927
	BSW	773+00	18-27	4.40	0.88	11,330
	DB	787+00	18-28	1.50		3,872
	DB	787+00	18-29	1.39		3,571
	BSW	15+20	18-30	1.01	0.20	2,609
	BSW	30+00	18-31	0.88	0.18	2,281
	DB	44+00	18-32	4.56		11,754
	DB	56+00	18-33	3.10		7,988
	DB	780+00	18-34	0.97		2,492
	NIA	562+00	18-35	1.64		4,231
	NIA	610+00	18-36	0.38		967
	NIA	635+00	18-37	1.22		3,132

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Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
	NIA	654+00	18-38	0.89		2,291
	NIA	692+00	18-39	2.34		6,031
	NIA	727+00	18-40	2.50		6,446
			Total	84.37	7.87	217374

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**BMP SUMMARY FOR ALTERNATIVES
 11, 12, 13, 14 AND 17**

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
11	Bioswale	A 425+52	I5-1	9.39	1.88	25574
	Bioswale	A 464+78	I5-1A	2.50	0.50	6804
	Bioswale	A 472+03	I5-1B	0.99	0.20	2692
	Bioswale	A 484+43	I5-1C	10.79	2.16	29378
	Bioswale	578+34	I5-1D	2.52	0.50	6863
	Biostrip	583+06	I5-1E	1.65	0.33	4501
	Biostrip	583+81	I5-1F	1.38	0.28	3757
	Biostrip	591+50	I5-1G	1.75	0.35	4753
	Biostrip	590+69	I5-1H	1.24	0.25	3386
	Bioswale	682+40	I5-1I	2.36	0.47	6413
	Bioswale	702+03	I5-1J	4.27	0.85	11622
	Bioswale	849+52	I5-1K	2.25	0.45	6136
	Bioswale	864+54	I5-1L	1.52	0.30	4131
	Bioswale	918+04	I5-1M	4.47	0.89	12169
	Detention Basin	1071+63	I5-1N	1.58		4310
	Detention Basin	397+86	I5-2	3.10		8433
	Bioswale	A 391+81	I5-3	4.93	0.99	13412
	DPP	A 364+04	I5-4	0.86		2337
	Bioswale	A 300+94	I5-6	5.20	1.04	14145
	Bioswale	A 249+23	I5-7	1.51	0.30	4112
	Bioswale	A 211+05	I5-8	1.50	0.30	4094
	Bioswale	3799+48	I5-9	2.60	0.52	7090
	DPP	A 59+16	I5-10	0.41		1128
	Detention Basin	3784+24	I5-11	23.30		63434
			Total	92.07	12.56	250674
	Bioswale	A 425+52	I5-1	9.39	1.88	25574

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Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
12	Bioswale	A 464+78	I5-1A	2.50	0.50	6804
	Bioswale	A 472+03	I5-1B	0.99	0.20	2692
	Bioswale	A 484+43	I5-1C	10.79	2.16	29378
	Bioswale	578+34	I5-1D	2.52	0.50	6863
	Biostrip	583+06	I5-1E	1.65	0.33	4501
	Biostrip	583+81	I5-1F	1.38	0.28	3757
	Biostrip	591+50	I5-1G	1.75	0.35	4753
	Biostrip	590+69	I5-1H	1.24	0.25	3386
	Bioswale	682+40	I5-1I	2.36	0.47	6413
	Bioswale	702+03	I5-1J	4.27	0.85	11622
	Bioswale	849+52	I5-1K	2.25	0.45	6136
	Bioswale	864+54	I5-1L	1.52	0.30	4131
	Bioswale	918+04	I5-1M	4.47	0.89	12169
	Detention Basin	397+86	I5-2	3.10		8433
	Bioswale	A 391+81	I5-3	4.93	0.99	13412
	DPP	A 364+04	I5-4	0.86		2337
	Bioswale	A 300 + 94	I5-6	5.20	1.04	14145
	Bioswale	A 249 + 23	I5-7	1.51	0.30	4112
	Bioswale	A 211 + 05	I5-8	1.50	0.30	4094
	Bioswale	3799+48	I5-9	2.60	0.52	7090
	DPP	A 59+16	I5-10	0.41		1128
	Detention Basin	3784+24	I5-11	23.30		63434
			Total	90.49	12.56	246364
	Detention Basin	393+00	BMP-1	9.70		26408
	Detention Basin	368+00	BMP-2	9.30		25319
	Detention Basin	304+00	BMP-3	5.90		16063
	Detention Basin	283+00	BMP-4	6.90		18785
	Detention Basin	268+00	BMP-5	6.60		17969
	Detention Basin	258+00	BMP-6	3.40		9257
	Detention Basin	245+00	BMP-7	2.60		7079
	Detention Basin	235+00	BMP-8	10.80		29403

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Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
13	Detention Basin	195+00	BMP-9	5.70		15518
	Detention Basin	160+00	BMP-10	2.30		7569
	Detention Basin	129+00	BMP-11	11.40		31037
	Detention Basin	85+00	BMP-12	11.80		32126
	Bioswale	73+97	BMP-13	4.30	0.86	11707
	Bioswale	A 425+52	I5-1	9.39	1.88	25574
	Detention Basin	397+86	I5-2	3.10		8433
	Bioswale	A 391+81	I5-3	4.93	0.99	13412
	DPP	A 364+04	I5-4	0.86		2337
	Bioswale	A 300 + 94	I5-6	5.20	1.04	14145
	Bioswale	A 249 + 23	I5-7	1.51	0.30	4112
	Bioswale	A 211 + 05	I5-8	1.50	0.30	4094
	Bioswale	3799+48	I5-9	2.60	0.52	7090
	DPP	A 59+16	I5-10	0.41		1128
	Detention Basin	3784+24	I5-11	23.30		63434
	Total			143.50	5.89	391999
14	Detention Basin	550+00	BMP1	12.30		32147
	Detention Basin	510+00	BMP2	7.40		19341
	Detention Basin	465+00	BMP3	14.00		36590
	Detention Basin	425+00	BMP4	7.10		18557
	Bioswale	400+00	BMP5	4.20	0.84	10977
	Detention Basin	375+00	BMP6	7.90		20647
	Detention Basin	360+00	BMP7	7.30		19079
	Detention Basin	335+00	BMP8	2.70		7057
	Detention Basin	315+00	BMP9	2.30		6011
	Detention Basin	305+00	BMP10	3.60		14270
	Bioswale	275+00	BMP11	7.30	1.46	19079
	Bioswale	255+00	BMP12	4.90	0.98	12807
	Detention Basin	240+00	BMP13	2.80		7318
	Detention Basin	223+00	BMP14	6.50		21693
	Bioswale	202+27	BMP15	4.50	0.90	11761

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Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
	Bioswale	193+59	BMP16	3.70	0.74	9670
	Bioswale	3799+48	I5-9	2.60	0.52	6806
	DPP	3860+75	I5-10	0.41		1083
	Detention Basin	3784+24	I5-11	23.30		60897
	Total			124.81	5.44	335790
17	Detention Basin	393+00	BMP1	13.20		35458
	Detention Basin	368+00	BMP2	9.20		24713
	Detention Basin	325+00	BMP3	4.90		13162
	Detention Basin	295+00	BMP4	6.80		18266
	Detention Basin	285+00	BMP5	14.00		37607
	Detention Basin	245+00	BMP6	10.00		26862
	Detention Basin	207+50	BMP7	5.60		15043
	Detention Basin	185+00	BMP8	7.60		21382
	Detention Basin	155+00	BMP9	5.50		14935
	Detention Basin	115+00	BMP10	11.20		30085
	Bioswale	81+85	BMP11	14.60	2.92	39219
	Bioswale	249 + 23	I5-7	1.51	0.30	4057
	Bioswale	211 + 05	I5-8	1.50	0.30	4039
	Bioswale	3799+48	I5-9	2.60	0.52	6995
	DPP	59+16	I5-10	0.41		1113
	Detention Basin	3784+23	I5-11	23.30		62588
	Total			131.92	4.04	355524

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Created By: MAG
 Checked By: RSB

Date: 2/26/2018
 Date: 2/1/2018

BMP SUMMARY FOR ALTERNATIVE 21

Alternative	Device Type	Approximate Station No.	BMP ID	Impervious Tributary Area (Acres)	Water Quality Flow (cfs)	Water Quality Volume (cf)
21	Bioswale	A 425+52	I5-1	9.39	1.88	25574
	Bioswale	A 464+78	I5-1A	2.50	0.50	6804
	Bioswale	A 472+03	I5-1B	0.99	0.20	2692
	Bioswale	A 484+43	I5-1C	10.79	2.16	29378
	Bioswale	578+34	I5-1D	2.52	0.50	6863
	Biostrip	583+06	I5-1E	1.65	0.33	4501
	Biostrip	583+81	I5-1F	1.38	0.28	3757
	Biostrip	591+50	I5-1G	1.75	0.35	4753
	Biostrip	590+69	I5-1H	1.24	0.25	3386
	Bioswale	682+40	I5-1I	2.36	0.47	6413
	Detention Basin	397+86	I5-2	3.10		8433
	Bioswale	A 391+81	I5-3	4.93	0.99	13412
	DPP	A 364+04	I5-4	0.86		2337
	Bioswale	A 300+94	I5-6	5.20	1.04	14145
	Bioswale	A 249+23	I5-7	1.51	0.30	4112
	Bioswale	A 211+05	I5-8	1.50	0.30	4094
	Bioswale	3799+48	I5-9	2.60	0.52	7090
	DPP	A 59+16	I5-10	0.41		1128
	Detention Basin	3784+24	I5-11	23.30		63434
	Detention Basin	200+29	BMP-01	9.20		25038
	Detention Basin	186+97	BMP-02	3.44		9371
	Bioswale	170+63	BMP-03	3.99	0.80	10864
	Bioswale	141+99	BMP-04	1.78	0.36	4836
	Bioswale	117+62	BMP-05	9.23	1.85	25117
	Detention Basin	"LP" 198+65	BMP-06	1.09		2969
	Detention Basin	"LP" 192+00	BMP-07	4.16		11324
	Detention Basin	"LP" 187+30	BMP-08	1.32		3604
	Bioswale	"LP" 180+67	BMP-09	4.56	0.91	12403
			Total	116.75	13.99	317832

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ALTERNATIVE 11

Aliso Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																		
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																					
Date(s): 12/18/2017		☐ Modoc Plateau ☒ Coast Ranges ☐ Cascade Range ☐ Transverse Ranges ☐ Sierra Nevada ☐ Peninsular Ranges ☐ Klamath Mountains ☐ Mojave Desert ☐ Great Valley ☐ Colorado Desert ☐ Basin and Range				☐ Bedrock ☐ Cascade ☐ Step-Pool ☐ Engineered/channelized ☒ Plane-Bed ☐ Pool-Riffle ☐ Dune-Ripple ☐ Braided				<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 49</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>49 < R < 85</td> <td>41 < R < 70</td> <td>R < 54</td> </tr> <tr> <td>Fair</td> <td>85 < R < 120</td> <td>70 < R < 98</td> <td>54 < R < 129</td> </tr> <tr> <td>Poor</td> <td>120 < R</td> <td>98 < R</td> <td>129 < R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 49	R < 41	N/A	Good	49 < R < 85	41 < R < 70	R < 54	Fair	85 < R < 120	70 < R < 98	54 < R < 129	Poor	120 < R	98 < R	129 < R	Raw Score 73.5 Rating Good	
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																															
Excellent	R < 49	R < 41	N/A																															
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Persons: R. Bottcher		Site/Location: Aliso Creek		Conditions:		Identify Associated File Locations		GPS/° km		Photos		Other																						
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																																		
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)		1	2	3	4	5	6	7	8	9	10	Overview Entire Reach		Score for Reach	Notes by Cross Section																			
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Upstream	Downstream																					
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										10	10	10.0	1	Rip rap under freeway																		
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										6	6	6.0	2	Narrower, Meandering, Veg Channel																		
3	Channel pattern	2	10	5	10	10	10	5	7	5	5	2	7	6.5	3	Narrow Vegetated Channel																		
4	Entrenchment/channel confinement	8	6	6	4	4	4	4	4	4	3	8	3	4.8	4	Wider, Meandering, Veg Channel																		
5	Bed material	2	11	11	11	11	11	11	11	11	11	1	11	9.4	5	Wider, Meandering, Veg Channel																		
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	20	97	97	97	97	97	97	97	97	0	80	0		6	Wider, Meandering, Veg Channel																		
6	Bar development	2	3	3	3	3	3	3	3	3	3	1	3	2.8	7	Widened channel, Heavy Vegetation																		
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	7	5	5	5	5	5	5	5	5	8	3	7	5.4	8	Heavy Vegetation, Less Meandering																		
8	Bank soil texture and coherence	2	11	11	11	11	11	11	11	11	11	2	11	9.6	9	Heavy Vegetation, Less Meandering																		
9	Average bank slope angle	2	2	4	5	5	5	4	4	4	4	2	5	3.8	10	Heavy Vegetation, Widened																		
10	Vegetative or engineered bank protection	2	4	4	4	4	4	6	6	6	2	6	2	4.2	11																			
11	Bank erosion	2	6	4	6	7	6	5	5	5	5	2	5	4.8	12																			
12	Mass wasting or bank failure	2	5	5	5	5	5	5	5	5	1	2	5	4.2	13																			
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												2.0	D/S	Concrete lined trap channel																		
																	Wide, meandering, vegetated chnl																	

Aliso Creek Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

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ALTERNATIVE 18

Canada Chiquita Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Date(s):	12/18/2017	☐ Modoc Plateau	☒ Coast Ranges	☐ Bedrock	<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 49</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>49 < R < 85</td> <td>41 < R < 70</td> <td>R < 54</td> </tr> <tr> <td>Fair</td> <td>85 < R < 120</td> <td>70 < R < 98</td> <td>94 < R < 129</td> </tr> <tr> <td>Poor</td> <td>120 < R</td> <td>98 < R</td> <td>129 < R</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="15">R = Raw Score</td> </tr> <tr> <td>Persons:</td> <td>R. Bottcher</td> <td>☐ Cascade Range</td> <td>☐ Transverse Ranges</td> <td>☐ Cascade</td> <td colspan="10" rowspan="2"> <table border="1"> <tr> <th>Raw Score</th> <td>81.4</td> </tr> <tr> <th>Rating</th> <td>Good</td> </tr> </table> </td> </tr> <tr> <td>Site/Location</td> <td>Canada Chiquita</td> <td>☐ Sierra Nevada</td> <td>☐ Peninsular Ranges</td> <td>☐ Step-Pool</td> </tr> <tr> <td>Conditions:</td> <td></td> <td>☐ Klamath Mountains</td> <td>☐ Mojave Desert</td> <td>☐ Engineered/channelized</td> </tr> <tr> <td colspan="2">Identify Associated File Locations</td> <td>☐ Great Valley</td> <td>☐ Colorado Desert</td> <td>☒ Plane-Bed</td> <td colspan="10"></td> </tr> <tr> <td>GPS/* .kmil</td> <td></td> <td>☐ Basin and Range</td> <td></td> <td>☐ Pool-Riffle</td> <td colspan="10"></td> </tr> <tr> <td>Photos</td> <td></td> <td></td> <td></td> <td>☐ Dune-Ripple</td> <td colspan="10"></td> </tr> <tr> <td>Other</td> <td></td> <td></td> <td></td> <td>☐ Braided</td> <td colspan="10"></td> </tr> <tr> <td colspan="15">Step 4. 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Canada Chiquita Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

ALTERNATIVE 9

Horno Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																														
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																	
Date(s):	12/18/2017	☐ Modoc Plateau	☒ Coast Ranges	☐ Bedrock	<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>$R < 49$</td> <td>$R < 41$</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>$49 \leq R < 85$</td> <td>$41 \leq R < 70$</td> <td>$R \leq 54$</td> </tr> <tr> <td>Fair</td> <td>$85 \leq R < 120$</td> <td>$70 \leq R < 98$</td> <td>$94 \leq R < 129$</td> </tr> <tr> <td>Poor</td> <td>$120 \leq R$</td> <td>$98 \leq R$</td> <td>$129 \leq R$</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	$R < 49$	$R < 41$	N/A	Good	$49 \leq R < 85$	$41 \leq R < 70$	$R \leq 54$	Fair	$85 \leq R < 120$	$70 \leq R < 98$	$94 \leq R < 129$	Poor	$120 \leq R$	$98 \leq R$	$129 \leq R$	Raw Score		79.8
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																											
Excellent	$R < 49$	$R < 41$	N/A																											
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Poor	$120 \leq R$	$98 \leq R$	$129 \leq R$																											
Persons:	R. Bottcher	☐ Cascade Range	☐ Transverse Ranges	☐ Cascade	Rating		Good																							
Site/Location	Horno Creek	☐ Sierra Nevada	☐ Peninsular Ranges	☐ Step-Pool																										
Conditions:		☐ Klamath Mountains	☐ Mojave Desert	☐ Engineered/channelized																										
Identify Associated File Locations		☐ Great Valley	☐ Colorado Desert	☒ Plane-Bed																										
GPS/° km		☐ Basin and Range		☐ Pool-Riffle																										
Photos				☐ Dune-Ripple																										
Other				☐ Braided																										
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																														
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)		1	2	3	4	5	6	7	8	9	10	Notes by Cross Section																		
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐																			
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										5	10	7.5	3	Moderately vegetated														
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										6	6	6.0	4	Moderately vegetated														
3	Channel pattern	5	5	7	6	5	4	4	5	5	5	6	6	5.3	5	Heavy Vegetation														
4	Entrenchment/channel confinement	5	6	6	6	6	6	6	6	6	4	5	4	5.5	6	Heavy Vegetation														
5	Bed material	10	10	10	10	10	10	10	10	10	10	10	10	10.0	7	Slight Meandering, downstream bridge														
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	90	90	90	90	90	90	90	90	90	90	90	90		8	Heavily vegetated														
6	Bar development	4	3	3	3	3	3	3	3	3	3	5	3	3.3	9	Heavily vegetated														
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	8	5	5	5	5	8	6	6	5	5	5	5	5.7	10	Heavily vegetated														
8	Bank soil texture and coherence	11	11	11	11	11	11	11	11	11	11	11	11	11.0	11															
9	Average bank slope angle	4	4	3	3	3	3	5	5	5	5	4	7	4.3	12															
10	Vegetative or engineered bank protection	7	7	6	6	5	4	4	4	4	4	7	6	5.3	13															
11	Bank erosion	5	4	4	4	4	5	4	4	4	4	6	6	4.5	14															
12	Mass wasting or bank failure	4	4	4	4	4	4	4	5	5	5	5	5	4.4	U/S	Upstream Detention														
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												7.0	D/S	Narrows downstream with less veg														

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Horno Creek Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuts, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

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ALTERNATIVE 11 AND 12

Oso Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																		
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																					
Date(s): 12/18/2017		☐ Modoc Plateau ☒ Coast Ranges ☐ Cascade Range ☐ Transverse Ranges ☐ Sierra Nevada ☐ Peninsular Ranges ☐ Klamath Mountains ☐ Mojave Desert ☐ Great Valley ☐ Colorado Desert ☐ Basin and Range				☐ Bedrock ☐ Cascade ☐ Step-Pool ☐ Engineered/channelized ☒ Plane-Bed ☐ Pool-Riffle ☐ Dune-Ripple ☐ Braided				<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 40</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>40 < R < 85</td> <td>41 < R < 70</td> <td>R < 94</td> </tr> <tr> <td>Fair</td> <td>85 < R < 120</td> <td>70 < R < 98</td> <td>94 < R < 129</td> </tr> <tr> <td>Poor</td> <td>120 < R</td> <td>98 < R</td> <td>129 < R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 40	R < 41	N/A	Good	40 < R < 85	41 < R < 70	R < 94	Fair	85 < R < 120	70 < R < 98	94 < R < 129	Poor	120 < R	98 < R	129 < R	Raw Score 65.5 Rating Good	
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																															
Excellent	R < 40	R < 41	N/A																															
Good	40 < R < 85	41 < R < 70	R < 94																															
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Poor	120 < R	98 < R	129 < R																															
Persons: R. Bottcher																																		
Site/Location: Oso Creek																																		
Conditions:																																		
Identify Associated File Locations																																		
GPS (°/°/°) km																																		
Photos																																		
Other																																		
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																																		
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)												Overview Entire Reach		Score for Reach		Notes by Cross Section																		
		1	2	3	4	5	6	7	8	9	10	Upstream	Downstream	1																				
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐																							
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										8	10	9.0	3	Rip rap trap channel under freeway																		
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										6	6	6.0	4	Downstream 90 deg bend, veg channel																		
3	Channel pattern	2	10	3	3	3	3	4	7	7	2	3	7	4.3	5	Narrow Veg Channel																		
4	Entrenchment/channel confinement	8	6	6	6	4	4	4	4	5	8	4	7	5.5	6	Widened channel, Heavy Vegetation																		
5	Bed material	1	11	11	11	11	11	11	11	11	1	10	1	8.4	7	Widened channel, Heavy Vegetation																		
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	20	97	97	97	97	97	97	97	97	0	80	0		8	Widened channel, Heavy Vegetation																		
6	Bar development	4	3	3	3	3	3	3	3	3	3	5	3	3.3	9	Narrower, Meandering, Veg Channel																		
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	7	5	7	7	5	5	5	5	7	7	4	7	5.9	10	Concrete Lined Trap Channel																		
8	Bank soil texture and coherence	8	11	11	11	11	11	11	11	11	1	8	1	8.8	11																			
9	Average bank slope angle	2	2	3	4	2	2	2	2	4	2	2	2	2.4	12																			
10	Vegetative or engineered bank protection	2	4	4	4	4	4	6	6	6	2	6	2	4.2	13																			
11	Bank erosion	2	4	4	4	4	5	5	5	5	1	2	2	3.6	14																			
12	Mass wasting or bank failure	2	5	5	5	5	5	5	5	5	1	5	2	4.2	U/S	golf course, straight, vegetated																		
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												4.0	D/S	Concrete Lined trap channel																		

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Oso Creek Rapid Assessment

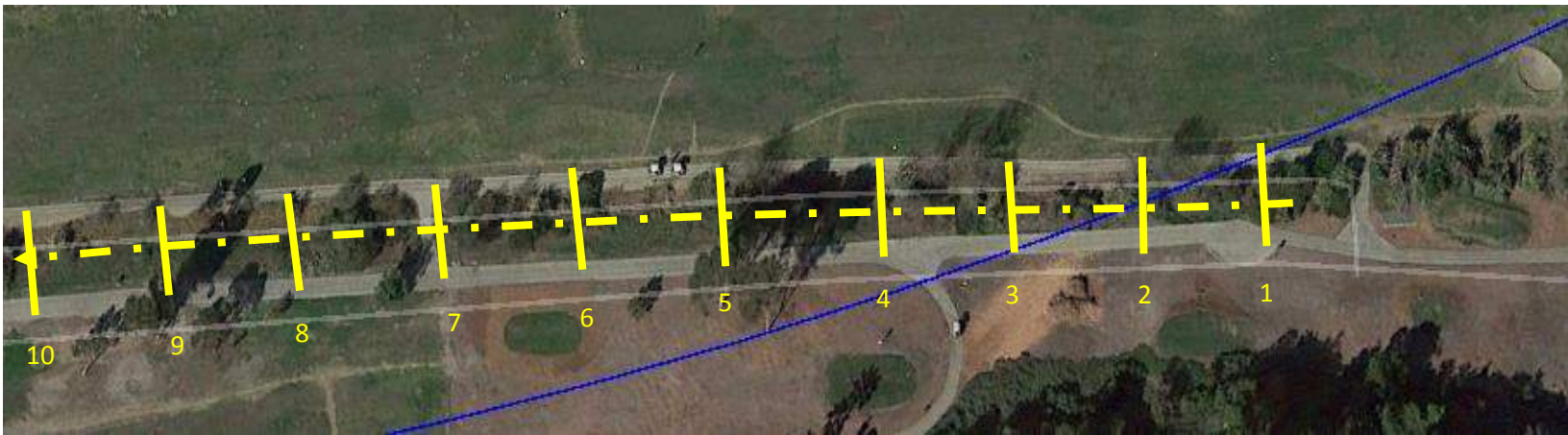
Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

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ALTERNATIVE 17

Prima Deshecha Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type				Step 6. Summarize Site Score and Rating		
Date(s): 12/18/2017		☐ Modoc Plateau		☒ Coast Ranges		☐ Bedrock								Raw Score <u>60.3</u> Rating <u>Good</u>		
Persons: R. Bottcher		☐ Cascade Range		☐ Transverse Ranges		☐ Cascade										
Site/Location: San Juan Creek		☐ Sierra Nevada		☐ Peninsular Ranges		☐ Step-Pool										
Conditions:		☐ Klamath Mountains		☐ Mojave Desert		☐ Engineered/channelized										
Identify Associated File Locations		☐ Great Valley		☐ Colorado Desert		☒ Plane-Bed										
GPS/* .kml		☐ Basin and Range				☐ Pool-Riffle										
Photos						☐ Dune-Ripple										
Other						☐ Braided										
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections															Notes by Cross Section	
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)		1	2	3	4	5	6	7	8	9	10	Overview Entire Reach		Score for Reach	1	
												Upstream	Downstream			
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐				2	
1 Watershed and floodplain activity and impacts		Evaluate at watershed-scale for upstream and downstream reaches >										10	10	10.0	3	
2 Flow characteristics		Evaluate at watershed-scale for upstream and downstream reaches >										7	7	7.0	4	
3 Channel pattern		2	2	2	2	2	2	2	2	2	2	2	2	2.0	5	
4 Entrenchment/channel confinement		4	4	4	4	4	4	4	4	4	4	4	4	4.0	6	
5 Bed material		5	5	5	5	5	5	5	5	5	5	5	5	5.0	7	
Fs = approximate percentage of sand in bed sediments, 0 to 100.		34	34	34	34	34	34	34	34	34	34	34	34		8	
6 Bar development		1	1	1	1	1	1	1	1	1	1	4	1	1.3	9	
7 Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.		4	4	4	4	4	3	5	3	5	3	5	5	4.1	10	
8 Bank soil texture and coherence		5	5	5	5	5	5	5	5	5	5	5	5	5.0	11	
9 Average bank slope angle		5	5	5	5	5	5	5	5	5	5	5	5	5.0	12	
10 Vegetative or engineered bank protection		2	2	3	2	4	2	3	2	2	4	2	3	2.6	13	
11 Bank erosion		3	2	3	2	3	2	3	2	2	3	2	3	2.5	14	
12 Mass wasting or bank failure		2	1	2	2	2	1	2	2	2	1	2	2	1.8	U/S	
13 Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.		Evaluate only for upstream approach >												10	D/S	skewed

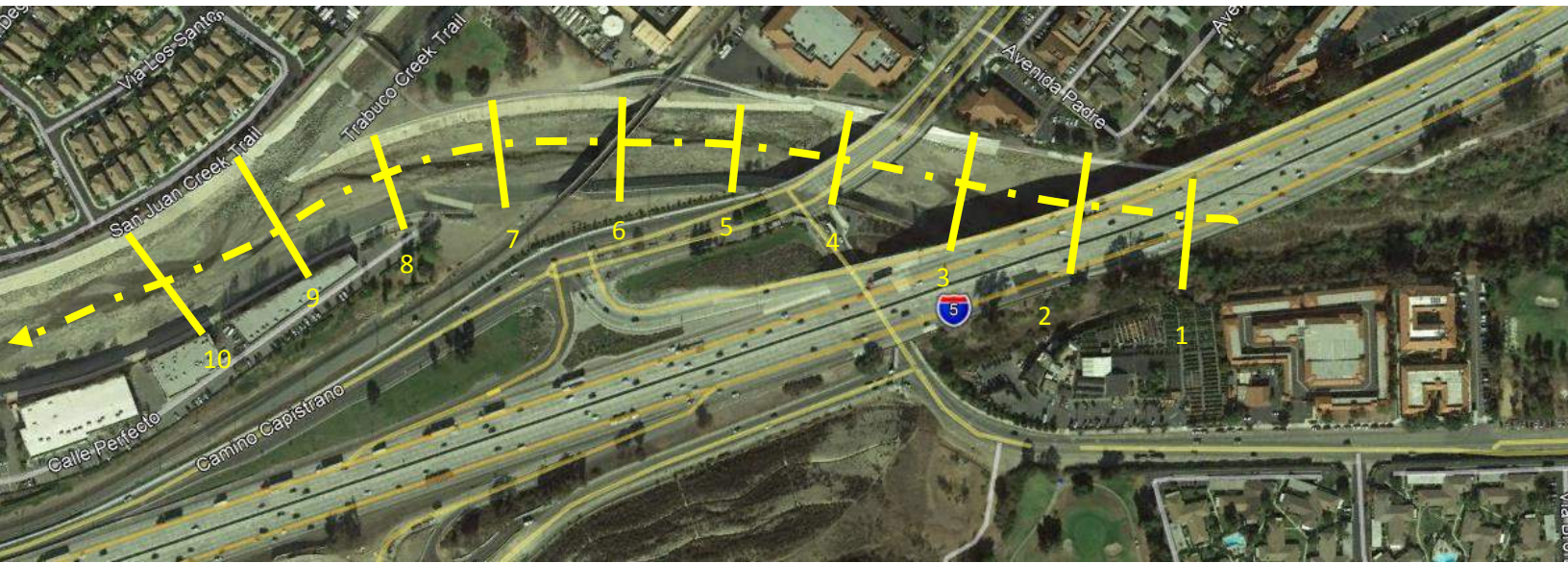
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Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

ALTERNATIVE 11 AND 12

San Juan Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																	
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																				
Date(s):	12/18/2017	☐ Modoc Plateau	☒ Coast Ranges	☐ Bedrock	<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 40</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>40 < R < 85</td> <td>41 < R < 70</td> <td>R < 94</td> </tr> <tr> <td>Fair</td> <td>85 < R < 120</td> <td>70 < R < 98</td> <td>94 < R < 129</td> </tr> <tr> <td>Poor</td> <td>120 < R</td> <td>98 < R</td> <td>129 < R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 40	R < 41	N/A	Good	40 < R < 85	41 < R < 70	R < 94	Fair	85 < R < 120	70 < R < 98	94 < R < 129	Poor	120 < R	98 < R	129 < R	<table border="1"> <tr> <td>Raw Score</td> <td>62.9</td> </tr> <tr> <td>Rating</td> <td>Good</td> </tr> </table>		Raw Score	62.9	Rating	Good
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																														
Excellent	R < 40	R < 41	N/A																														
Good	40 < R < 85	41 < R < 70	R < 94																														
Fair	85 < R < 120	70 < R < 98	94 < R < 129																														
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Raw Score	62.9																																
Rating	Good																																
Persons:	R. Bottcher	☐ Cascade Range	☐ Transverse Ranges	☐ Cascade																													
Site/Location	San Juan Creek	☐ Sierra Nevada	☐ Peninsular Ranges	☐ Step-Pool																													
Conditions:		☐ Klamath Mountains	☐ Mojave Desert	☒ Engineered/channelized																													
Identify Associated File Locations		☐ Great Valley	☐ Colorado Desert	☐ Plane-Bed																													
GPS/* .kml		☐ Basin and Range		☐ Pool-Riffle																													
Photos				☐ Dune-Ripple																													
Other				☐ Braided																													
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																																	
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)												Overview Entire Reach		Score for Reach		Notes by Cross Section																	
		1	2	3	4	5	6	7	8	9	10	Upstream	Downstream	1																			
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐																						
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										6	11	8.0	3	Concrete Embankment																	
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										9	11	10.0	4	Concrete Embankment																	
3	Channel pattern	3	1	1	1	3	3	3	4	4	4	5	2	2.8	5	Concrete Embankment																	
4	Entrenchment/channel confinement	6	9	9	9	9	9	9	9	9	9	6	9	8.5	6	Concrete Embankment																	
5	Bed material (River Wash)	5	8	8	8	8	8	8	8	8	8	5	8	7.5	7	Concrete Embankment																	
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	40	50	50	50	50	50	50	50	50	50	40	50		8	Concrete Embankment																	
6	Bar development	6	4	4	4	4	4	5	5	5	5	6	4	4.7	9	Concrete Embankment																	
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	6	5	2	5	2	5	2	2	2	2	6	3	3.5	10	Concrete Embankment																	
8	Bank soil texture and coherence	8	1	1	1	1	1	1	1	1	1	8	1	2.2	11	Concrete Embankment																	
9	Average bank slope angle	6	2	2	3	3	3	3	3	3	3	6	3	3.3	12																		
10	Vegetative or engineered bank protection	6	1	1	1	1	1	1	1	1	1	6	1	1.8	13	Concrete Embankment																	
11	Bank erosion	6	1	1	1	1	1	1	1	1	1	6	1	1.8	14	Concrete Embankment																	
12	Mass wasting or bank failure	6	1	1	1	1	1	1	1	1	1	6	1	1.8	U/S	widens, heavily vegetated																	
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												7.0	D/S	skewed																	

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San Juan Creek Rapid Assessment

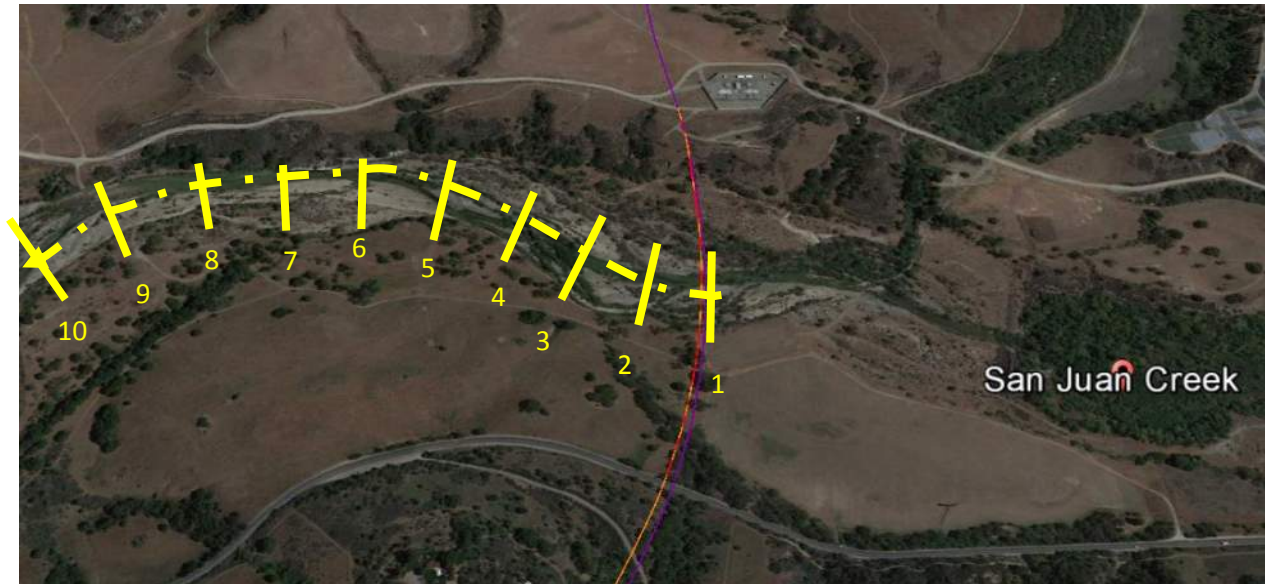
Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

DRAFT

ALTERNATIVE 13, 14, AND 17

Upstream San Juan Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																		
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																					
Date(s): 12/18/2017		☐ Modoc Plateau ☒ Coast Ranges ☐ Cascade Range ☐ Transverse Ranges ☐ Sierra Nevada ☐ Peninsular Ranges ☐ Klamath Mountains ☐ Mojave Desert ☐ Great Valley ☐ Colorado Desert ☐ Basin and Range				☐ Bedrock ☐ Cascade ☐ Step-Pool ☐ Engineered/channelized ☒ Plane-Bed ☐ Pool-Riffle ☐ Dune-Ripple ☐ Braided				<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 40</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>40 < R < 85</td> <td>41 < R < 70</td> <td>R < 94</td> </tr> <tr> <td>Fair</td> <td>85 < R < 120</td> <td>70 < R < 98</td> <td>94 < R < 129</td> </tr> <tr> <td>Poor</td> <td>120 < R</td> <td>98 < R</td> <td>129 < R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 40	R < 41	N/A	Good	40 < R < 85	41 < R < 70	R < 94	Fair	85 < R < 120	70 < R < 98	94 < R < 129	Poor	120 < R	98 < R	129 < R	Raw Score 79.7 Rating Good	
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																															
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Identify Associated File Locations																																		
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Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																																		
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GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Upstream	Downstream		2																			
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										4	8	6.0	3																			
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										7	7	7.0	4																			
3	Channel pattern	6	7	7	7	6	4	4	4	4	4	4	6	5.3	5																			
4	Entrenchment/channel confinement	5	5	5	4	4	4	6	6	6	5	4	5	4.9	6																			
5	Bed material	10	10	10	10	10	10	10	10	10	10	10	10	10.0	7																			
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	80	80	80	80	80	80	80	80	80	80	80	80		8																			
6	Bar development	5	5	5	4	4	4	6	6	6	5	7	5	5.2	9																			
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	4	4	4	4	4	4	4	4	4	4	7	4	4.3	10																			
8	Bank soil texture and coherence	10	10	10	10	10	10	10	10	10	10	10	10	10.0	11																			
9	Average bank slope angle	4	4	4	4	4	4	4	4	4	4	4	4	4.0	12																			
10	Vegetative or engineered bank protection	9	7	8	8	10	10	7	9	9	9	6	9	8.4	13																			
11	Bank erosion	6	6	6	5	5	5	4	4	4	4	4	5	4.8	14																			
12	Mass wasting or bank failure	6	6	6	5	5	5	4	4	4	4	4	5	4.8	U/S																			
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												5	D/S	Grade Control Upstream																		

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Upstream San Juan Creek Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuts, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

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San Mateo Creek Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																														
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																	
Date(s):	12/18/2017	☐ Modoc Plateau	☒ Coast Ranges	☐ Bedrock	<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 49</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>49 ≤ R < 85</td> <td>41 ≤ R < 70</td> <td>R < 94</td> </tr> <tr> <td>Fair</td> <td>85 ≤ R < 120</td> <td>70 ≤ R < 98</td> <td>94 ≤ R < 129</td> </tr> <tr> <td>Poor</td> <td>120 ≤ R</td> <td>98 ≤ R</td> <td>129 ≤ R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 49	R < 41	N/A	Good	49 ≤ R < 85	41 ≤ R < 70	R < 94	Fair	85 ≤ R < 120	70 ≤ R < 98	94 ≤ R < 129	Poor	120 ≤ R	98 ≤ R	129 ≤ R	Raw Score		73.7
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																											
Excellent	R < 49	R < 41	N/A																											
Good	49 ≤ R < 85	41 ≤ R < 70	R < 94																											
Fair	85 ≤ R < 120	70 ≤ R < 98	94 ≤ R < 129																											
Poor	120 ≤ R	98 ≤ R	129 ≤ R																											
Persons:	R. Bottcher	☐ Cascade Range	☐ Transverse Ranges	☐ Cascade	Rating		Good																							
Site/Location	San Mateo Creek	☐ Sierra Nevada	☐ Peninsular Ranges	☐ Step-Pool																										
Conditions:		☐ Klamath Mountains	☐ Mojave Desert	☐ Engineered/channelized																										
Identify Associated File Locations		☐ Great Valley	☐ Colorado Desert	☒ Plane-Bed																										
GPS/* .kml		☐ Basin and Range		☐ Pool-Riffle																										
Photos				☐ Dune-Ripple																										
Other				☐ Braided																										
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																														
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)		1	2	3	4	5	6	7	8	9	10	Notes by Cross Section																		
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐																			
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										2	3	2.5	3	Heavy Vegetation														
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										4	6	5.0	4	Heavy Vegetation														
3	Channel pattern	6	6	5	5	5	6	5	4	4	4	5	5	5.0	5	Lagoon Condition														
4	Entrenchment/channel confinement	6	6	6	4	4	4	4	4	4	4	4	6	4.7	6	Lagoon Condition														
5	Bed material (River Wash)	11	11	11	11	11	11	11	11	11	11	11	11	11.0	7	Lagoon Condition														
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	93	93	93	93	93	93	93	93	93	93	93	93		8	Lagoon Condition														
6	Bar development	6	6	4	4	5	5	5	5	5	5	6	6	5.2	9	Lagoon Condition														
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	5	5	4	4	4	6	6	6	5	5	5	5	5.0	10	Lagoon Condition														
8	Bank soil texture and coherence	1	1	11	11	11	11	11	11	11	11	11	11	9.3	11															
9	Average bank slope angle	4	4	6	5	5	5	6	5	6	6	6	5	5.3	12															
10	Vegetative or engineered bank protection	1	1	6	4	4	4	6	6	6	6	6	6	4.7	13															
11	Bank erosion	1	1	5	5	5	5	5	5	5	5	5	5	4.3	14															
12	Mass wasting or bank failure	1	1	5	6	5	5	6	6	6	5	5	5	4.7	U/S	widens, pristine condition														
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												7.0	D/S	Skewed														

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ALTERNATIVE 11 AND 12

San Mateo Creek Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

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ALTERNATIVE 9

Arroyo Trabuco Rapid Assessment



Field Form for Caltrans Rapid Assessment of Stream Channel Stability and Susceptibility to Hydromodification Induced Instability																																
Step 1. Provide Basic Information		Step 2. Check California Physiographic Province				Step 3. Check Stream Type(s)				Step 5. Review Resulting Score of Hydromodification Susceptibility (Below) Based on Stream Channel Type			Step 6. Summarize Site Score and Rating																			
Date(s): 12/18/2017		☐ Modoc Plateau		☒ Coast Ranges		☐ Bedrock		<table border="1"> <tr> <th>Category</th> <th>Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels</th> <th>Cascade or Step-pool Channels</th> <th>Braided Channels</th> </tr> <tr> <td>Excellent</td> <td>R < 49</td> <td>R < 41</td> <td>N/A</td> </tr> <tr> <td>Good</td> <td>49 ≤ R < 85</td> <td>41 ≤ R < 70</td> <td>R < 54</td> </tr> <tr> <td>Fair</td> <td>85 ≤ R < 120</td> <td>70 ≤ R < 98</td> <td>94 ≤ R < 129</td> </tr> <tr> <td>Poor</td> <td>120 ≤ R</td> <td>98 ≤ R</td> <td>129 ≤ R</td> </tr> </table>			Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels	Excellent	R < 49	R < 41	N/A	Good	49 ≤ R < 85	41 ≤ R < 70	R < 54	Fair	85 ≤ R < 120	70 ≤ R < 98	94 ≤ R < 129	Poor	120 ≤ R	98 ≤ R	129 ≤ R	Raw Score 82.0	
Category	Pool-riffle, Plane-bed, Dune-ripple, Engineered Channels	Cascade or Step-pool Channels	Braided Channels																													
Excellent	R < 49	R < 41	N/A																													
Good	49 ≤ R < 85	41 ≤ R < 70	R < 54																													
Fair	85 ≤ R < 120	70 ≤ R < 98	94 ≤ R < 129																													
Poor	120 ≤ R	98 ≤ R	129 ≤ R																													
Persons: R. Bottcher		☐ Cascade Range		☐ Transverse Ranges		☐ Cascade		Rating Good																								
Site/Location: Arroyo Trabuco		☐ Sierra Nevada		☐ Peninsular Ranges		☐ Step-Pool																										
Conditions:		☐ Klamath Mountains		☐ Mojave Desert		☐ Engineered/channelized																										
Identify Associated File Locations		☐ Great Valley		☐ Colorado Desert		☒ Plane-Bed																										
GPS/* .kml		☐ Basin and Range				☐ Pool-Riffle																										
Photos						☐ Dune-Ripple																										
Other						☐ Braided																										
Step 4. Enter Stability Indicator Ratings at 10 Equally-Spaced Cross Sections																																
Stability Indicators (Below) and Cross Section (XS) Numbers (Right)												Overview Entire Reach		Score for Reach		Notes by Cross Section																
		1	2	3	4	5	6	7	8	9	10	Upstream	Downstream																			
GPS shot? (check boxes for XS where GPS coordinates recorded) >>		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐																					
1	Watershed and floodplain activity and impacts	Evaluate at watershed-scale for upstream and downstream reaches >										4	8	6.0	1	Vegetated Slopes @ 1.5:1, slight meander																
2	Flow characteristics	Evaluate at watershed-scale for upstream and downstream reaches >										9	9	9.0	2	Heavily vegetated																
3	Channel pattern	6	6	3	3	3	3	7	7	7	7	7	7	5.5	3	Heavy Vegetation																
4	Entrenchment/channel confinement	4	6	6	6	6	6	8	8	8	8	3	7	6.3	4	Heavy Vegetation																
5	Bed material	10	10	10	10	10	10	10	10	10	10	10	10	10.0	5	Heavy Vegetation																
	Ps = approximate percentage of sand in bed sediments, 0 to 100.	85	85	85	85	85	85	85	85	85	85	85	85		6	One side rocky w/o vegetation																
6	Bar development	4	3	3	3	3	3	3	3	3	3	5	3	3.3	7	Undercutting one side																
7	Obstructions, including bedrock outcrops, armor layer, LWD jams, grade controls, bridge bed paving, revetments, dikes, vanes, or riprap.	5	5	5	5	5	6	6	6	5	5	5	5	5.3	8	Undercutting one side																
8	Bank soil texture and coherence	10	10	11	11	11	11	11	11	11	11	11	11	10.8	9	Undercutting one side																
9	Average bank slope angle	2	2	3	4	5	5	6	7	7	7	2	6	4.7	10																	
10	Vegetative or engineered bank protection	4	4	4	4	4	4	6	6	6	6	6	6	4.7	11																	
11	Bank erosion	4	4	4	3	3	5	7	7	7	7	4	6	5.1	12																	
12	Mass wasting or bank failure	5	5	5	6	5	6	6	6	5	5	5	5	5.3	13																	
13	Stream crossing alignment with flow and distance from stream crossing to upstream meander impact point.	Evaluate only for upstream approach >												6.0	D/S	Slight skew																

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Arroyo Trabuco Rapid Assessment

Rating Table

Stability Indicator	Ratings			
	Excellent (1-3)	Good (4-6)	Fair (7-9)	Poor (10-12)
1. Watershed and floodplain activity and characteristics	Stable, forested, undisturbed watershed.	Occasional minor disturbances in the watershed, including cattle activity (grazing and/or access to stream), construction, logging, or other minor deforestation. Limited agricultural activities.	Frequent disturbances in the watershed, including cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Urbanization over significant portion of watershed.	Continual disturbances in the watershed. Significant cattle activity, landsliding, channel sand or gravel mining, logging, farming, or construction of buildings, roads, or other infrastructure. Highly urbanized or rapidly urbanizing watershed.
2. Flow habit	Perennial stream with no flashy behavior	Perennial stream or ephemeral 1 st order stream with slightly increased rate of flooding	Perennial or intermittent stream with flashy behavior	Extremely flashy; flash floods prevalent mode of discharge; ephemeral stream other than 1 st order stream
3. Channel pattern	Straight to meandering with low radius of curvature; primarily suspended load	Meandering, moderate radius of curvature; mix of suspended and bed loads; well maintained engineered channel	Meandering with some braiding; tortuous meandering; primarily bed load; poorly maintained engineered channel.	Braided; primarily bed load; unmaintained engineered channel.
4. Entrenchment / channel confinement	Active floodplain exists at top of banks; no sign of undercutting infrastructure; no levees	Active floodplain abandoned, but is currently rebuilding; minimal channel confinement; infrastructure not exposed; levees are low and set well back from the river	Moderate confinement in valley or channel walls; some exposure of infrastructure; terraces exist; floodplain abandoned; levees are moderate in size and have minimal setback from the river.	Knickpoints visible downstream; exposed water lines or other infrastructure; channel width to top of banks ratio small; deeply confined; no active floodplain; levees are high and along the channel edge.
5. Bed material Fs = approximate portion of sand in the bed	Assorted sizes tightly packed, overlapping, and possibly imbricated. Most material > 4 mm. Fs < 20%	Moderately packed with some overlapping. Very small amounts of material < 4 mm. 20 < Fs < 50%	Loose assortment with no apparent overlap. Small to medium amounts of material < 4 mm. 50 < Fs < 70%	Very loose assortment with no packing. Large amounts of material < 4 mm. Fs > 70%
6. Bar development S = Slope W/Y = Width to Depth ratio	For S < 0.02 and W/Y > 12, bars are mature, narrow relative to stream width at low flow, well vegetated, and composed of coarse gravel to cobbles. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bars may have vegetation and/or be composed of coarse gravel to cobbles, but minimal recent growth of bar evident by lack of vegetation on portions of the bar. For S > 0.02 and W/Y < 12, no bars are evident.	For S < 0.02 and W/Y > 12, bar widths tend to be wide and composed of newly deposited coarse sand to small cobbles and/or may be sparsely vegetated. Bars forming for S > 0.02 and W/Y < 12.	Bar widths are generally greater than ½ the stream width at low flow. Bars are composed of extensive deposits of fine particles up to coarse gravel with little to no vegetation. No bars for S < 0.02 and W/Y > 12.
7. Obstructions, including bedrock outcrops, armor layer, large woody debris jams, grade control, bridge bed paving, revetments, dikes or vanes, riprap	Rare or not present.	Occasional, causing cross currents and minor bank and bottom erosion.	Moderately frequent and occasionally unstable obstructions, cause noticeable erosion of the channel. Considerable sediment accumulation behind obstructions.	Frequent and often unstable causing a continual shift of sediment and flow. Traps are easily filled causing channel to migrate and/or widen.
8. Bank soil texture and coherence	Clay and silty clay; cohesive material	Clay loam to sandy clay loam; minor amounts of noncohesive or unconsolidated mixtures; layers may exist, but are cohesive materials.	Sandy clay to sandy loam; unconsolidated mixtures of glacial or other materials; small layers and lenses of noncohesive or unconsolidated mixtures	Loamy sand to sand; noncohesive material; unconsolidated mixtures of glacial or other materials; layers or lenses that include noncohesive sands and gravels
9. Average bank slope angle (where 90° is a vertical bank) V = Vertical H = Horizontal	Bank slopes < 3H:1V (18°) for noncohesive or unconsolidated materials to < 1:1 (45°) in clays on both sides	Bank slopes up to 2H:1V (27°) in noncohesive or unconsolidated materials to 0.8:1 (50°) in clays on one or occasionally both banks	Bank slopes to 1H:1V (45°) in noncohesive or unconsolidated materials to 0.6:1 (60°) in clays common on one or both banks.	Bank slopes over 45° in noncohesive or unconsolidated materials or over (60°) in clays common on one or both banks
10. Vegetative or engineered bank protection	Wide band of woody vegetation with at least 90% density and cover. Primarily hard wood, leafy, deciduous trees with mature, healthy, and diverse vegetation located on the bank. Woody vegetation oriented vertically. In absence of vegetation, both banks are lined or heavily armored.	Medium band of woody vegetation with 70-90% plant density and cover. A majority of hard wood, leafy, deciduous trees with maturing, diverse vegetation located on the bank. Woody vegetation oriented 80-90° from horizontal with minimal root exposure. Partial lining or armoring of one or both banks.	Small band of woody vegetation with 50-70% plant density and cover. A majority of soft wood, piney, coniferous trees with young or old vegetation lacking in diversity located on or near the top of bank. Woody vegetation oriented at 70-80° from horizontal often with evident root exposure. No lining of banks, but some armoring may be in place on one bank.	Woody vegetation band may vary depending on age and health with less than 50% plant density and cover. Primarily soft wood, piney, coniferous trees with very young, old and dying, and/or monostand vegetation located off of the bank. Woody vegetation oriented at less than 70° from horizontal with extensive root exposure. No lining or armoring of banks.
11. Bank Cutting	Little or none evident. Infrequent raw banks, insignificant percentage of total bank.	Some intermittently along channel bends and at prominent constrictions. Raw banks comprises minor portion of bank in vertical direction.	Significant and frequent on both banks. Raw banks comprise large portion of bank in vertical direction. Root mat overhangs.	Almost continuous cuts on both banks, some extending over most of the banks. Undercutting and sod-root overhangs.
12. Mass wasting or bank failure	No or little evidence of potential or very small amounts of mass wasting. Uniform channel width over the entire reach.	Evidence of infrequent and/or minor mass wasting. Mostly healed over with vegetation. Relatively constant channel width and minimal scalloping of banks.	Evidence of frequent and/or significant occurrences of mass wasting that can be aggravated by higher flows, which may cause undercutting and mass wasting of unstable banks. Channel width quite irregular and scalloping of banks is evident.	Frequent and extensive mass wasting. The potential for bank failure, as evidenced by tension cracks, massive undercuttings, and bank slumping, is considerable. Channel width is highly irregular and banks are scalloped.
13. Upstream distance to bridge from meander impact point and alignment	More than 115 ft (35 m); bridge is well aligned with river flow	66-115 ft (20 - 35 m); bridge is aligned with flow	33 - 66 ft (10 - 20 m); bridge is skewed to flow or flow alignment is otherwise not centered beneath bridge	Less than 33 ft (10 m); bridge is poorly aligned with flow

DRAFT

South County Traffic Relief Effort BMP Cost Estimate

Estimated costs for Construction Site BMPs, Design Pollution Prevention and Treatment BMPs is based on the San Diego (I-405) Improvement Project, SR-73 to I-605, EA 0H1000, EFIS ID 1200000180, dated March 2015. The San Diego Improvement Project is an approximately 16-mile-long project corridor that is primarily located in Orange County on I-405 and traverses the cities of Costa Mesa, Fountain Valley, Huntington Beach, Westminster, Garden Grove, Seal Beach, Los Alamitos, Long Beach and the community of Rossmore. Given that the San Diego Improvement Project cost estimate was prepared in 2015, and because it is a recent project, cost indexes were not used to adjust for variations.

Construction BMPs: For the San Diego Improvement Project, Construction Site BMP cost equated to approximately \$330,000 per mile. For Alternative 11 and Alternative 12, only cost per mile of widening was considered and areas where roadway striping is only being done was not considered. The freeway widening for Alternative 11 and Alternative 12 have lengths of approximately 22 and 20 miles, respectively. The lengths for Alternative 9 and Alternative 18 range from 5 miles to 7.0 miles, respectively. The lengths for Alternative 13, Alternative 14 and Alternative 17 vary between 18 and 20 miles. The freeway widening portion of Alternative 21 has a length of approximately 13.9 miles. The length of the new roadway portion of Alternative 21 is approximately 4.2 miles, totaling 18.1 miles for the entirety. The alternative that covered the longest distance (approximately 22 miles for Alternative 11), was conservatively used for cost estimating purposes of alternatives 9, 11, 12, 13, 14, 17, 18 and 21.

Total Estimated Construction Site BMP Cost = \$ 330,000/mile * 22 miles
 = \$ 7,260,000

Treatment BMPs: The Treatment BMP strategy for the SCTRE project proposes the use of Detention, Natural Infiltration Areas and Biofiltration devices. For the San Diego Improvement Project, the estimated cost for a water quality volume type BMP (i.e., Natural Infiltration Areas, Detention Basins, etc.) equated to \$200,000 each. The cost for biofiltration swales was based on the Caltrans Corridor Storm Water Management Studies which were prepared for District 7 during the 2009 – 2011 time-frame. The average cost for a biofiltration device (biofiltration swale/strip) was estimated as \$26,000 each (which brought to today's equivalent dollars would be approximately \$30,000). Table 2 displays the total cost for Treatment BMPs for each alternative. Using this method, the total estimated Treatment BMP cost for the SCTRE alternatives ranges from \$1.1 to \$4.1 million dollars.

Table 2. Treatment BMP Cost Estimate

Alternative	BMP	Quantity	Cost/BMP (\$)	Total (\$)
9	Biofiltration Device	15	30,000	450,000
	Detention Basin	6	200,000	1,200,000
	Natural Infiltration Area	4	200,000	800,000
	Total			2,450,000
11	Biofiltration Device	19	30,000	570,000
	Detention Basin	3	200,000	600,000
	Natural Infiltration Area	2	200,000	400,000
	Total			1,600,000
12	Biofiltration Device	19	30,000	570,000
	Detention Basin	2	200,000	400,000
	Natural Infiltration Area	2	200,000	400,000
	Total			1,400,000
13	Biofiltration Device	7	30,000	210,000
	Detention Basin	14	200,000	2,800,000
	Natural Infiltration Area	2	200,000	400,000
	Total			3,400,000
14	Biofiltration Device	6	30,000	180,000

South County Traffic Relief Effort
BMP Cost Estimate

	Detention Basin	12	200,000	2,400,000
	Natural Infiltration Area	1	200,000	200,000
Total				2,800,000
17	Biofiltration Device	5	30,000	150,000
	Detention Basin	11	200,000	2,200,000
	Natural Infiltration Area	1	200,000	200,000
Total				2,600,000
18	Biofiltration Device	17	30,000	510,000
	Detention Basin	12	200,000	2,400,000
	Natural Infiltration Area	6	200,000	1,200,000
Total				4,110,000
21	Biofiltration Device	19	30,000	570,000
	Detention Basin	7	200,000	1,400,000
	Natural Infiltration Area	2	200,000	400,000
Total				2,400,000

SWDR Signed Date	District	EA/Project ID	County	Route	Beg_PM	End_PM	Project Description	Project Phase	Long SWDR	Risk Level	DSA (ac)	TMDL Waterbody	BioSwale	Detention	DPPIA	SA	Est. Const_Start	Est. Const_Comp	SW Comment	Post Const Treatment Area (ac)	Treated Impervious Area (ac)	Treated Impervious Area Balance (ac)	Treated Pervious Area (ac)	Stabilized Area (ac)	MWEL O	RSA
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	400	Yes	15	6	4	0	1/2/2024	1/29/2027	9	54.00	59.00	5.00	0	TBD	TBD	NO
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	1,080	Yes	19	3	2	0	1/2/2024	1/29/2027	11	80.00	92.07	12.07	0	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	920	Yes	19	2	2	0	1/2/2024	1/29/2027	12	70.00	90.49	20.49	0	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	1,400	Yes	7	14	2	0	1/2/2024	1/29/2027	13	129.00	143.50	14.50	0	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	1,089	Yes	6	12	1	0	1/2/2024	1/29/2027	14	283.00	124.81	-158.19	0	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	1,121	Yes	10	11	1	0	1/2/2024	1/29/2027	17	330.00	131.92	-198.08	0.00	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	530	Yes	17	12	6	0	1/2/2024	1/29/2027	18	82.00	84.00	2.00	0.00	TBD	TBD	YES
TBD	12	12-111020K	ORA/SD	241/5	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	12-ORA-241, 2.1/14.4; 12-ORA-73, 10.34-11.28; 12-ORA-5 0.0/20.5; 11-SD-5 71.3/72.4	HIGHWAY EXTENSION	PID	YES	Special	734	Yes	19	7	2	0	Yes	Yes	21	77.00	117.00	40.00	0.00	TBD	TBD	YES

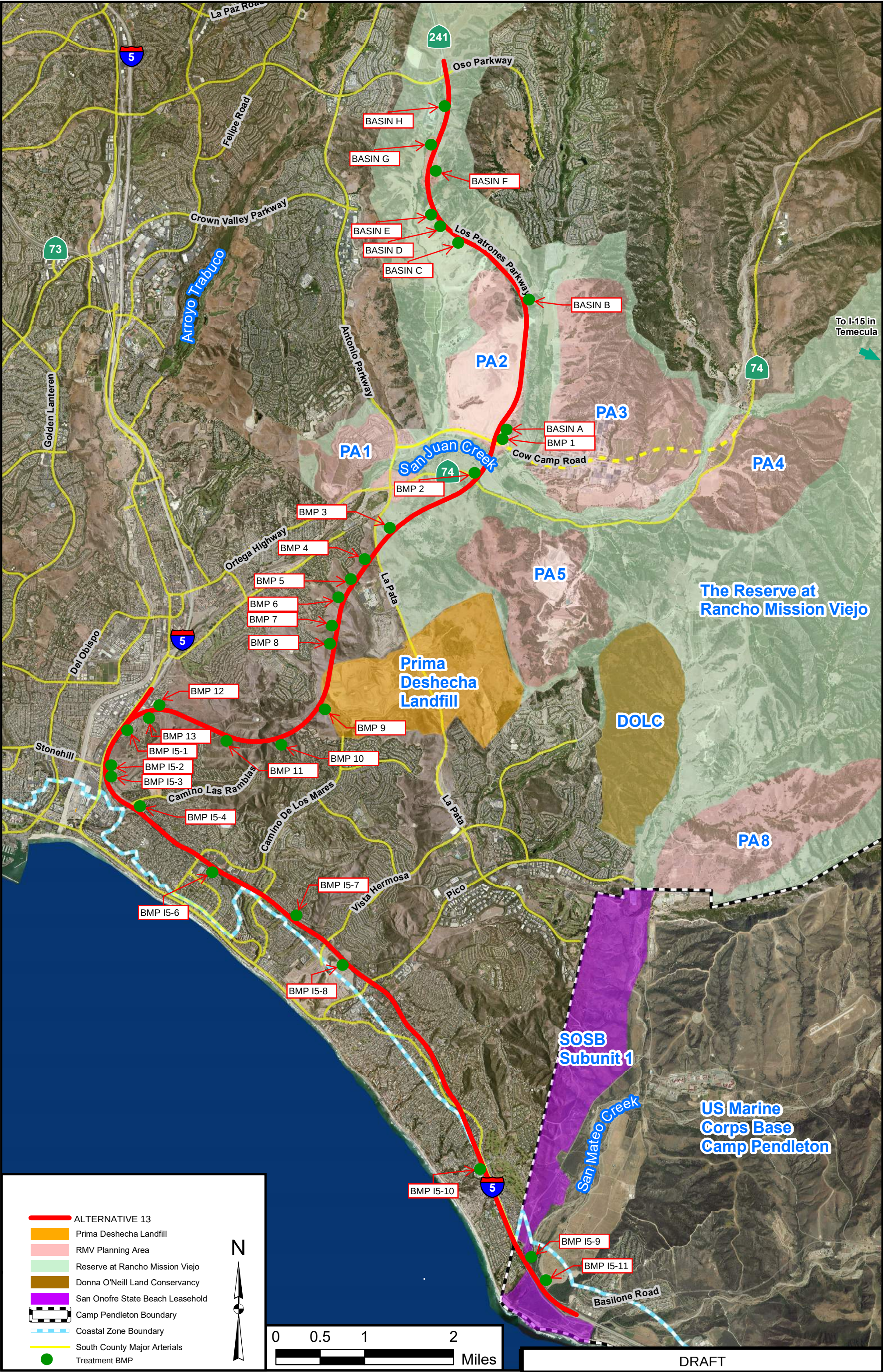
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IDNO	EA / Project ID	BMP Type	District	County	Route	LocBPM	LocEPM	Direction	Treated Impervious Area (ac CT R/W)	Treated Pervious Area (ac CT R/W)	WQV Capacity (cf)	WQF Capacity (cfs)	Basis of BMP Requirement (non 402)	Stabilized Area (ac)	TMDL Waterbody	BMP Capital Cost	Watershed	RWB
BMP-13	12-111020K	BioSwale	12	ORA	241	73+97	73+97	s	4.30	0.00	-	0.86	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator)	\$30,000	SAN JUAN	San Diego (Region 9)
I5-1	12-111020K	BioSwale	12	ORA	5	A 425+52	A 425+52	s	9.39	0.00		1.88	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator)	\$30,000	SAN JUAN	San Diego (Region 9)
I5-3	12-111020K	Detention	12	ORA	5	A 391+81	A 391+81	s	4.93	0.00		0.99	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator)	\$200,000	SAN JUAN	San Diego (Region 9)
I5-6	12-111020K	BioSwale	12	ORA	5	A 300 + 94	A 300 + 94	s	5.20	0.00		1.04	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator)	\$30,000	SAN JUAN	San Diego (Region 9)
I5-7	12-111020K	DPPIA	12	ORA	5	A 249 + 23	A 249 + 23	s	1.51	0.00		0.30	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator)	\$200,000	SAN JUAN	San Diego (Region 9)
I5-8	12-111020K	BioSwale	12	ORA	5	A 211 + 05	A 211 + 05	s	1.50	0.00		0.30	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$30,000	SAN JUAN	San Diego (Region 9)
I5-9	12-111020K	BioSwale	12	ORA	5	3799+48	3799+48	s	2.60	0.00		0.52	Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$30,000	PRIMA DESHECHA	San Diego (Region 9)
I5-4	12-111020K	DPPIA	12	ORA	5	A 364+04	A 364+04	s	0.86	0.00	2,337		Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$30,000	PRIMA DESHECHA	San Diego (Region 9)
I5-10	12-111020K	DPPIA	12	ORA	5	A 59+16	A 59+16	s	0.41	0.00	1,128		Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$30,000	SEGUNDA DESHECHA	San Diego (Region 9)

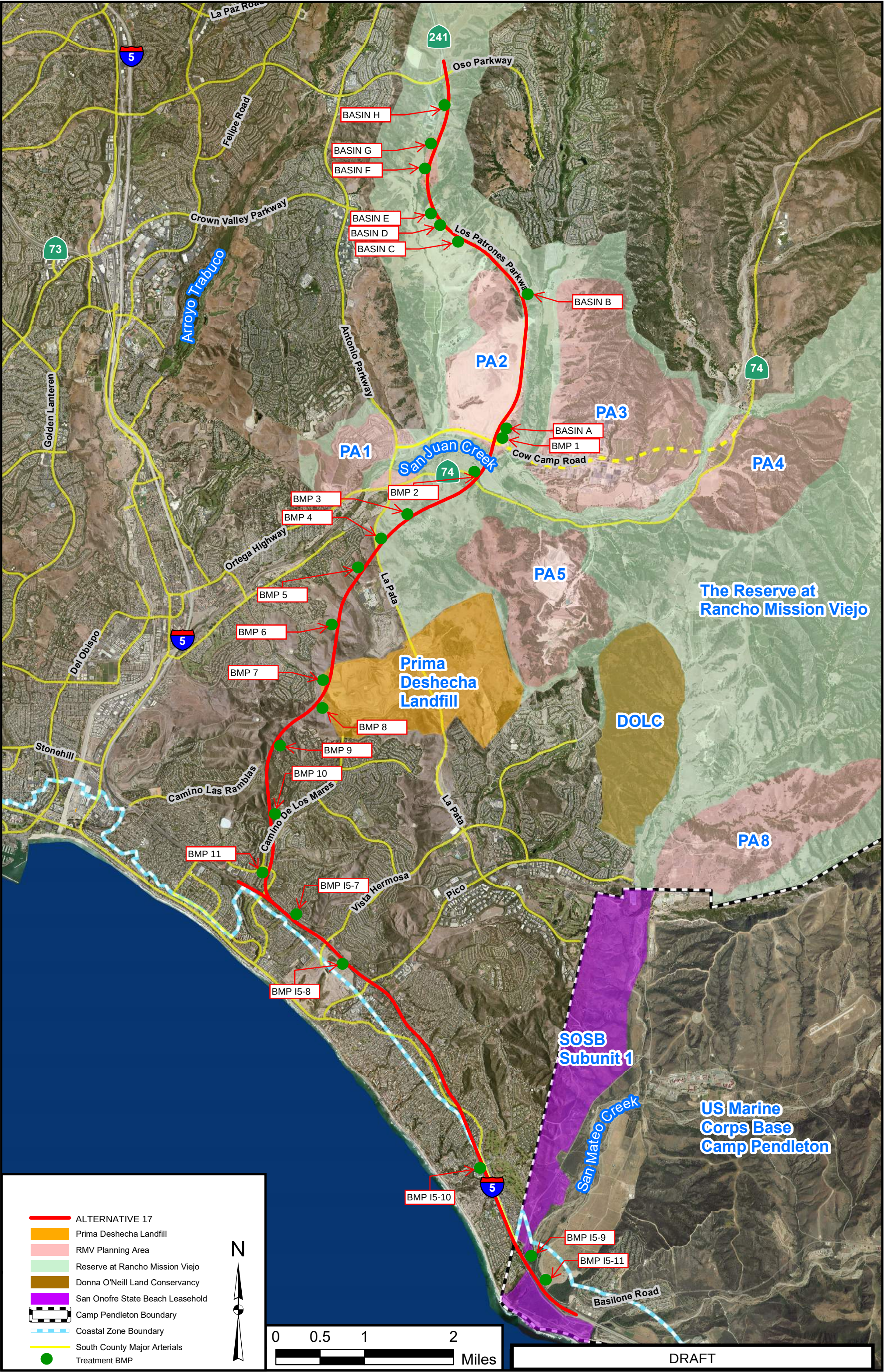
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IDNO	EA / Project ID	BMP Type	District	County	Route	LocBPM	LocEPM	Direction	Treated Impervious Area (ac CT R/W)	Treated Pervious Area (ac CT R/W)	WQV Capacity (cf)	WQF Capacity (cfs)	Basis of BMP Requirement (non 402)	Stabilized Area (ac)	TMDL Waterbody	BMP Capital Cost	Watershed	RWB	
I5-2	12-111020K	Detention	12	ORA	5	397+86	397+86	S	3.10	0.00	8,433		Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$200,000	SEGUNDA DESHECHA	San Diego (Region 9)	
I5-11	12-111020K	Detention	11	SD	5	3784+00	3784+00	S	23.3	0.00	63,434		Waste Discharge Requiement (WDR)	0.00	Project I - Revised Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) (Indicator Bacteria)	\$200,000	SAN MATEO CANYON	San Diego (Region 9)	
BMP1	12-111020K	Detention	12	ORA	241	393+00	393+00	S	9.70	0.00	26,408		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	CANADA GOBERNAD ORA	San Diego (Region 9)	
BMP2	12-111020K	Detention	12	ORA	241	368+00	368+00	S	9.30	0.00	25,319		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP3	12-111020K	Detention	12	ORA	241	304+00	304+00	S	5.90	0.00	16,063		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP4	12-111020K	Detention	12	ORA	241	283+00	283+00	S	6.90	0.00	18,785		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP5	12-111020K	Detention	12	ORA	241	268+00	268+00	S	6.60	0.00	17,969		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP6	12-111020K	Detention	12	ORA	241	258+00	258+00	S	3.40	0.00	9,257		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP7	12-111020K	Detention	12	ORA	241	245+00	245+00	S	2.60	0.00	7,079		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP8	12-111020K	Detention	12	ORA	241	235+00	235+00	S	10.80	0.00	29,403		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
BMP9	12-111020K	Detention	12	ORA	241	195+00	195+00	S	5.70	0.00	15,518		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	PRIMA DESHECHA	San Diego (Region 9)	
BMP10	12-111020K	Detention	12	ORA	241	160+00	160+00	S	2.30	0.00	7,569		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	PRIMA DESHECHA	San Diego (Region 9)	
BMP11	12-111020K	Detention	12	ORA	241	129+00	129+00	S	11.40	0.00	31,037		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$30,000	SAN JUAN	San Diego (Region 9)	
BMP12	12-111020K	Detention	12	ORA	241	85+00	85+00	S	11.80	0.00	32,126		Waste Discharge Requiement (WDR)	0.00	Non-TMDL	\$200,000	SAN JUAN	San Diego (Region 9)	
									143.50	0.00	311,865.00	5.89					0.00		

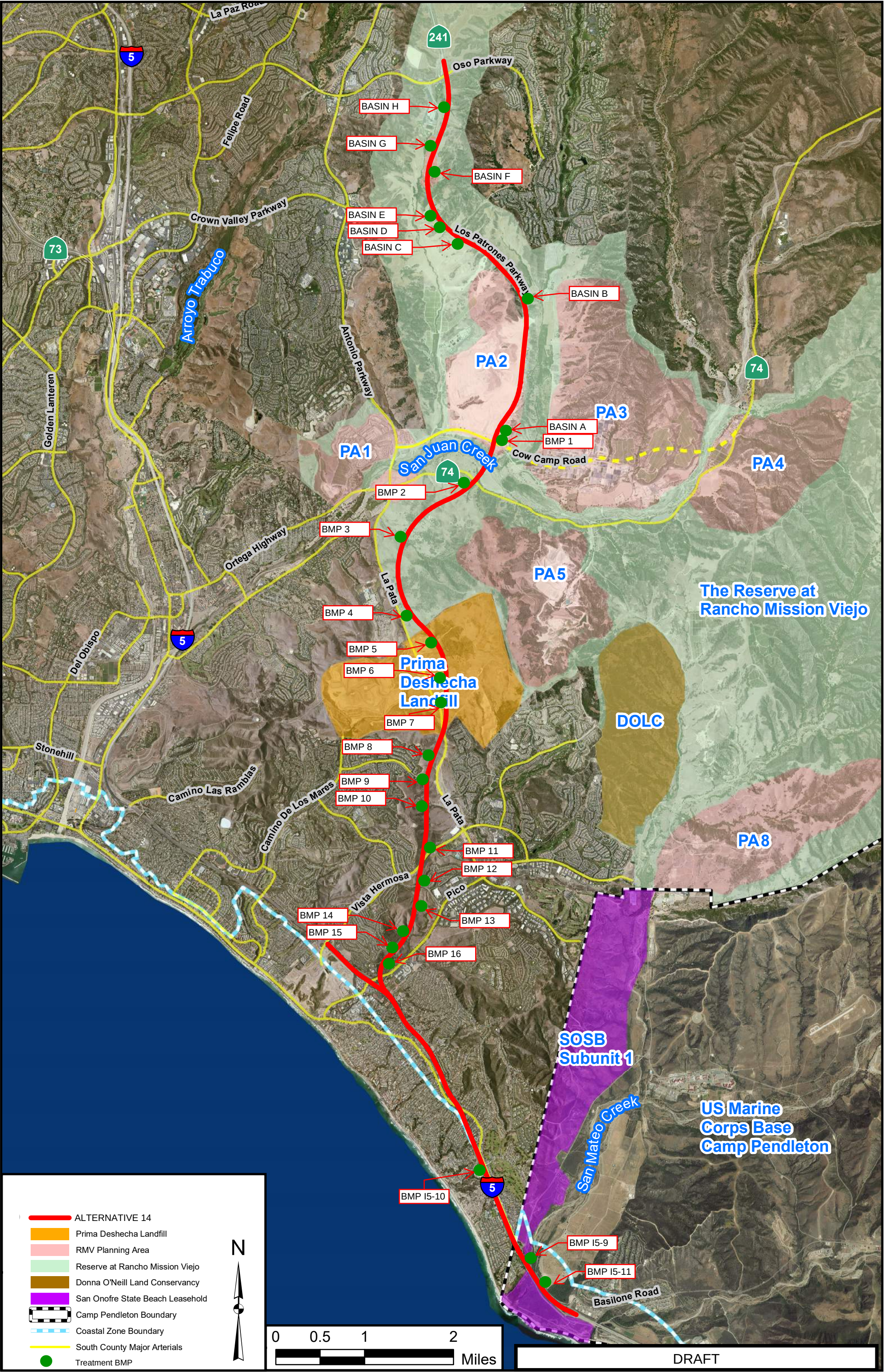
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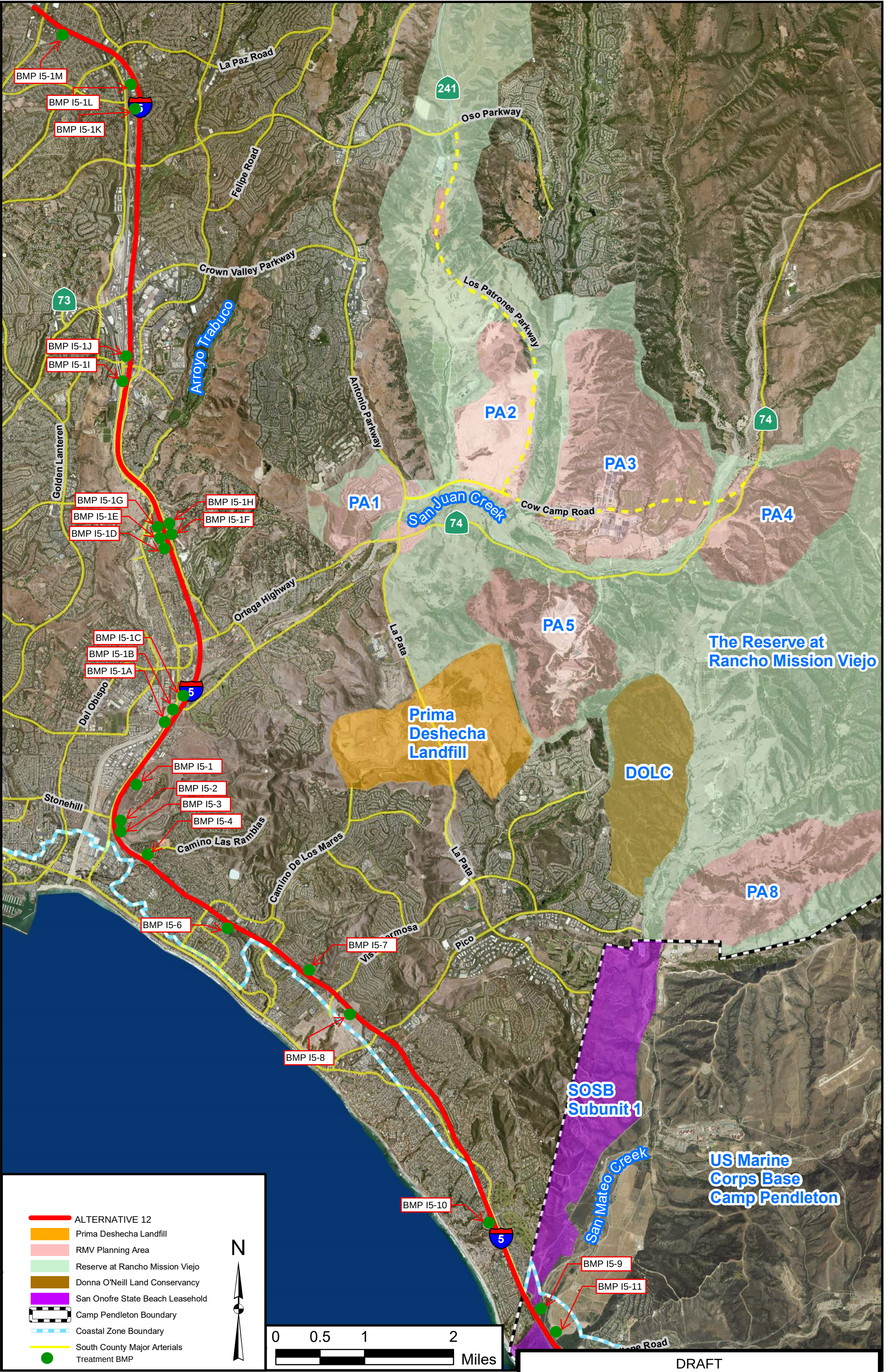
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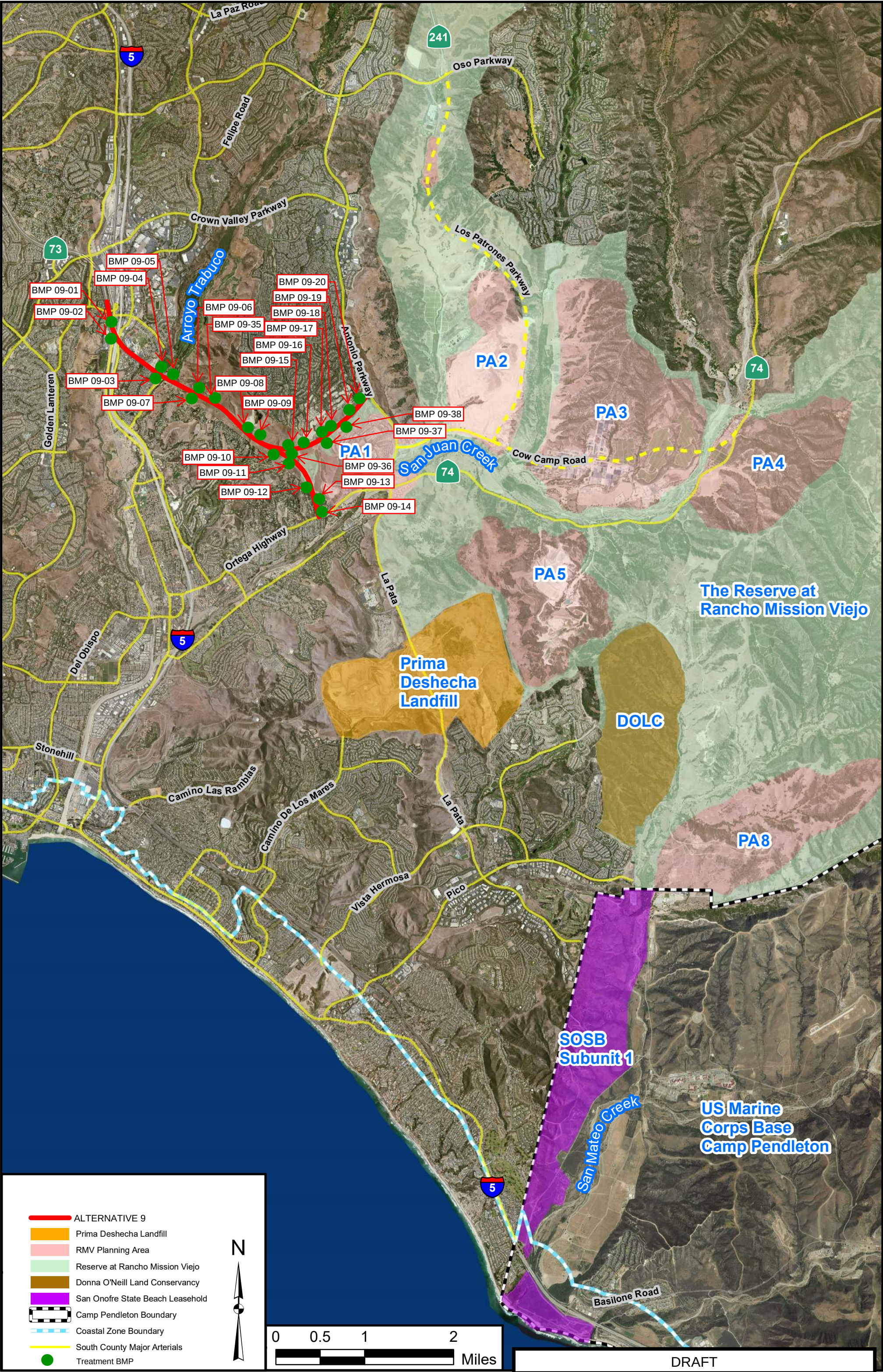
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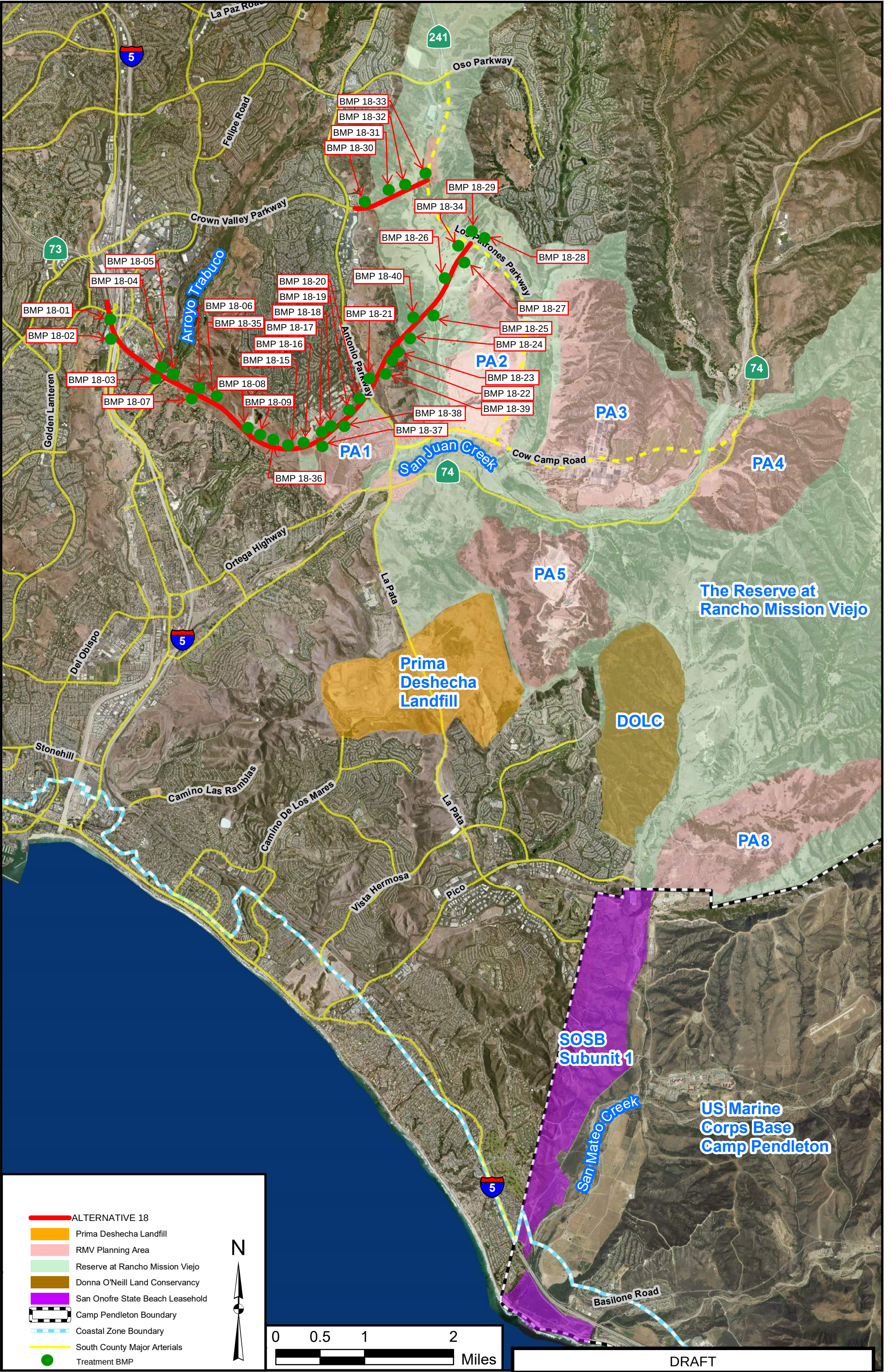
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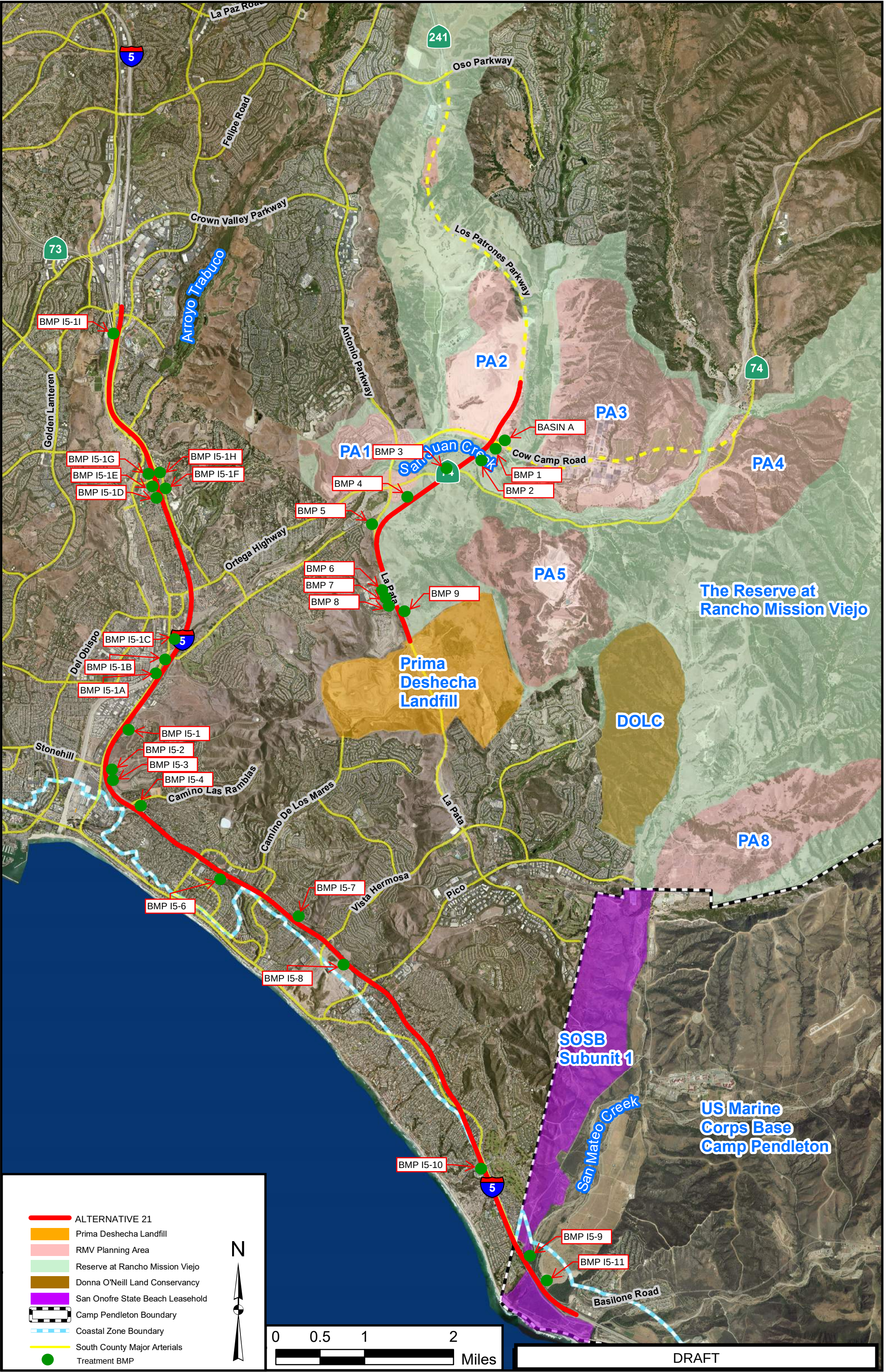
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12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

**CALTRANS DIVISION OF ENGINEERING SERVICES (DES) PSR-PDS
SCOPING CHECKLIST**

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South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project #ID 1217000087

Project Description: Alternative 13 - Build Idea 13 (ID 13): Connect SR241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Project Manager: Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 916-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to Cow Camp Road and extend SR241 by adding a new four-lane express tolled highway from south of Cow Camp Road to I-5. Alternative 2 would connect Los Patrones Parkway to I-5 with a four-lane median managed lane connector at La Novia Avenue. Alternative 13 would add managed lanes or convert HOV lanes to managed lanes to provide two managed lanes in each direction on I-5 from La Novia Avenue to the county line.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☒ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☒ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☒ Yes ☐ No) | ☐ Building Project | ☐ Stabilize Subgrade |
| ☒ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☒ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☐ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 13: Connect SR 241 to I-5 via Western Alignment (Local Connection at La Novia Avenue)

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego

County and would end at Basilone Road.

Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 13 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet Highway Design Manual (HDM) standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Road;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at 'I' Street, including northbound and southbound connections;
- Add one new interchange on SR 241 at Camino Las Ramblas, including northbound and southbound connections;
- Add a four-lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (between Avenida California and Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from 'I' Street to Oso Parkway) and southbound direction (South of Cow Camp Road to Avenida La Pata as well as between San Juan Hills High School to Camino Del Rio).

I-5 Improvements

- Modify ten existing interchanges along I-5 at Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Modify existing northbound on-ramp to I-5 at Stonehill Drive to accommodate the widening of I-5;
- Convert one HOV lane to one HOT and add one HOT lane in each direction on I-5 from La Novia Avenue to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino Las Ramblas to proposed SR 241/Camino Las Ramblas interchange; and
- Extend existing La Novia to proposed SR 241/Camino Las Ramblas interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and
- Include sidewalks, Americans with Disabilities Act (ADA) ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$220-\$280M for right-of-way and \$1.8-\$2.3B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 13 (ID13): Connect SR241 to I-5 via Western Alignment (Local Connection at La Novia Avenue) would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-1 in the PSR-PDS.

Project Schedule

PA/ED Date	Start July 2018
	End January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

**Alternative # 13 – Connect SR-241 to I-5 via Western Alignment (Local
Connection at La Novia Avenue)**

Project Cost Range (\$ 1000's) Cost of Largest Structure (\$ 1000's)

Roadway	\$1,440,000	\$80,942
Structure**	\$574,243	
Total	\$2,280,000	

**Structure Cost Range to be provided by (check one)

☒ Consultant ☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Number	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	13	SR241/I-5 Connector OC' LA Pata Ave UC (L/R) Ortega Hwy UC (L/R) Cow Camp Road OC San Juan Creek Bridge (L/R) PrimaDeshechaLandfillServiceRd1OC PrimaDeshechaLandfillServiceRd2OC Camino Las Ramblas UC (L/R) I Street OC	TBD	269808 24960 32480 37050 144000 9600 9600 24960 24600
☒ Bridge Replacement(s)	7	Avenida San Dimas PED OC Avenida San Luis Rey OC Avenida Mendocino OC Avenida Vista Hermosa OC (L) Avenida Vista Hermosa OC (R) Camino De Estrella OC Via California OC	55 0513 55 0151 55 0463 55 0610R 55 0610L 55 024 55 0225	6120 9416 11000 30772 30772 20746 22932

☒ Bridge Widening(s)		El Camino Real UC (R) El Camino Real UC (L) Avenida Presido UC (R) Avenida Palizada UC (R) Avenida Palizada UC (L) Avenida Pico UC (L) Avenida Vaquero UC (R) Avenida Vaquero UC (L) 5/N5-N1 CONN SEPARATION 5/N5-N1 CONN SEPARATION N5-N1 CONNECTOR UC (L) N5-N1 COONECTOR UC (R) San Mateo Creek Br. (R/L) Camino Capistrano UC (L) Camino Capistrano UC (R) Route 5/1 Separation	55 0203 55 0203 55 0304 55 0205 55 0205 55 0207 55 0223 55 0223 55 0511 55 0511 55 0226 55 0226 57 0001 57 0227 57 0227 55 0510	8148 8148 22022 9780 1304 5760 4176 4176 5950 4704 2430 3933 43010 11616 3630 2000
	17			
☒ New Bridge over water	2	San Juan Creek Bridge (L/R)	TBD	144000
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	2	San Mateo Creek Br. (R/L)	57 0001	43010
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	4	San Juan Creek Bridge (L/R) San Mateo Creek Br. (R/L)	TBD 57 0001	144000 43010
☒ Bridge w/ Special Design or Retrofit		El Camino Real UC (R) El Camino Real UC (L) Avenida Presido UC (R) Avenida Palizada UC (R) Avenida Palizada UC (L) Avenida Pico UC (L) Avenida Vaquero UC (R) Avenida Vaquero UC (L) 5/N5-N1 CONN SEPARATION (NB) 5/N5-N1 CONN SEPARATION (SB) N5-N1 CONNECTOR UC (NB) N5-N1 COONECTOR UC (SB) San Mateo Creek Br. (R/L) Route 5/1 Separation Camino Capistrano UC (L) Camino Capistrano UC (R)	55 0203 55 0203 55 0204 55 0205 55 0205 55 0207 55 0223 55 0223 55 0511 55 0511 55 0226 55 0226 57 0001 55 0510 550227 55 0227	8148 8148 22022 9780 1304 5760 4176 4176 5950 4704 24303933 800 16192 2000 11616 3630
	17			

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 25	Est. Max. Ht 15ft Est. Length 34,033 ft	☐ Standard Design	☐ Special Design
☒ Ret. walls(s) Number 2	Est. Max. Ht 16 ft Est. Length 1,154 ft	☐ Standard Design	☐ Special Design

☒ NonStandWall(s) Number 37	Est. Max. Ht 60 ft Est. Length 49,063 ft	☐ Standard Design	☒ Special Design
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Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 100
☒ Changeable Message Sign Foundations	Number 3

Other:

☒ Special Studies (slope stability, rock fall, erosion, seepage, ground water, settlement, Liquefaction, slip out repair, rock slope, etc.) Explain Slope Stability

☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 60
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
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Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 17 - Build Idea 17 (ID 17): Connect SR241 to I-5 via Shore Cliffs
(Local Connection at Avenida Vaquero)

Project Manager: Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 17 would connect Los Patrones Parkway to I-5 with a four-lane median managed lane connector at Avenida Vaquero. Alternative 17 would add managed lanes or convert HOV lanes to managed lanes to provide two managed lanes in each direction on I-5 from Avenida Vaquero to the county line.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☒ New Expressway/Freeway
on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☒ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☒ Yes ☐ No) | ☐ Building Project | ☐ Stabilize Subgrade |
| ☒ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☒ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☐ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is. both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 17: Connect SR 241 to I-5 via Shore Cliffs (Local Connection at Avenida Vaquero)

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 17, would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Road;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at ‘I’ Street, including northbound and southbound connections;
- Add one new interchange at Camino De Los Mares, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Camino De Los Mares to Camino Las Ramblas, north of Avenida La Pata to Ortega Hwy, as well as from ‘I’ Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Ortega Highway as well as from Prima Deshecha Landfill to Camino Las Ramblas).

I-5 Improvements

- Modify eight existing interchanges along I-5 at Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5;
- Convert one HOV lane to one HOT lane and add one HOT lane in each direction on I-5 from Avenida Vaquero to Avenida Pico; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Camino De Los Mares to proposed SR 241/Camino De Los Mares interchange.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$220-\$280M for right-of-way and \$1.0-\$1.5B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 17 (ID17): Connect SR-241 to I-5 via via Shore Cliffs (Local Connection at Avenida Vaquero) would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-3 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Alternative # 17 – Connect SR-241 to I-5 via Western Alignment (Local Connection at Avenida Vaquero)

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$777,000	\$43,454
Structure**	\$485,060	
Total	\$1,524,000	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Num ber	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	15	SR241/I-5 Connector OC LA Pata Ave UC (L/R) Ortega Hwy UC (L/R) Cow Camp Road OC San Juan Creek Bridge (L/R) Camino De Los Mares UC (L/R) Ranch Road OC 458 Ranch Road OC 505 Camino Las Ramblas UC (L/R) I Street OC	TBD	269808 24960 15360 37050 144000 53760 5136 5136 24960 24600
☒ Bridge Replacement(s)	6	Cristianitos Road OC U. Concordia POC Avenida San Luis Rey OC Avenida Mendocino OC Avenida Vista Hermosa OC (EB) Avenida Vista Hermosa OC	57 0726 55 0513 55 0151 55 0463 55 0610R 55 0610L	15000 4800 11250 13500 10800 10000
☒ Bridge Widening(s)	9	El Camino Real UC (R) El Camino Real UC (L) Avenida Palizada UC (R) Avenida Palizada UC (L) Avenida Pico UC (L) Avenida Vaquero UC (L) Avenida Vaquero UC (R) San Mateo Creek Br. (L/R)	55 0203 55 0203 55 0205 55 0205 55 0207 55 0223 55 0223 57 0001	8148 8148 9780 1304 5760 4176 4176 43010
☒ New Bridge over water	2	San Juan Creek Bridge (L/R)	TBD	144000
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	2	San Mateo Creek Br. (R/L)	57 0001	43010
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A

☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	4	San Juan Creek Bridge (L/R) San Mateo Creek Br. (L/R Widen)	TBD 57 0001	144000 43010
☒ Bridge w/ Special Design or Retrofit	9	El Camino Real UC (R) El Camino Real UC (L) Avenida Palizada UC (R) Avenida Palizada UC (L) Avenida Pico UC (L) Avenida Vaquero UC (L) Avenida Vaquero UC (R) San Mateo Creek Br. (L/R)	55 0203 55 0203 55 0205 55 0205 55 0207 55 0223 55 0223 57 0001	8148 8148 9780 1304 5760 4176 4176 43010

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 16	Est. Max. Ht 15 ft Est. Length 23,412 ft	☒ Standard Design	☐ Special Design
☒ Ret. walls(s) Number 2	Est. Max. Ht 14 ft Est. Length 1000 ft	☒ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 35	Est. Max. Ht 55 ft Est. Length 41,679 ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 60
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
- ☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	40
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
--	---------

Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

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South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 14 - Build Idea 14 (ID 14): Connect SR241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Project Manager: Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 916-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 14 would connect Los Patrones Parkway to I-5 with a four-lane median managed lane connector at Avenida Pico. Alternative 14 would add managed lanes or convert HOV lanes to managed lanes to provide two managed lanes in each direction on I-5 from Avenida Pico to the county line.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☒ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☒ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☒ Yes ☐ No) | ☐ Building Project | ☐ Stabilize Subgrade |
| ☒ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☒ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☐ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 14: Connect SR 241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the

OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 14 would include the following additional improvements to the identified portion of the corridor:

SR 241 Improvements

- Widen Los Patrones Parkway to meet HDM standards for median widths for expressways under restrictive conditions from Oso Parkway to Chiquita Canyon Road;
- Modify existing northbound on-ramp to SR 241 at Chiquita Canyon Drive to accommodate the widening of SR 241;
- Modify a future intersection at Cow Camp Road to grade separate Cow Camp Road from SR 241 and add one new interchange on SR 241 at ‘I’ Street, including northbound and southbound connections;
- Add one new interchange at Calle Saluda, including northbound and southbound connections;
- Add one new interchange at Calle Del Cerro, including northbound and southbound connections;
- Add a four lane (two in each direction) median toll lane connector for SR 241 southbound to I-5 southbound and from I-5 northbound to SR 241 northbound; and
- Add climbing lanes in both the northbound direction (north of Calle Del Cerro to Prima Deshecha Landfill, north of Avenida La Pata to Ortega Hwy, as well as from ‘I’ Street to Oso Parkway) and southbound direction (south of Cow Camp Road to Avenida La Pata as well as from the Prima Deshecha Landfill to Camino Del Rio).

I-5 Improvements

- Modify seven existing interchanges along I-5 at Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real; Avenida Calafia, Cristianitos Road, and Basilone Road, to accommodate the widening of I-5; and
- Add two HOT lanes in each direction on I-5 from Avenida Pico to Basilone Road, just south of the Countyline.

Local Improvements

- Extend existing Calle Saluda to proposed SR 241/Calle Saluda interchange, including a new roundabout; and
- Extend existing Calle Del Cerro to proposed SR 241/Calle Del Cerro interchange, including a new roundabout.

Multi-Modal and Sustainability Improvements

- Along the SR 241 extension, provide a combination Class I bikeway/pedestrian path that would connect to existing trails within the alternative limits;
- Provide Complete Streets treatments at modified and new interchanges consistent with Caltrans’ Main Street, California: A Guide for Improving Community and Transportation

Vitality (November 2013) and Complete Streets Elements Toolbox Version 2.0 (January 2017); and

- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$100-\$130M for right-of-way and \$1.0-\$1.4B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 14 (ID14): Connect SR241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico) would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-5 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	
**Structure Cost Range to be provided by (check one)		
☒ Consultant		☐ Structure Design Technical Liaison.

Alternative # 14 – Connect SR-241 to I-5 via La Pata Avenue Crossing (Local Connection at Avenida Pico)

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$770,000	\$46,622
Structure**	\$431,615	
Total	\$1,325,000	
**Structure Cost Range to be provided by (check one)		
☒ Consultant		☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Number	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	20	SR241/I-5 Connector OC LA Pata Ave UC (L/R) Ortega Hwy UC (L/R) Cow Camp Road OC San Juan Creek Bridge (L/R) Camino Vera Cruz UC (L/R) Avenida Vista Hermosa UC (L/R) Camino Del Rio UC (L/R) Calle Frontera OC Calle Del Cerro OC Calle Saluda OC I Street OC Landfill UC 400 (L/R)	TBD	155408 24960 15360 37050 144000 24960 44160 34560 14400 21600 14400 24600 14592
☒ Bridge Replacement(s)	4	Avenida San Dimas PED OC Avenida San Luis Rey OC Avenida Mendocino OC Avenida Palizada UC (L)	55 0513 55 0151 55 0463 55 0205	6120 9416 11000 9780
☒ Bridge Widening(s)	6	El Camino Real UC (R) El Camino Real UC (L) Avenida Presido UC (L) Avenida Palizada UC (R) San Mateo Creek Br. (L/R)	55 0203 55 0203 55 0204 55 0205 57 0001	3638 17315 22165 1304 16192
☒ New Bridge over water	2	San Juan Creek Bridge (L/R)	TBD	144000
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	2	San Mateo Creek Br. (L/R)	57 0001	16192
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	4	San Juan Creek Bridge (L/R) San Mateo Creek Br. (L/R)	TBD 57 0001	144000 16192
☒ Bridge w/ Special Design or Retrofit	6	El Camino Real UC (R) El Camino Real UC (L) Avenida Presido UC (L) Avenida Palizada UC (R) San Mateo Creek Br. (R/L)	55 0203 55 0203 55 0204 55 0205 57 0001	3638 17315 22165 1304 16192

Other DES functional units required for Structure Work

- ☒ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 22	Est. Max. Ht 15 ft Est. Length 13,615ft	☒ Standard Design	☐ Special Design
☒ Ret. walls(s) Number 2	Est. Max. Ht 10 ft Est. Length 938 ft	☒ Standard Design	☐ Special Design
☒ NonStandWall(s) Number 30	Est. Max. Ht 60 ft Est. Length 37,910 ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 76
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
- ☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 48
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
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Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

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South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 11 - Build Idea 11 (ID 11): Add I-5 General Purpose Lanes from I-405 to San Diego County

Project Manager Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 11 would add one General Purpose lane in each direction on I-5 from I-405 to Basilone Road, extending into San Diego County.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☐ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☐ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☐ Yes ☒ No) | ☐ Building Project | ☒ Stabilize Subgrade |
| ☐ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☐ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☒ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR-241 and I-5. Under the No-Build Alternative, no extension of the express tolled SR-241 lanes to I-5 new General Purpose lanes or high-occupancy toll (HOT) lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR-73 would occur. This alternative includes other projects on the financially-constrained project list in the Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) and the Preferred Plan in OCTA's 2014 Long Range Transportation Plan (LRTP) in the Project Limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The no-build alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The no-build alternative does not meet the established purpose and need of the project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 11: Add I-5 General Purpose Lane (From I-405 to San Diego County)

Alternative 11 would widen I-5 with the addition of one General Purpose lane in each direction from the I-405/I-5 Junction to Basilone Road, just south of the Countyline.

It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 11 would include the following improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-three existing interchanges along I-5 at Lake Forest Drive, El Toro Road, Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR

73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$570-\$710M for right-of-way and \$1.3-\$1.6B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 11 (ID11): Add I-5 General Purpose Lane from I-405 to San Diego County would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-7 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Alternative # 11: Add I-5 General Purpose Lane (From I-405 to San Diego County)

Project Cost Range (\$ 1000's) Cost of Largest Structure (\$ 1000's)

Roadway	\$754,000	\$15,020
Structure**	\$651,537	
Total	\$2,091,000	

**Structure Cost Range to be provided by (check one)

☒ Consultant ☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Number	Br. Name(s)	Br. No(s)	Area (SF)
☒ Bridge Replacement(s)	14	Avenida San Dimas PED OC	55 0513	11659
		Avenida San Luis Rey OC	55 0151	9416
		Avenida Mendocino OC	55 0463	11000
		Avenida Vista Hermosa OC (R)	55 0610	30772
		Avenida Vista Hermosa OC (L)	55 0610	30772
		Camino De Estrella OC	55 0224	20746
		Via California OC	55 0225	22932
		Crown Valley Pkwy OC	55 0444	29160
		Oso Parkway OC	55 0509	37450
		El Toro Overhead OFF Ramp	55 0221	10696
		La Paz Road NB Loop On-ramp	55 0234	7560
		Alicia Parkway OC	55 0591	38720
		Los Aliso Blvd OC	55 0631	22880
		Lake Forest Dr OC	55 0548	46216
☒ Bridge Widening(s)		San Mateo Creek (R)	57 0001	21505
		San Mateo Creek (L)	57 0001	21505
		El Camino Real UC (L)	55 0203	8148
		El Camino Real UC (R)	55 0203	8148
		Avenida Presido UC (L)	55 0204	22165

	39	Avenida Palizada UC (L)	55 0205	9780
		Avenida Palizada UC (R)	55 0207	1304
		Avenida Pico UC (L)	55 0207	5760
		Avenida Vaquero UC	55 0223	4176
		Avenida Vaquero UC	55 0223	4176
		5/N5-N1 CONN SEPARATION	55 0511	5950
		5/N5-N1 CONN SEPARATION	55 0511	4704
		ROUTE 5/1 SEPARATION	55 0226	2430
		ROUTE 5/1 SEPARATION	55 0226	3933
		CAMINO CAPISTRANO UC	55 0227	8712
		CAMINO CAPISTRANO UC	55 0227	484
		San Juan Creek Rd UC (L)	55 0298	3354
		San Juan Creek Rd UC (R)	55 0298	2451
		San Juan Creek Bridge (L)	55 228L	13398
		San Juan Creek Bridge (R)	55 228R	12180
		El Horno UC (L)	55 0230	2832
		El Horno UC (R)	55 0230	2832
		Junipero Serra UC (L)	55 0231	1364
		Junipero Serra UC (R)	55 0231	3844
		Trabuco Creek Bridge	55 0289	7320
		Avery Parkway UC (SB)	55 0232	2924
		Avery Parkway UC (NB)	55 0232	2924
		Oso Creek (SB)	55 0509	5181
		Oso Creek (NB)	55 0509	7222
		El Toro Overhead (SB)	55 0221	2025
		El Toro Overhead (NB)	55 0221	6132
		La Paz Road UC (SB)	55 0234	3078
		La Paz Road UC (NB)	55 0234	3936
		Aliso Creek Rd UC (NB)	55 0014	15367
		Aliso Creek Rd UC (SB)	55 0014	18415
		El Toro Rd UC (NB)	55 0235	2717
		El Toro Rd UC (SB)	55 0235	3575
☐ New Bridge over water	N/A	N/A	N/A	N/A
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	5	San Mateo Creek Br. (L/R)	57 0001	43010
		San Juan Creek Bridge (L/R)	55 0228	25578
		Trabuco Creek Bridge	55 0289	7320
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	5	San Juan Creek UC (L/R)	55 0228	25578
		San Mateo Creek Br. (L/R)	57 0001	43010
		Trabuco Creek Bridge	55 0289	7320
☒ Bridge w/ Special Design or Retrofit	39	San Mateo Creek (R)	57 0001	21505
		San Mateo Creek (L)	57 0001	21505
		El Camino Real UC (L)	55 0203	8148
		El Camino Real UC (R)	55 0203	8148
		Avenida Presido UC (L)	55 0204	22165
		Avenida Palizada UC (L)	55 0205	9780
		Avenida Palizada UC (R)	55 0207	1304
		Avenida Pico UC (L)	55 0207	5760
		Avenida Vaquero UC	55 0223	4176
		Avenida Vaquero UC	55 0223	4176
		5/N5-N1 CONN SEPARATION	55 0511	5950
		5/N5-N1 CONN SEPARATION	55 0511	4704
		ROUTE 5/1 SEPARATION	55 0226	2430
		ROUTE 5/1 SEPARATION	55 0226	3933
		CAMINO CAPISTRANO UC	55 0227	8712
		CAMINO CAPISTRANO UC	55 0227	484
		San Juan Creek Rd UC (L)	55 0298	3354

		San Juan Creek Rd UC (R)	55 0298	2451
		San Juan Creek Bridge (L)	55 228L	13398
		San Juan Creek Bridge (R)	55 228R	12180
		El Horno UC (L)	55 0230	2832
		El Horno UC (R)	55 0230	2832
		Junipero Serra UC (L)	55 0231	1364
		Junipero Serra UC (R)	55 0231	3844
		Trabuco Creek Bridge	55 0289	7320
		Avery Parkway UC (SB)	55 0232	2924
		Avery Parkway UC (NB)	55 0232	2924
		Oso Creek (SB)	55 0509	5181
		Oso Creek (NB)	55 0509	7222
		El Toro Overhead (SB)	55 0221	2025
		El Toro Overhead (NB)	55 0221	6132
		La Paz Road UC (SB)	55 0234	3078
		La Paz Road UC (NB)	55 0234	3936
		Aliso Creek Rd UC (NB)	55 0014	15367
		Aliso Creek Rd UC (SB)	55 0014	18415
		El Toro Rd UC (NB)	55 0235	2717
		El Toro Rd UC (SB)	55 0235	3575

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 36	Est. Max. Ht 15 ft Est. Length 54,070ft	☒ Standard Design	☐ Special Design
☐ Ret. walls(s) Number 0	Est. Max. Ht 0 ft Est. Length 0 ft	☐ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 96	Est. Max. Ht 25 ft Est. Length 90,604 ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 0
☒ Changeable Message Sign Foundations	Number 0

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number0
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
--	---------

Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 12 - Build Idea 12 (ID 12): Add I-5 High-Occupancy/Toll (HOT)
Lane from I-405 to San Diego County

Project Manager Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 12 would add managed lanes or convert HOV lanes to managed lanes, to provide two managed lanes in each direction on I-5 from I-405 to Basilone Road, extending into San Diego County.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☐ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☐ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☐ Yes ☒ No) | ☐ Building Project | ☒ Stabilize Subgrade |
| ☐ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☐ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☒ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 12: Add I-5 HOT Lane (From I-405 to San Diego County)

Alternative 12 would convert two existing HOV lanes to HOT lanes in each direction on I-5 from I-405 to Alicia Parkway. One existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from Alicia Parkway to Avenida Pico. Two HOT lanes would be added in each direction from Avenida Pico to Basilone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 12, those HOV lanes would be incorporated into the Alternative 12 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 12 would include the following additional improvements to the identified portion of the corridor:

I-5 Improvements

- Modify twenty-one existing interchanges along I-5 at Alicia Parkway, La Paz Road, Oso Parkway, Crown Valley Parkway, Avery Parkway, SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway/Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$250-\$320M for right-of-way and \$1.2-\$1.6B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 12 (ID12): Add I-5 HOT Lane from I-405 to San Diego County would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-9 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Alternative # 12 –Build Idea 12 (ID12: Connect SR 241 to I-5 at Avenida Vaquero)

Project Cost Range (\$ 1000's) Cost of Largest Structure (\$ 1000's)

Roadway \$750,000 \$10,001

Structure** \$599,290

Total \$1,771,000

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Number	Br. Name(s)	Br. No(s)	Area (SF)
☒ Bridge Replacement(s)	11	Avenida San Dimas PED OC	55 0513	11659
		Avenida San Luis Rey OC	55 0151	9416
		Avenida Mendocino OC	55 0463	11000
		Avenida Vista Hermosa OC (R)	55 0610	30772
		Avenida Vista Hermosa OC (L)	55 0610	30772
		Camino De Estrella OC	55 0224	20746
		Via California OC	55 0225	22932
		Crown Valley Pkwy OC	55 0444	29160
		Oso Parkway OC	55 0509	37450
		El Toro Overhead OFF Ramp	55 0221	10696
		La Paz Road NB Loop On-ramp	55 0591	7560

☒ Bridge Widening(s)	33	San Mateo Creek (L)	57 0001	21505
		San Mateo Creek (R)	57 0001	21505
		El Camino Real UC (L)	55 0203	8148
		El Camino Real UC (R)	55 0203	8168
		Avenida Presido UC (L)	55 0204	22022
		Avenida Palizada UC (L)	55 0205	9780
		Avenida Palizada UC (R)	55 0205	1304
		Avenida Pico UC (L)	55 0207	5760
		Avenida Vaquero UC	55 0223	4176
		Avenida Vaquero UC	55 0223	4176
		5/N5-N1 CONN SEPARATION NB	55 0511	5950
		5/N5-N1 CONN SEPARATION SB	55 0511	4704
		ROUTE 5/1 SEPARATION NB	55 0226	2430
		ROUTE 5/1 SEPARATION SB	55 0226	3933
		CAMINO CAPISTRANO UC NB	55 0227	8712
		CAMINO CAPISTRANO UC SB	55 0227	484
		San Juan Creek Rd UC (L)	55 0298	3354
		San Juan Creek Rd UC (R)	55 0298	2451
		San Juan Creek Bridge (L)	55 0228	13398
		San Juan Creek Bridge (R)	55 0228	12180
		El Horno UC (L)	55 0230	2832
		El Horno UC (R)	55 0230	2832
		Junipero Serra UC (L)	55 0231	1364
		Junipero Serra UC (R)	55 0231	3844
		Trabuco Creek	55 0289	7320
		Avery Parkway UC (SB)	55 0232	2924
		Avery Parkway UC (NB)	55 0232	2924
		Oso Creek (SB)	55 0509	5181
		Oso Creek (NB)	55 0509	7222
		El Toro Overhead (SB)	55 0221	2025
		El Toro Overhead (NB)	55 0221	6132
		La Paz Road UC (SB)	55 0234	3078
		La Paz Road UC (NB)	55 0234	3936
☐ New Bridge over water	N/A	N/A	N/A	N/A
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	5	San Mateo Creek Br. (L/R)	57 0001	43010
		San Juan Creek Bridge (L/R)	55 0228	5805
		Trabuco Creek Bridge	55 0298	7320
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	5	San Juan Creek UC (L/R)	55 0298	5805
		San Mateo Creek Br. (L/R)	57 0001	43010
		Trabuco Creek Bridge	55 0289	7320
☒ Bridge w/ Special Design or Retrofit	33	San Mateo Creek (L)	57 0001	21505
		San Mateo Creek (R)	57 0001	21505
		El Camino Real UC (L)	55 0203	8148
		El Camino Real UC (R)	55 0203	8168
		Avenida Presido UC (L)	55 0204	22022
		Avenida Palizada UC (L)	55 0205	9780
		Avenida Palizada UC (R)	55 0205	1304
		Avenida Pico UC (L)	55 0207	5760
		Avenida Vaquero UC	55 0223	4176
		Avenida Vaquero UC	55 0223	4176
		5/N5-N1 CONN SEPARATION NB	55 0511	5950
		5/N5-N1 CONN SEPARATION SB	55 0511	4704
		ROUTE 5/1 SEPARATION NB	55 0226	2430
		ROUTE 5/1 SEPARATION SB	55 0226	3933
		CAMINO CAPISTRANO UC NB	55 0227	8712
		CAMINO CAPISTRANO UC SB	55 0227	484

		San Juan Creek Rd UC (L)	55 0298	3354
		San Juan Creek Rd UC (R)	55 0298	2451
		San Juan Creek Bridge (L)	55 0228	13398
		San Juan Creek Bridge (R)	55 0228	12180
		El Horno UC (L)	55 0230	2832
		El Horno UC (R)	55 0230	2832
		Junipero Serra UC (L)	55 0231	1364
		Junipero Serra UC (R)	55 0231	3844
		Trabuco Creek	55 0289	7320
		Avery Parkway UC (SB)	55 0232	2924
		Avery Parkway UC (NB)	55 0232	2924
		Oso Creek (SB)	55 0509	5181
		Oso Creek (NB)	55 0509	7222
		El Toro Overhead (SB)	55 0221	2025
		El Toro Overhead (NB)	55 0221	6132
		La Paz Road UC (SB)	55 0234	3078
		La Paz Road UC (NB)	55 0234	3936

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
☒ Preliminary Investigations (Structure Foundation Plan)
☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 36	Est. Max. Ht 15 ft Est. Length 54,070ft	☒ Standard Design	☐ Special Design
☐ Ret. walls(s) Number 0	Est. Max. Ht 0 ft Est. Length 0 ft	☐ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 85	Est. Max. Ht 25 ft Est. Length 82,104ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 152
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 76
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
--	-----------------------------------	---

Other

☐ Special Products:	Explain
--	---------

Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ Date: _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087
Project Description: Alternative 9 – Build Idea 9 (ID 9): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR73

Project Manager Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 9 would construct an arterial connection from SR-73 to Ortega Highway in the south and Antonio Parkway in the north. The proposed arterial connection would exit SR-73 with connector structures over I-5, continuing to an intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway with a grade separated split and the northbound segment would terminate at Antonio Parkway. The southbound segment would terminate at Ortega Highway.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☒ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☒ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☒ Yes ☐ No) | ☐ Building Project | ☐ Stabilize Subgrade |
| ☒ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☒ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☐ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR-241 and I-5. Under the No-Build Alternative, no extension of the express tolled SR-241 lanes to I-5 new General Purpose lanes or high-occupancy toll (HOT) lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR-73 would occur. This alternative includes other projects on the financially-constrained project list in the Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) and the Preferred Plan in OCTA's 2014 Long Range Transportation Plan (LRTP) in the Project Limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The no-build alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The no-build alternative does not meet the established purpose and need of the project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 9: Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR 73

Alternative 9 would construct four-lane (two lanes in each direction) arterial connections from SR 73 to Ortega Highway and Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial facility would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue east from Avery Parkway and the northbound segment would terminate with a new signalized intersection at Antonio Parkway. The southbound segment would terminate with a new signalized intersection at Ortega Highway.

Alternative 9 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new intersection at the proposed arterial roadway and Antonio Parkway, including a signalized intersection; and
- Add one new intersection at the proposed arterial roadway and Ortega Highway, including a signalized intersection.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73, bicycles would not be permitted.

Estimated costs associated with this Build Idea include \$250-\$320M for right-of-way and \$0.6-\$0.8B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 09 (ID 09): Connect Ortega Highway and Antonio Parkway to Avery Parkway and SR73) would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-11 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

**Alternative # 9 - Connect Ortega Highway and Antonio Parkway to Avery
Parkway and SR-73**

<u>Largest Structure (\$ 1000's)</u>	<u>Project Cost Range (\$ 1000's)</u>	<u>Cost of</u>
Roadway	\$541,000	\$75,427.5
Structure**	\$128,914	
Total	\$960,000	
**Structure Cost Range to be provided by (check one)		
☒ Consultant	☐ Structure Design Technical Liaison.	

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Num ber	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	2	SR 73 Connector ID09 Separator	TBD	301710 15936
☐ New Bridge over water	N/A	N/A	N/A	N/A
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☐ Bridge Widening over water	N/A	N/A	N/A	N/A
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☐ Bridge w/ Scour Analysis	N/A	N/A	N/A	N/A
☐ Bridge w/ Special Design or Retrofit	N/A	N/A	N/A	N/A

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
☒ Preliminary Investigations (Structure Foundation Plan)
☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 4	Est. Max. Ht 15 ft Est. Length 3620 ft	☒ Standard Design	☐ Special Design
☐ Ret. walls(s) Number 0	Est. Max. Ht 0 ft Est. Length 0 ft	☐ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 7	Est. Max. Ht 55 ft Est. Length 5,960 ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 12
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 12
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
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Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 18 - Build Idea 18 (ID 18): Connect SR241 to SR73 and Extend
Crown Valley Parkway to SR241

Project Manager Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 18 would construct an arterial connection from SR-73 to Antonio Parkway. The proposed arterial connection would exit SR-73 with connector structures over I-5, continuing to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to an intersection at Antonio Parkway and continue further northeast to connect to Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones, under this Alternative.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☒ New Expressway/Freeway
on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☒ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☒ Yes ☐ No) | ☐ Building Project | ☐ Stabilize Subgrade |
| ☒ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☒ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☐ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 18: Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

Alternative 18 would include the following additional improvements to the identified portion of the corridor:

Local Improvements

- Extend Avery Parkway to the proposed arterial roadway intersection, including a signalized intersection;
- Add one new interchange at the proposed arterial roadway and Los Patrones Parkway, including northbound and southbound connections; and
- Extend Crown Valley Parkway and add one new interchange at the Los Patrones Parkway, including northbound and southbound connections.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans' Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017);
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections; and
- Provide bicycle lanes, to the extent feasible, on portions of the arterial between signalized intersections. For portions of this alternative where the arterial forms a direct connection to SR 73 or a connection to a high-speed ramp to Los Patrones Parkway, bicycles would not be permitted.

Estimated costs associated with this Build Idea include \$240-\$300M for right-of-way and \$0.6-\$0.8B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 18 (ID18): Connect SR241 to SR73 and Extend Crown Valley Parkway to SR241 would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-13 in the PSR PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>		<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway	\$0	\$0
Structure**	\$0	
Total	\$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

**Alternative #18 - Construct an East-West Arterial Highway Connecting SR-73
with SR-241, Extend Crown Valley Parkway to Connect to SR-241**

Project Cost Range (\$ 1000's) Cost of Largest Structure (\$ 1000's)

Roadway	\$565,000	\$75,427.5
Structure**	\$134,584	
Total	\$979,000	

**Structure Cost Range to be provided by (check one)

☒ Consultant ☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Num ber	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	3	SR 73 Connector Los Patrones Parkway OC Crown Valley Parkway OC	TBD	301710 14596 16020
☐ New Bridge over water	N/A	N/A	N/A	N/A
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☐ Bridge Widening over water	N/A	N/A	N/A	N/A
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☐ Bridge w/ Scour Analysis	N/A	N/A	N/A	N/A
☐ Bridge w/ Special Design or Retrofit	N/A	N/A	N/A	N/A

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Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 4	Est. Max. Ht 15 ft Est. Length 3620 ft	☒ Standard Design	☐ Special Design
☐ Ret. walls(s) Number 0	Est. Max. Ht 0 ft Est. Length 0 ft	☐ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 7	Est. Max. Ht 55 ft Est. Length 5,960 ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 60	Est. Volume (ft³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 20
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
- ☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 20
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:

☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
--	---------

Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

South County Traffic Relief Effort Project Study Report-Project Development Support (PSR-PDS)

Division of Engineering Services PSR-PDS Scoping Checklist

Project Information

District 12 County OC Route 241/I-5 (Post Mile) EA 12-0Q680K Project ID#1217000087

Project Description: Alternative 21 - Build Idea 21 (ID 21): Los Patrones Parkway Extension and I-5 HOT Lanes

Project Manager Farid Nowshiravan Phone # 657-328-6303

DES Project Liaison Engineer* (PLE): **Select a PLE from pulldown**

DES Special Funded Projects Liaison Engineer: Imad Abu-Markhieh Phone # 949-227-4491

DES Consultant Management Engineer: Phone #

*The Project Liaison Engineer will provide assistance with the completion of this form.

Project Scope

Alternative 21 would add managed lanes or convert HOV lanes to managed lanes, to provide two managed lanes in each direction on I-5 from I-405 to Basilone Road, extending into San Diego County.

Check applicable boxes describing proposed scope of project.

- | | | |
|--|--|--|
| ☐ New Expressway/Freeway on new alignment | ☐ Other Roadway Realignment | ☒ Widen Highway |
| ☐ Construct Interchange | ☐ Emergency/Storm Damage | ☐ Rockfall Project |
| ☒ Modify Interchange | ☒ Bridge Widening | ☐ Left-turn Pocket |
| ☒ Bridge Replacement | ☒ Curve Correction | ☒ Modify Slope |
| (New alignment? ☐ Yes ☒ No) | ☐ Building Project | ☒ Stabilize Subgrade |
| ☐ Bridge Rehabilitation | ☒ Median Barrier Retrofit | ☐ Stabilize Roadway |
| ☒ New Bridge | ☐ Construct Passing Lane | ☒ Landslide/Slip-out |
| ☒ Bridge Seismic Retrofit | ☒ Soundwall/Retaining Wall | ☒ Bridge Deck Rehab. |
| ☐ Other Design: Explain: | ☒ Roadway Rehabilitation | ☒ Bridge Joint Seals |

Briefly describe proposed scope of DES involvement for all alternatives.

Alternative 1: No-Build Alternative

Alternative 1, the No-Build Alternative, does not include improvements to the existing lane configurations and route adoptions for SR 241 and I-5. Under the No-Build Alternative, no extension of the tolled SR 241 lanes to I-5, new General-Purpose lanes or HOT lanes on I-5, or new connections between Ortega Highway, Antonio Parkway, Avery Parkway, and SR 73 would occur. This alternative includes other projects on the financially-constrained project list in the SCAG 2016 RTP/SCS and the Preferred Plan in OCTA's 2014 LRTP in the Project limits on I-5. Additional land areas would not be impacted and existing and projected traffic congestion would not be alleviated beyond that associated with other projects in approved regional transportation plans. The No-Build Alternative does not include any of the features considered during the conceptual analysis and preliminary engineering stage of the Project. That is, it does not address the current north-south regional traffic demand, which will increase in the future. The No-Build Alternative does not meet the established purpose and need of the Project outlined in Section 3; it only provides a baseline for comparison with the Build Alternatives.

Under Alternative 1, two scenarios were analyzed for the purpose of this study. The only difference between the two scenarios is the assumption of the I-5 HOV lane between Avenida Pico and Countyline. One scenario assumes I-5 between Avenida Pico and Countyline would remain as existing conditions; while the other assumes an HOV lane will be added on each direction of I-5 between Avenida Pico and Countyline. In addition, Los Patrones Parkway (Oso Parkway to Cow Camp Road) is assumed to be non-tolled under the No-Build Alternative for both scenarios.

There are no costs associated with this Alternative, as it leaves the existing conditions as-is.

Alternative 21: Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basiline Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its nationwide

regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

Alternative 21 would include the following additional improvements to the identified portion of the corridor:

Los Patrones Parkway Improvements

- Construct a new interchange at ‘I’ Street and Los Patrones Parkway (the northern limit of this alternative is the limit of work required to construct the on- and off ramps at the ‘I’ Street interchange);
- Construct a grade separated interchange at the Vista Montana intersection to allow traffic on Avenida La Pata to proceed northbound and southbound without stopping, and provide on- and off- ramps for northbound and southbound access to Vista Montana; and
- Reconfigure the northbound access road from Prima Deshecha Landfill to provide grade separated “braided ramps” between the new northbound off ramp to Vista Montana and the existing northbound access road.
- Subject to further study, in the next phase of project development, this alternative may include the addition of tolling equipment along Los Patrones Parkway.

I-5 Improvements

- Modify sixteen existing interchanges along I-5 at SR 73, Junipero Serra Road, Ortega Highway, Camino Capistrano, La Novia Avenue, Stonehill Drive, Pacific Coast Highway /Camino Las Ramblas, Camino De Estrella, Avenida Vista Hermosa, Avenida Pico, Avenida Palizada, Avenida Presidio, El Camino Real, Avenida Califia, Cristianitos Road, and Basilone Road, to accommodate the proposed I-5 widening.

Multi-Modal and Sustainability Improvements

- Provide Complete Streets treatments at modified and new interchanges consistent with *Caltrans’ Main Street, California: A Guide for Improving Community and Transportation Vitality* (November 2013) and *Complete Streets Elements Toolbox Version 2.0* (January 2017); and
- Include sidewalks, ADA ramps, and bikeway connections (as applicable) at local arterial intersections.

Estimated costs associated with this Build Idea include \$70-\$90M for right-of-way and \$1.0-\$1.3B for capital construction; for a breakdown of costs, refer to Attachments D and G, respectively.

Impact to Structures

The Build Idea 21 (ID21): Los Patrones Parkway Extension and I-5 HOT Lanes would impact numerous existing structures and create new structures. The affected structures and the proposed improvements are summarized in Table 7-11 in the PSR-PDS.

Project Schedule

PA/ED Date	Start	July 2018
	End	January 2022

Project Cost

Alternative # 1 – No-Build Alternative

<u>Project Cost Range (\$ 1000's)</u>	<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway \$0	\$0
Structure** \$0	
Total \$0	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Alternative # 6 –Build Idea 12 (ID12: Connect SR 241 to I-5 at Avenida Vaquero)

<u>Project Cost Range (\$ 1000's)</u>	<u>Cost of Largest Structure (\$ 1000's)</u>
Roadway \$546,000	\$17,325
Structure** \$568,558	
Total \$1,212,000	

**Structure Cost Range to be provided by (check one)

☒ Consultant

☐ Structure Design Technical Liaison.

Project Scope Breakdown by DES Function

Photogrammetry

Bridge Design Services (check applicable boxes)

Design by:

- ☐ Office of Structure Design
- ☐ Structure Maintenance Design
- ☐ Office of Structure Contract Management (Consultant Design Oversight)
- ☒ Office of Special Funded Projects (Consultant Design Oversight)

Bridge Information:

	Number	Br. Name(s)	Br. No(s)	Area (SF)
☒ New Bridge(s)	9	NB La Pata On Vista Montana La Pata Connector Service Road 1 Service Road 2 Ortega Hwy San Juan Creek Bridge Cow Camp I Street	TBD TBD TBD TBD TBD TBD TBD TBD TBD	3280 8840 69300 2250 2250 28260 67230 37050 24600
☒ Bridge Replacement(s)	7	Avenida San Dimas PED OC Avenida San Luis Rey OC Avenida Mendocino OC Avenida Vista Hermosa OC (R) Avenida Vista Hermosa OC (L) Camino De Estrella OC Via California OC	55 0513 55 0151 55 0463 55 0610 55 0610 55 0224 55 0225	11659 9416 11000 30772 30772 20746 22932
☒ Bridge Widening(s)	25	San Mateo Creek (L) San Mateo Creek (R) El Camino Real UC (L) El Camino Real UC (R) Avenida Presido UC (L) Avenida Palizada UC (L) Avenida Palizada UC (R) Avenida Pico UC (L) Avenida Vaquero UC Avenida Vaquero UC 5/N5-N1 CONN SEPARATION NB 5/N5-N1 CONN SEPARATION SB ROUTE 5/1 SEPARATION NB ROUTE 5/1 SEPARATION SB CAMINO CAPISTRANO UC NB CAMINO CAPISTRANO UC SB San Juan Creek Rd UC (L) San Juan Creek Rd UC (R) San Juan Creek Bridge (L) San Juan Creek Bridge (R) El Horno UC (L) El Horno UC (R) Junipero Serra UC (L) Junipero Serra UC (R) Trabuco Creek	57 0001 57 0001 55 0203 55 0203 55 0204 55 0205 55 0205 55 0207 55 0223 55 0223 55 0511 55 0511 55 0226 55 0226 55 0227 55 0227 55 0298 55 0298 55 0228 55 0228 55 0230 55 0230 55 0231 55 0231 55 0289	21505 21505 8148 8168 22022 9780 1304 5760 4176 4176 5950 4704 2430 3933 8712 484 3354 2451 13398 12180 2832 2832 1364 3844 7320
☐ New Bridge over water	N/A	N/A	N/A	N/A
☐ Bridge Replacement over water	N/A	N/A	N/A	N/A
☒ Bridge Widening over water	5	San Mateo Creek Br. (L/R) San Juan Creek Bridge (L/R) Trabuco Creek Bridge	57 0001 55 0228 55 0298	43010 5805 7320
☐ Bridge Rail Replacement(s)	N/A	N/A	N/A	N/A
☐ Approach Slab	N/A	N/A	N/A	N/A
☐ Bridge with Railroad Involved	N/A	N/A	N/A	N/A
☒ Bridge w/ Scour Analysis	5	San Juan Creek UC (L/R) San Mateo Creek Br. (L/R) Trabuco Creek Bridge	55 0298 57 0001 55 0289	5805 43010 7320
☒ Bridge w/ Special Design or Retrofit	25	San Mateo Creek (L) San Mateo Creek (R) El Camino Real UC (L) El Camino Real UC (R) Avenida Presido UC (L)	57 0001 57 0001 55 0203 55 0203 55 0204	21505 21505 8148 8168 22022

	Avenida Palizada UC (L)	55 0205	9780
	Avenida Palizada UC (R)	55 0205	1304
	Avenida Pico UC (L)	55 0207	5760
	Avenida Vaquero UC	55 0223	4176
	Avenida Vaquero UC	55 0223	4176
	5/N5-N1 CONN SEPARATION NB	55 0511	5950
	5/N5-N1 CONN SEPARATION SB	55 0511	4704
	ROUTE 5/1 SEPARATION NB	55 0226	2430
	ROUTE 5/1 SEPARATION SB	55 0226	3933
	CAMINO CAPISTRANO UC NB	55 0227	8712
	CAMINO CAPISTRANO UC SB	55 0227	484
	San Juan Creek Rd UC (L)	55 0298	3354
	San Juan Creek Rd UC (R)	55 0298	2451
	San Juan Creek Bridge (L)	55 0228	13398
	San Juan Creek Bridge (R)	55 0228	12180
	El Horno UC (L)	55 0230	2832
	El Horno UC (R)	55 0230	2832
	Junipero Serra UC (L)	55 0231	1364
	Junipero Serra UC (R)	55 0231	3844
	Trabuco Creek	55 0289	7320

Other DES functional units required for Structure Work

- ☐ Structure Hydraulics (include if bridge is over or adjacent to water)
- ☒ Preliminary Investigations (Structure Foundation Plan)
- ☒ Geotechnical Services (Structure Foundations)

Wall Design Data for Structure Design & Geotechnical Services

☒ Soundwall(s) Number 31	Est. Max. Ht 12 ft Est. Length 43,950ft	☒ Standard Design	☐ Special Design
☐ Ret. walls(s) Number 0	Est. Max. Ht 0 ft Est. Length 0 ft	☐ Standard Design	☐ Special Design
☒ NonStand.Wall(s) Number 45	Est. Max. Ht 20 ft Est. Length 58,204ft	☐ Standard Design	☒ Special Design

Geotechnical Services

Is Oversight for consultant prepared geotechnical reports required?

☒ Yes ☐ No

Has the Geotechnical Design Liaison or other geotechnical person been contacted?

☐ Yes ☒ No If yes, who? TBD

Terrain	☐ Flat	☐ Rolling	☒ Mountainous
Cuts:	Est. Max Height (ft)	Est. Volume (ft ³):	☐ New ☐ Widen
Fills:	Est. Max Height (ft) 50	Est. Volume (ft ³):	☒ New ☐ Widen

Sign Structures

☒ Overhead Sign Foundations	Number 140
☒ Changeable Message Sign Foundations	Number 3

Other:

- ☒ Special Studies (slope stability, rockfall, erosion, seepage, ground water, settlement, liquefaction, slipout repair, rock slope, etc.) Explain Slope Stability
☐ Existing Maintenance Problems: Explain:

Technical Specialist Design

Anticipated insertable plan sheet(s) check below:

☒ Culvert(s)	Number 2
☐ Barrier(s)	Number
☒ Signs and Overhead Structures	Number 70
☐ Other Design:	Explain:

Transportation Architecture Design

☐ Design New Building(s)	Explain:
☐ Remodel Existing Buildings(s)	Explain:
☒ Bridge Aesthetics Evaluation	Explain: TCA Aesthetic Design Guidelines
☐ Build scale model	Explain:
☐ Other Aesthetics work	Explain:

Electrical, Mechanical, Water & Wastewater Design

☐ Pumping Plants	Explain:
☐ Movable bridge, drawbridge	Explain:
☐ Lighting control system for facilities	Explain:
☐ Sanitary Systems	Explain:

Materials Engineering & Testing Services

Pavement

☐ Rigid	☒ Flexible	Average Grade 3-6%	Average Superelevation 0-6.8%
☐ Deflection Study Required	No. of Locations	Lane/miles to be tested	

Consultation and Inspection

☒ Loop detectors	☒ Signal & Lighting Products	☒ Changeable Message Signs, Closed Circuit TV
☒ Concrete Bridge	☐ Steel Bridge	

Materials Engineering & Testing Services (Continued)

Corrosion Tests

☒ Soil	☐ Concrete	☐ Cathodic Protection System
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Other

☐ Special Products:	Explain
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Additional Studies, Investigations or Research from DES

Identify additional studies or investigations that may be required from DES Functional Units.

Prepared By: _____ **Date** _____

Please submit this form to DES, to the attention of the Project Liaison Engineer, Office of Project Delivery, in the subdivision of Program/Project & Resource Management.

DES will provide a Structure Cost Estimate Range, for each alternative and a resource summary estimate to be included in the project work plan.

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

QUALITY MANAGEMENT PLAN (QMP)

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Quality Management Plan

**For Preparation of Project Initial Documents for Locally Implemented Projects on the
State Highway System**

August/2018

QUALITY MANAGEMENT PLAN FOR South County Traffic Relief Effort

Approved by _____ Date _____
Farid Nowshiravan, *PROJECT MANAGER*
Caltrans District 12

Approved by _____ Date _____
Valarie McFall, *Chief Environmental Planning Officer*
FOOTHILL/EASTERN TRANSPORTATION
CORRIDOR AGENCY (F/ETCA) PROJECT SPONSOR
Accepts Risks Identified in this PSR-PDS and Attached Quality Management Plan

Approved by _____ Date _____
David Spears, *CONSULTANT PROJECT MANGER*
Corridor Management Group
On behalf of Transportation Corridor Agencies

Approved by _____ Date _____
Tom Schroeder, *CONSULTANT QUALITY CONTROL*
MANAGER
Corridor Management Group
On behalf of Transportation Corridor Agencies

DRAFT

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Exhibit B	Quality Control Review Process
Exhibit C	Quality Control Certification Form

Introduction

The purpose of the Quality Management Plan is to facilitate an effective and efficient process for the development, review and approval of Project Initial Documents (PIDs) for State Highway System projects sponsored by others. The project sponsor and/or implementing agency must develop and follow a Quality Management Plan that meets the standards of professional practice and satisfies requirements of the project scope, cost, and schedule. The Project Managers from Caltrans and the Foothill/Eastern Transportation Corridor Agency (F/ETCA) shall ensure that all Project Development Team (PDT) members utilize the Quality Management Plan elements as described in this document during the production and review of PIDs. Quality Assurance (QA)/Quality Control (QC) will be performed before deliverables are presented to Caltrans for review. Each team member must understand the project objectives, apply sound engineering principles and is expected to produce quality, accurate, and complete documents within the project schedule and budget. Project documents will be prepared in accordance with current Caltrans regulations, policies, procedures, manuals, and standards including compliance with Federal Highway Administration requirements.

The following information describes the quality procedures that will be implemented for work performed during all phases of development, review and approval of locally implemented PIDs.

Quality Control Reviews

1. QC Reviews shall be conducted for all deliverables to Caltrans. A project schedule shall be developed with the consensus of the PDT that identifies anticipated reports, submittal dates and review periods. The General List of Deliverables and Assigned QC Reviewers, as shown in Exhibit A, shall be used to conduct project-specific quality control reviews; final listing subject to staff resources.
2. Prior to submission to Caltrans, each deliverable will be subject to review by independent staff, Quality Control Reviewer, and the F/ETCA Project Manager.
3. Project documents will be reviewed for conformance with project design criteria, legibility, and completeness and compliance with regulatory and code requirements.
4. All QC comments will be evaluated by the lead author/lead technical professional for the document, discussed with the QC reviewer as needed and, if appropriate, incorporated into the deliverable. The F/ETCA and Caltrans Project Manager will review and approve the resolution of each comment.
5. The Project Quality Control Review Process, as shown in Exhibit B, shall be used to conduct all quality control reviews.
6. The Project Quality Control Certification Form, as shown in Exhibit C, shall be used to document all quality control reviews and certifications.

Checking of Calculations

Final report calculations associated with the conceptual alternatives, cost estimates, and traffic technical reports shall be checked for reasonableness. All calculations shall be reviewed by the Lead.

Checking of Drawings

Conceptual geometric plans figures, mapping, and preliminary bridge plans (if applicable) shall be checked in accordance with established standards (e.g. Highway Design Manual and local standards).

Quality Assurance

The Project Managers from Caltrans and F/ETCA, along with its Corridor Management Group (CMG) consultant(s) will be responsible for the development of deliverables and assure that the stated quality control procedures are being followed. A Quality Assurance Log that includes dates when documents were received reviewed, and names of the QC reviewers shall be maintained for each report or work product.

Reporting Structure

An organization chart that describes the reporting structure and assigned staff that are involved in the QA/QC shall be developed at the beginning of the PID project.

QA/QC Duties and Responsibilities

Quality control begins with assigning the most appropriate person to each task. Each member of the team should be responsible for controlling the quality of the product, beginning with the project staff through to the Project Managers. The qualifications of the team members overseeing and doing the work should be identified. All team members should be in constant communication with the each other and their respective Principals and Project Managers in regards to project status, schedule, and any issues that might arise during the development of the PID.

The duties and responsibilities of each of the project members in coordinating and guiding the project efforts are described below:

- a. Quality Control Manager** – Responsible for monitoring of the project to ensure adherence to the project objectives, schedule, budget, approvals, and ensuring that the QA/QC plan is in place and being implemented. Provides periodic audits of technical work and performance of respective staff.
- b. Caltrans Project Manager** – Responsible for Independent Quality Assurance as described in the Cooperative Agreement.
- c. Local Agency Project Managers** – Responsible for completion of project scope and tasks, and adherence to project schedule and budget, including QA/QC program. The Project Managers allocate resources to various elements of the work, establish and implement the Quality Management Plan, schedule the various activities and adjust plans as the work progresses to identify potential problem areas and resolve them in a timely manner. Responsible for technical review and approval of project documents before issuance to the reviewing agency; certifies that each submittal has been prepared and checked in accordance with Caltrans standards, policies, and procedures, sound engineering practices and represents a quality product; and maintains frequent contact and communication with the Caltrans Project Manager to assure satisfaction with the progress and performance.

d. CMG Consultant Project Manager – The CMG Consultant Project Manager reviews and monitors the implementation of the QA/QC practices and processes and ensures consistency with Caltrans standards, policies, and procedures. The CMG Consultant Project Manager identifies the quality control actions required to be taken, the resources to be applied to these quality control actions, and interaction of these activities with the other elements of work. In this process, it is essential that the CMG Consultant Project Manager clearly identify the personnel involved and their duties; allocate time, effort, and resources to the quality control function; and reviews and revises the allocated resources appropriately as the work progresses. The CMG Consultant Project Manager is responsible for production of the technical work produced by their staff. They also assist the Project Managers in the execution of the Quality Management Plan. The CMG Consultant Project Manager reports administratively to the Project Managers and works closely with them in the early identification and resolution of any product deficiencies. This includes but is not limited to:

- Perform periodic reviews of quality control documentation;
- Identification and control of nonconforming conditions

d. CMG Technical Staff – CMG Technical staff are responsible to their CMG Consultant Project Manager for the quality of the work produced within their respective disciplines. In this capacity, technical staff establishes operating guidelines and areas of responsibility within the activity; monitors the work periodically to assure adherence to the contract scope of services and to the established reviewing procedures to ensure consistency with Caltrans standards, policies, and procedures, advises the CMG Consultant Project Manager regarding the progress of work and of any circumstances that may require particular attention; reviews work prior to submittal to the Project Managers for quality control review; resolves QC review comments; insures comments are incorporated into the final document and reviews completed work before it is transmitted to the Project Managers for approval and submittal to the reviewing agencies.

Document Control

F/ETCA or CMG consultant shall make available and maintain electronic records and hard copies of drafts and final reports for inspection upon request during the development of the Project Study Report-Project Development Support.

Control of Sub-Consultants

If a portion of the scope of work is subcontracted out by the F/ETCA CMG consultant, then all sub-consultants will have the same responsibilities as the F/ETCA CMG consultant.

EXHIBIT A – GENERAL LIST OF DELIVERABLES AND ASSIGNED QC REVIEWERS

Task No	Deliverable	CMG Consultant Reviewer	F/ETCA Reviewer
01	Project Schedule	Jeff Fromhertz	Paul Bopp
02	Project Purpose and Need Statement	Dave Spiers	Paul Bopp
03	Project Maps	Karen Kosup	Paul Bopp
04	Ideas Evaluation Matrix	Dave Spiers	Paul Bopp
05	Conceptual Geometric Plans	Jeff Fromhertz	Paul Bopp
06	Cost Estimates – Capital Outlay	Dave Spiers	Paul Bopp
07	Preliminary Environmental Analysis and Report	Dave Spiers	Paul Bopp
08	Transportation Planning Scoping Information Sheet	Karen Kosup	Paul Bopp
09	Conceptual Cost Estimates – Right-of-Way Component	Dave Spiers	Paul Bopp
10	Risk Register	Jeff Fromhertz	Paul Bopp
11	South County Traffic Relief Effort Screening Matrix	Dave Spiers	Paul Bopp
12	Traffic Engineering Performance Assessment and Report	Dave Spiers	Paul Bopp
13	Storm Water Data Report	Rick Botcher	Paul Bopp
14	Division of Engineering Services PSR-PDS Scoping Checklists	Dave Spiers	Paul Bopp
15	Quality Management Plan	Jeff Fromhertz	Paul Bopp
16	ICE Step 1 Memorandum	Dave Spiers	Paul Bopp
17	Draft PSR-PDS Review	Dave Spiers	Paul Bopp
18	Final PSR-PDS Approval	Dave Spiers	Paul Bopp

Notes: CMG = Corridor Management Group; F/ETCA = Foothill/Eastern Transportation Corridor Agency; PSR-PDS = Project Study Report-Project-Project Development Support; QC = Quality Control

EXHIBIT B – QUALITY CONTROL REVIEW PROCESS

Applicability

Corridor Management Group's (CMGs) 5-Step Quality Control Review Process provides a means for conducting Quality Control reviews for work products suitable for its use. Among those work products are construction plans, specifications and estimates, calculations, reports, and studies.

The guidance below is intended to refer to this 5-Step Quality Control Review Process, and will need modification to adapt for other Quality Control Review Processes.

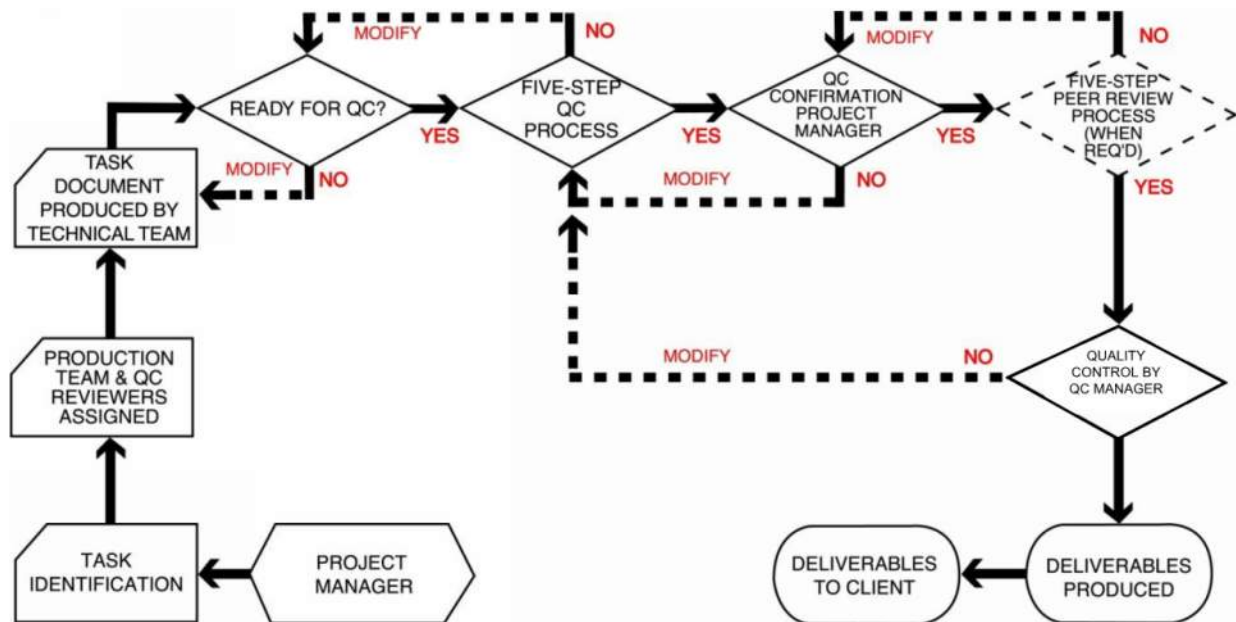
Responsible Review Participants

The LTP is the Lead Technical Professional responsible for the work product being reviewed.

The QCR is the Quality Control Reviewer. Individuals acting as the QCR must be qualified to have performed the work themselves. The QCR may be a project participant, but to make sure that the Quality Control Review is independent from the production of the work element, the QCR is precluded from having produced or directed the production of the work product being reviewed.

Project Production Process

The following graphic illustrates the process flow for the production, Quality Control Review, and submittal for a typical work product's development, incorporating the 5-Step Quality Control Review process.



Step 1 – Ready for Quality Control: The LTP assembles the documents for review, whether prepared by them or under their direction, applies the QC stamp (stamp may also be CAD generated if desired), and enters a unique descriptive label for the Quality Control Document in the block provided, for future tracking and retrieval purposes, and makes a determination that the documents are ready for review. The LTP affirms this by signing or initialing and dating in the blocks provided.

Step 2 – Quality Control Review: The QCR conducts the quality control review, red-marking anything that requires further review or anything that is found to be in error or is questionable. Highlighting in yellow is used to identify the elements of the document that have been reviewed and deemed to be acceptable. Often it is necessary that the QCR perform interim manual calculations on the drawing. When this is necessary, they should use a black pencil for this.

Items not reviewed are not to be highlighted in yellow; however, if there are elements that were previously reviewed, found to be acceptable, and are unchanged, a strike-through of those previously-reviewed elements with a single highlighter mark, and noting that they were previously reviewed, is performed. Upon completion of the review, the QCR affirms the completion by signing or initialing and dating in the signature blocks provided.

Step 3 – Concurrence: The LTP reviews the Quality Control comments to confirm their validity, and does so by placing a red check mark by each Quality Control comment. For those Quality Control comments that are deemed questionable, LTP will coordinate with the QCR to discuss and better understand the concerns. If resolution of issues cannot be resolved by discussion with the QCR, the issues in question are elevated to the Project Manager. Clarification of any issues in question is documented in writing in red near the comment. Upon successful completion of this Concurrence step, the LTP affirms the completion by signing or initialing and dating in the blocks provided.

Step 4 – Changes Made: After concurrence, the LTP makes or directs the corrections and/or revision of the documents. After such edits have been made, LTP then reviews the resultant documents and validates that the comments as agreed to have been addressed and incorporated, highlighting the Quality Control comments with a yellow highlighter, and affirms the completion by signing or initialing and dating in the blocks provided.

Step 5 – Changes Verified: Following the LTP's confirmation that the Quality Control comments have been addressed and incorporated, the QCR verifies the results and that his/her comments have been appropriately interpreted. Any unaddressed or unresolved issues identified will be coordinated with the LTP for final resolution. Once all issues have been resolved and addressed, the QCR affirms verification by means of a green check mark at each comment verified, and by signing or initialing and dating in the blocks provided.

For documents not easily suited to markup using the 5-step process, the reviews may alternately be conducted and documented using an electronic comment review and resolution process that incorporates the 5-step review process in a documented fashion.

Tracking Stamp

The document review process is identified and logged by using a Quality Control Tracking Stamp on the front sheet or title page of bound documents being reviewed, and on every sheet for unbound documents. When multiple work products or when work products have multiple disciplines involved, separate tracking stamps are to be used for each work product/discipline/QCR to allow identifying who has responsibility for each element of the work product and its associated QCR.

The details of the review are marked in red, yellow, or green on the documents themselves. The 5-step review process is illustrated and tracked in the fields on the Quality Control Tracking stamp.

QUALITY CONTROL TRACKING STAMP	
QC DOCUMENT:	
QC REVIEW ACTIVITY	
1. READY FOR QC	LTP DATE
2. QC REVIEW (YELLOW = OK) (RED = CHANGE)	QCR DATE
3. CONCURRENCE (RED CHECK)	LTP DATE
4. CHANGES MADE (YELLOW OVER RED)	LTP DATE
5. CHANGES VERIFIED (GREEN CHECK) (GREEN CIRCLE = FIX)	QCR DATE
CDMG	

Confirmation That All Quality Control Reviews Have Been Conducted

Prior to submittal, the Project Quality Assurance Manager or other designated individual reviews all Quality Control documents comprising the submittal to verify that Quality Control Review requirements have been met. If there are material deficiencies, these are to be resolved and their resolution verified prior to submittal.

Quality Control Log

A listing of all documents which have had Quality Control Reviews is maintained in a Quality Control Log. This log contains a unique identification for each document reviewed, along with the names and dates of the individuals responsible for each of the 5 steps. It will also include the name(s) of the individual(s) responsible for confirming that reviews have appropriately been conducted prior to each submittal along with the date that such confirmation was made. This Quality Control Log is to be kept current for use as a reference, during the course of producing the work and for future identification, to serve as an index of all Quality Control documents.

Certification

The certification form shown in Exhibit C shall be utilized for submittals of work tasks performed by CDMG.

EXHIBIT C – QUALITY CONTROL CERTIFICATION FORM
Certification of Compliance with Quality Control Procedure

The documents, reports, and/or specifications, submitted with this form have been prepared in accordance with accepted engineering practice and checked in accordance with the CMG's 5-Step Quality Control Review Process.

The signatures below certify that:

1. Required reviews have been completed.
2. The documents are in accordance with the Contract Requirements.
3. All work has been reviewed in regards to its technical soundness, ethical content and cost effectiveness.

Submittal No.: _____

Document Title: _____

Facility Owner: Foothill/Eastern Transportation
Corridor Agency (F/ETCA)

Originator:

(Print) _____ **Date:** _____

(Sign) _____

**Lead Technical
Professional:**

(Print) _____ **Date:** _____

(Sign) _____

I hereby certify that the above listed items are "Checked and Ready for Submittal".

**Quality Control
Reviewer:**

(Print) _____ **Date:** _____

(Sign) _____

CC: Document Control
Originator
Lead Technical Professional
Project Manager

12 - Ora - 241 – 2.1/14.4
12 - Ora - 73 – 10.34/11.28
12 - Ora - 5 – 0.0/20.5
11 - SD - 5 – 71.3/72.4

ICE STEP I MEMORANDUM

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South County Traffic Relief Effort

DRAFT

**Intersection Control Evaluation
(EA 12-0Q680K)**



Prepared for



August 2018

DRAFT

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MEMORANDUM

Date: August 2018

To: Valarie McFall, TCA

From: Steve Brown, P.E.
Anna Luo, P.E.

Subject: South County Traffic Relief Effort PSR-PDS (EA 12-0Q680K) – Draft Intersection Control Evaluation (Step One)

OC14-0344

Per Caltrans' Intersection Control Evaluation (ICE) screening process, a project must consider various strategies, treatments, configurations, and countermeasures at intersections to identify the most effective and comprehensive access alternatives. This means that all proposals for intersection design should consider and perform a high-level evaluation of traffic control strategies (i.e., roundabout, etc.). Two Steps of evaluation was identified per the ICE guidelines. Step One conducts a planning-level analysis to evaluate the feasibility of intersection traffic control concepts (i.e., roundabout, etc.) and identifies access solution concepts meriting further consideration. Step One is required for the PSR-PDS process. Step Two is required for the next phase (i.e., PA&ED or design phase) and focuses on in-depth analysis including detailed operational and safety analysis and economic analysis (e.g., benefit cost analysis.) If the traffic control concepts (i.e., roundabout) are determined to be infeasible during Step One, the concepts will be withdrawn from further Step Two analysis.

Fehr & Peers has completed a Step One Intersection Control Evaluation (ICE) in support of preparation of the PSR-PDS document for the South County Traffic Relief Effort Project (the Project) in Orange County, CA. The project proposes to materially improve north-south regional mobility and accommodate regional travel demand in South Orange County. The following eight build alternatives (see **Figure 1** for alternative alignments) were evaluated in the PSR-PDS stage and are proposed for consideration in the PA&ED phase of the Project.

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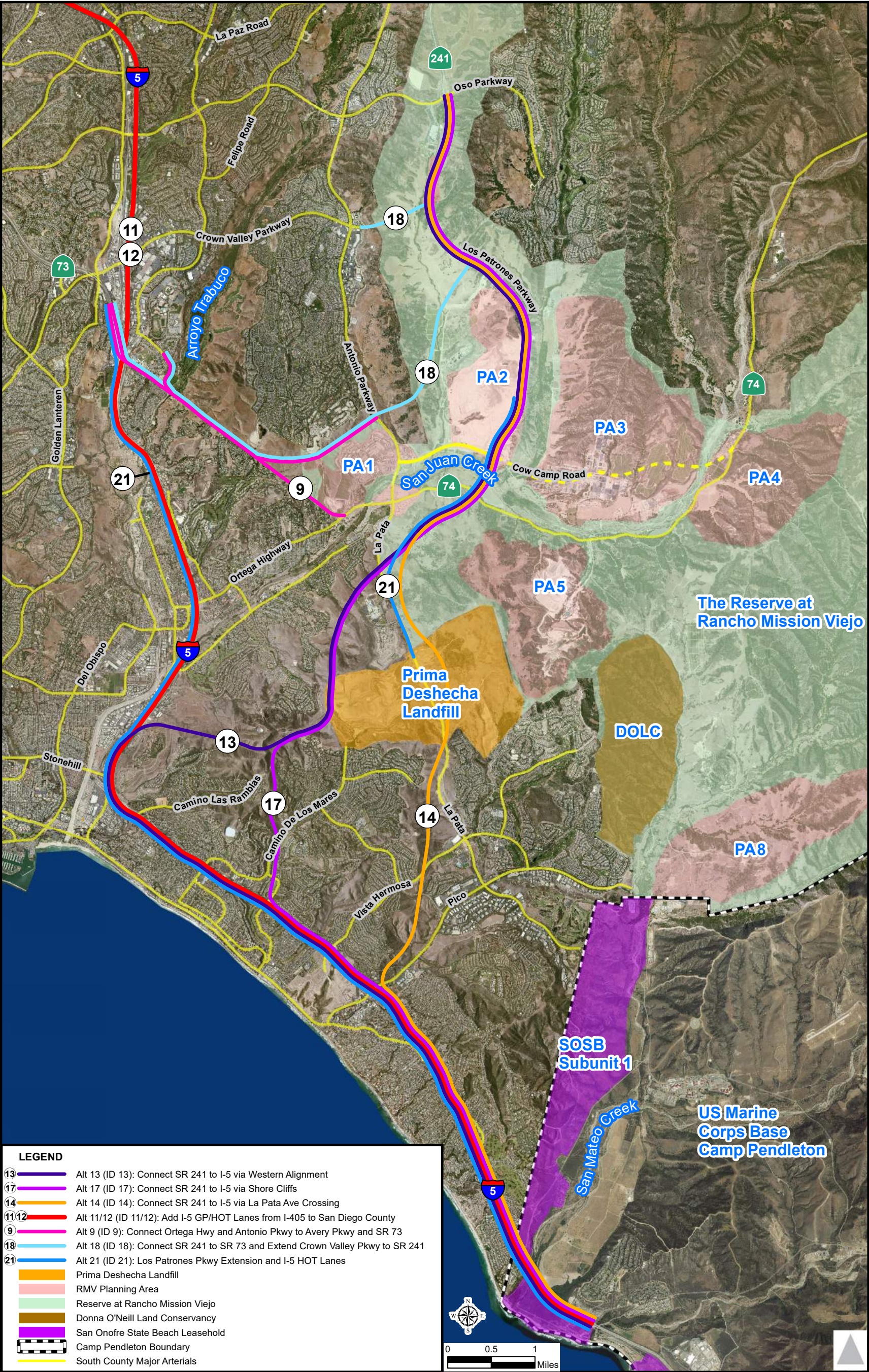


Figure 1
Project Alternatives

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- ❖ Alternative 13 – Build Idea 13 (Connect SR 241 to I-5 at La Novia Avenue)
- ❖ Alternative 17 – Build Idea 17 (Connect SR 241 to I-5 at Avenida Vaquero)
- ❖ Alternative 14 – Build Idea 14 (Connect SR 241 to I-5 at Avenida Pico)
- ❖ Alternative 11 – Idea 11 (Add I-5 General Purpose Lanes from I-405 to San Diego County)
- ❖ Alternative 12 – Idea 12 (Add I-5 HOT Lanes from I-405 to San Diego County)
- ❖ Alternative 9 – Idea 9 (Connect Ortega Hwy and Antonio Pkwy to Avery Pkwy and SR 73)
- ❖ Alternative 18 – Idea 18 (Connect SR 241 to SR 73 and Extend Crown Valley Pkwy to SR 241)
- ❖ Alternative 21 – Idea 21 (Los Patrones Parkway Extension and I-5 HOT Lanes)

All the projects alternatives propose to provide additional capacity to the mainline or arterial roadway system. In addition, Alternatives 13, 17, 14, 18, and 21 would also provide improvements at interchanges along the Los Patrones Parkway/SR 241 corridor. Under Alternatives 13, 17, and 14, Los Patrones Parkway/SR 241 will extend as a four lane (two lanes in each direction) toll road from Cow Camp Road to I-5 and provide connections with local streets via proposed interchanges. Alternative 18 would extend the new east-west arterial and Crown Valley Parkway to connect to Los Patrones Parkway and form two new interchanges along Los Patrones Parkway. Alternative 21 would extend Los Patrones Parkway/SR 241 as a four lane (two lanes in each direction) un-tolled facility from Cow Camp Road to La Pata and provide connections with I Street via a proposed interchange.

The purpose of this memorandum was to evaluate the feasibility of intersection traffic control concepts (i.e., roundabout, etc.) and identify access solution concepts meriting further consideration at the ramp terminal intersections at the SR 241 interchanges proposed by the Project under Alternatives 13, 17, 14, 18, and 21. This memorandum contains the following sections discussed below:

- ❖ Screening Objectives
- ❖ Planning-level Capacity Assessment/Analysis
- ❖ Summary and Conclusions

SCREENING OBJECTIVES

The purpose of this assessment is to determine which access strategies and configurations should be dropped from further consideration based on whether the concept is viable and practical. All



configurations evaluated as part of this memo were considered with regard for viability to the Purpose & Need of the project, listed below.

Purpose

The purpose and fundamental objectives of the project are to materially improve north-south regional mobility in South Orange County and accommodate regional travel demand in a manner that promotes the supporting objectives related to mobility in South Orange County:

- Improve regional mobility by reducing congestion on I-5 during peak commuting hours and weekends
- Provide additional north-south capacity in case of traffic incidents on I-5
- Provide additional north-south capacity in case of emergencies
- Enhance multi-modal mobility opportunities

Need

Transportation infrastructure improvements are necessary to materially address the existing and future deficiencies for north-south regional mobility in South Orange County. Roadway deficiencies and mobility limitations in South Orange County are described below:

- Demand approaches or exceeds capacity on I-5 during peak commuting hours and weekends
- The lack of redundant north-south capacity increases congestion during traffic incidents on I-5
- The lack of sufficient north-south capacity impairs evacuation and emergency response

The ICE Process Information Guide (Caltrans, August 2013) lists Intersection Traffic Control Systems/Strategies for consideration as part of the screening process. The following traffic control options were evaluated for the proposed SR 241 ramp terminal intersections. The intersection control concepts evaluated as part of this memo were considered for practicality with regard to limiting resource impacts.

- Roundabouts
- Stop (Side-street Stop or All-way Stop)
- Signalization



CAPACITY ASSESSMENT/ANALYSIS

The Step One ICE was performed under each of the following four build alternatives proposed for this project using the Design Year 2050 traffic demand.

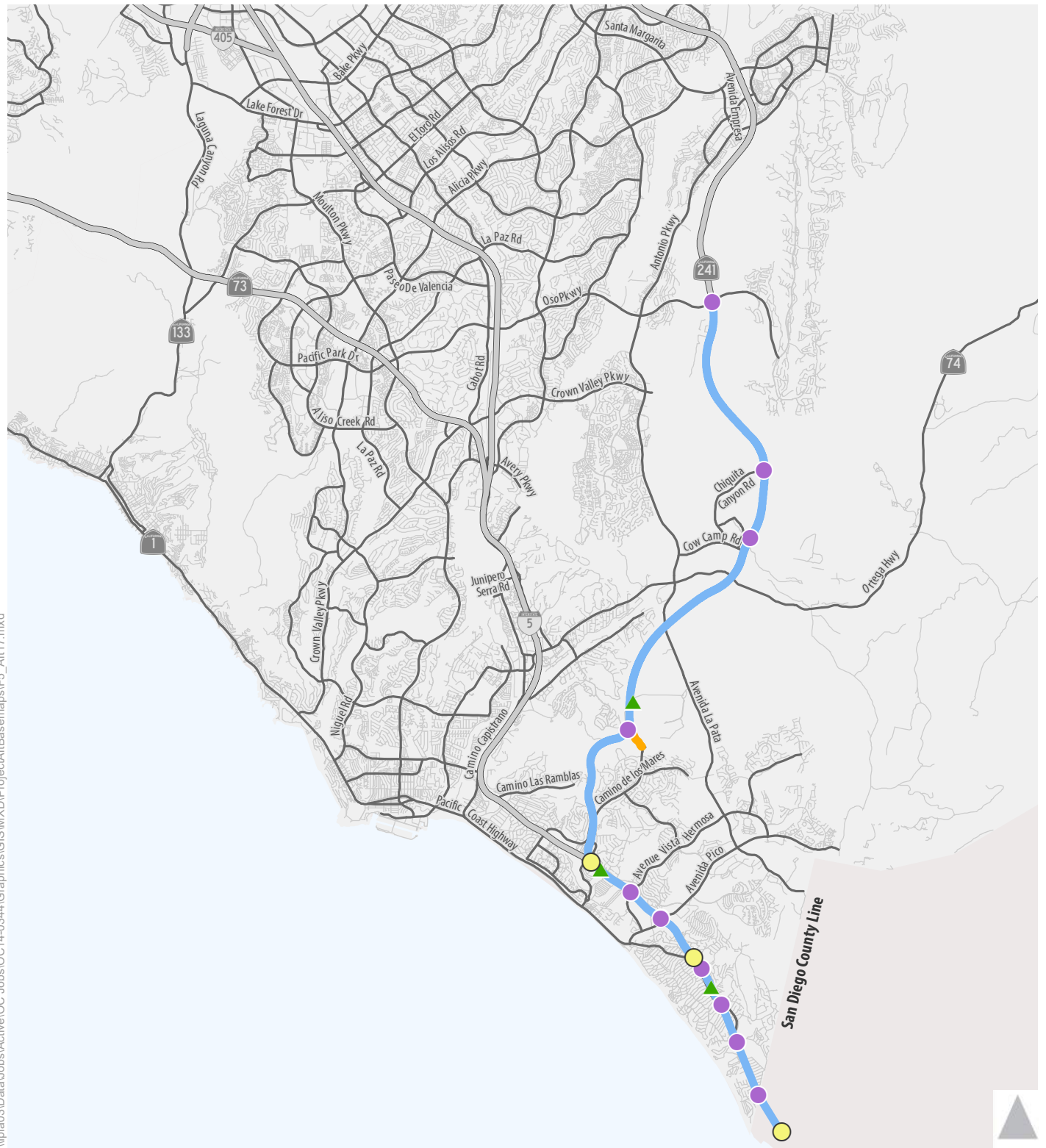
- ❖ Alternative 13 – Connect SR 241 to I-5 at La Novia Avenue
- ❖ Alternative 17 – Connect SR 241 to I-5 at Avenida Vaquero
- ❖ Alternative 14 – Connect SR 241 to I-5 at Avenida Pico
- ❖ Alternative 18 – Connect SR 241 to SR 73 and Extend Crown Valley Pkwy to SR 241
- ❖ Alternative 21 – Los Patrones Parkway Extension and I-5 HOT Lanes

The alignment of each build alternative and their connection points with local streets are illustrated in **Figures 2, 3, 4, 5, and 6** for Alternatives 13, 17, 14, 18, and 21 respectively. The brief descriptions of each of the five build alternatives are presented below.

Alternative 13: Connect SR 241 to I-5 via the Western Alignment [Local Connection at La Novia Avenue]

Alternative 13 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road, and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 13 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 13 would connect to I-5 at La Novia Avenue in the City of San Juan Capistrano. Where Alternative 13 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) south to the Countyline. Alternative 13 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road. Alternative 13 would add HOT lanes in each direction on I-5 from La Novia Avenue to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 13, those HOV lanes would be incorporated into the Alternative 13 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

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- Project Corridor
- Local Roadway Improvements
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

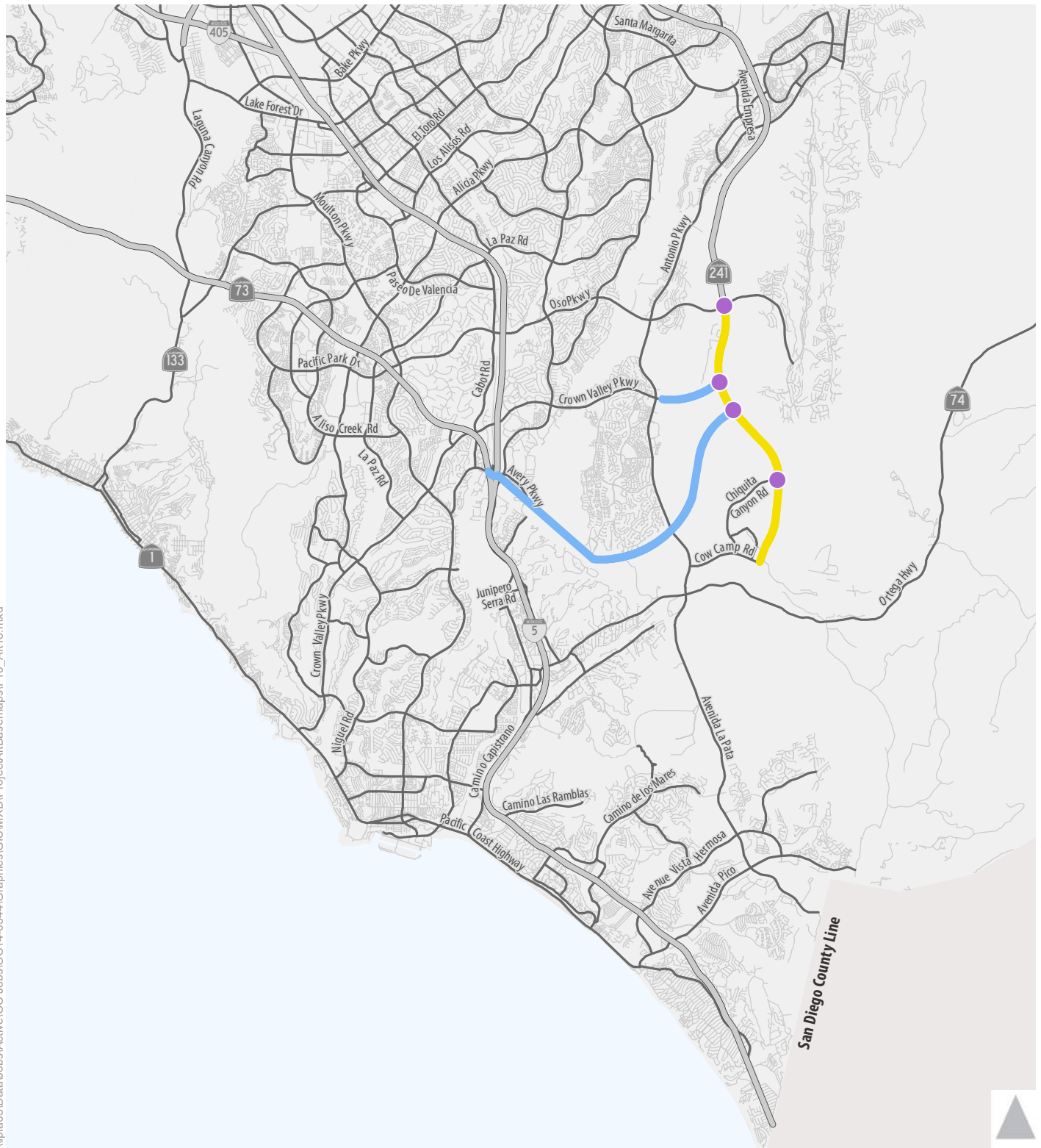
Figure 3
Project Alternative 17



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Figure 4

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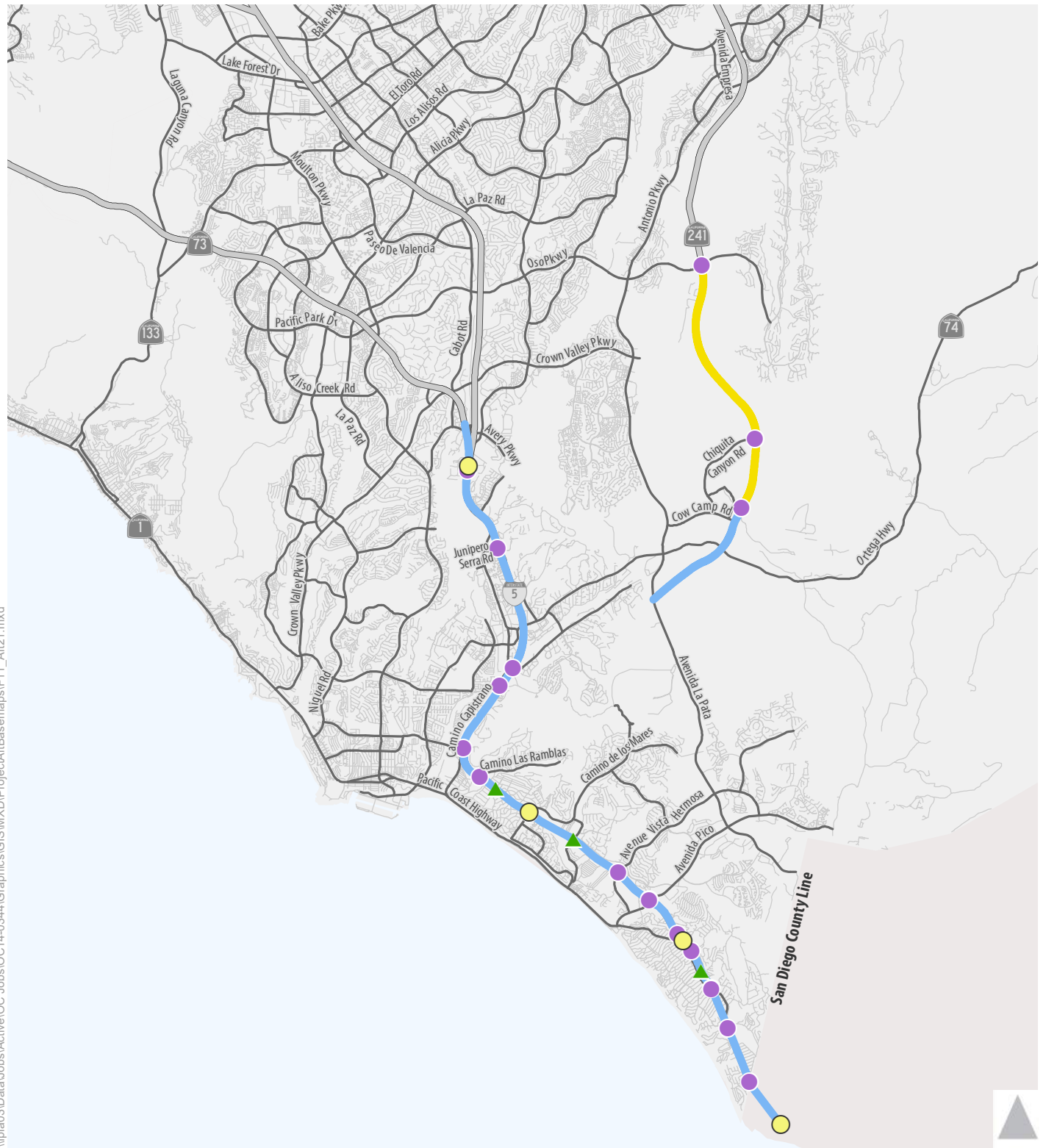


- Project Corridor
- Interchange
- Improvements Proposed by Others

Figure 5
Project Alternative 18



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- Project Corridor
- Improvements Proposed by Others
- Interchange
- Toll Collection Points
- Ingress/Egress Lanes

Figure 6
Project Alternative 21





ICE evaluation was conducted at following four interchanges with SR 241/Los Patrones Parkway under Alternative 13.

1. Oso Parkway (full interchange)
2. Chiquita Canyon Drive (half interchange – including northbound on-ramp and southbound off-ramp)
3. I Street (full interchange)
4. Camino Las Ramblas (full interchange)

Alternative 17: Connect SR 241 to I-5 via Shore Cliffs [Local Connection at Avenida Vaquero]

Alternative 17 would widen Los Patrones Parkway from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 17 would cross Ortega Highway and La Pata Avenue in unincorporated Orange County, and would run adjacent to the western boundary of Prima Deshecha Landfill in the City of San Juan Capistrano. Alternative 17 would cross through Shorecliff Golf Course and would connect to I-5 at Avenida Vaquero in the City of San Clemente. Where Alternative 17 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 17 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 17 would add HOT lanes on I-5 from Avenida Vaquero to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 17, those HOV lanes would be incorporated into the Alternative 17 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

ICE evaluation was conducted at following four interchanges with SR 241/Los Patrones Parkway under Alternative 17.



1. Oso Parkway (full interchange)
2. Chiquita Canyon Drive (half interchange – including northbound on-ramp and southbound off-ramp)
3. I Street (full interchange)
4. Camino De Los Mares (full interchange)

Alternative 14: Connect SR 241 to I-5 via La Pata Avenue Crossing [Local Connection at Avenida Pico]

Alternative 14 would widen Los Patrones Parkway, from Oso Parkway to north of Cow Camp Road and extend SR 241 by adding a new four-lane tolled highway (two tolled lanes in each direction) from north of Cow Camp Road to I-5. Alternative 14 would cross Ortega Highway in unincorporated Orange County, and would run parallel to La Pata Avenue and cross Prima Deshecha Landfill in unincorporated Orange County and the City of San Clemente. Alternative 14 would connect to I-5 at Avenida Pico in the City of San Clemente. Where Alternative 14 connects to I-5, two lanes in each direction would be provided in the median (widening I-5 to the outside) to the Countyline. Alternative 14 would transition to the existing alignment of I-5 in San Diego County and would end at Basilone Road.

Alternative 14 would add HOT lanes in each direction on I-5 from Avenida Pico to the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 14, those HOV lanes would be incorporated into the Alternative 14 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

ICE evaluation was conducted at following five interchanges with SR 241/Los Patrones Parkway under Alternative 14.

1. Oso Parkway (full interchange)
2. Chiquita Canyon Drive (half interchange – including northbound on-ramp and southbound off-ramp)
3. I Street (full interchange)



4. Calle Saluda (full interchange)
5. Calle Del Cerro (full interchange)

Alternative 18: Connect SR 241 to SR 73 and Extend Crown Valley Parkway to SR 241

Alternative 18 would construct a four-lane (two lanes in each direction) arterial connection from SR 73 to Antonio Parkway, consistent with HDM standards for median widths for expressways under restrictive conditions. This arterial facility would include connector structures over I-5 where the arterial would exit SR 73 to a signalized intersection at Avery Parkway. The arterial connection would continue northeast from Avery Parkway to a signalized intersection at Antonio Parkway and continue northeast to Los Patrones Parkway, ultimately providing access to SR 241 via Los Patrones Parkway. Crown Valley Parkway would also be extended in order to connect to Los Patrones Parkway, and ultimately providing access to SR 241 via Los Patrones Parkway.

ICE evaluation was conducted at following four interchanges with SR 241/Los Patrones Parkway under Alternative 18.

1. Oso Parkway (full interchange)
2. Crown Valley Parkway (full interchange)
3. SR 73 Extension/New East-West Arterial (full interchange)
4. Chiquita Canyon Drive (half interchange – including northbound on-ramp and southbound off-ramp)

Alternative 21: Los Patrones Parkway Extension and I-5 HOT Lanes

Alternative 21 consists of two separate roadway segments. The first segment would extend Los Patrones Parkway with two lanes in each direction from Cow Camp Road to Avenida La Pata, north of Vista Montana. The determination for Los Patrones Parkway as tolled or untolled from Oso Parkway to Vista Montana will be further evaluated during the PA&ED phase. For this Alternative, traffic forecasts are based upon an untolled scenario for the existing four-mile segment of Los Patrones Parkway and the extension. The second segment would provide a median-to-median HOT lane connector from SR 73 to I-5. In addition, on I-5, one existing HOV lane would be converted to a HOT lane and another HOT lane would be added in each direction from SR 73 HOT lane connectors to Avenida Pico. Alternative 21 would provide two HOT lanes in each direction on I-5 from Avenida Pico to Basillone Road, just south of the Countyline. If the OCTA-planned I-5 HOV lanes south of Avenida Pico to the Countyline were implemented before Alternative 21, those HOV

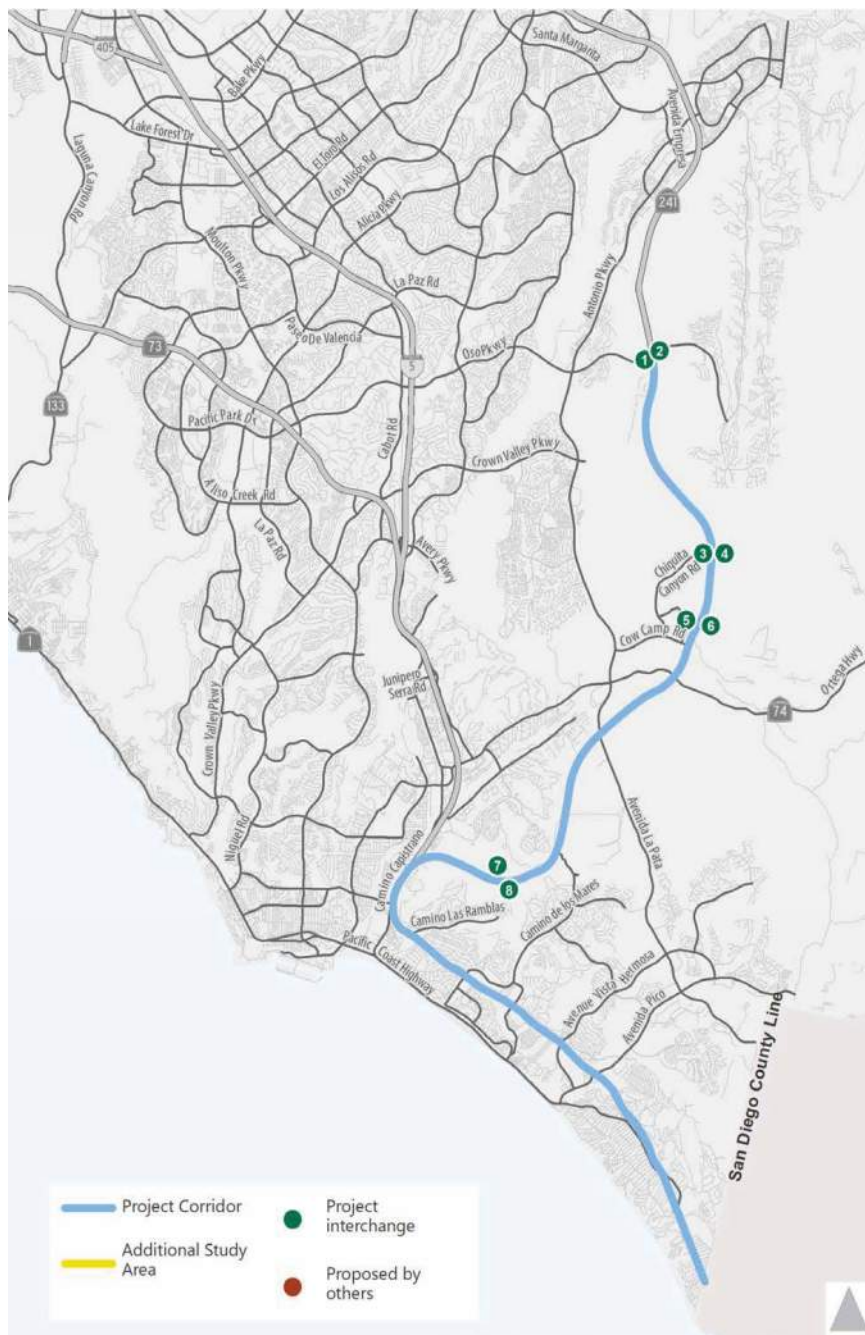


lanes would be incorporated into the Alternative 21 HOT lanes, and would allow for untolled HOV access subject to the prevailing HOV definition at the time the Project is implemented. It is noted that the existing I-5 HOV lanes north of Avenida Pico and the OCTA-planned I-5 HOV lanes south of Avenida Pico are intended to function as HOV lanes in the opening year (2025) but would be converted to HOT lanes by Caltrans as part of its regionwide regional express/HOT lane network by 2040, consistent with the financially-constrained Project list in the 2016 RTP/SCS (RTP ID No. 7120013).

ICE evaluation was conducted at following three interchanges with SR 241/Los Patrones Parkway under Alternative 21.

1. Oso Parkway (full interchange)
2. Chiquita Canyon Drive (half interchange – including northbound on-ramp and southbound off-ramp)
3. I Street (full interchange)

The Design Year 2050 peak hour traffic volumes used to conduct the planning-level capacity assessment were obtained from the Traffic Engineering Performance Assessment (TEPA, March 2018) and are displayed in **Figures 7, 8, 9, 10, and 11** for Alternatives 13, 17, 14, 18, and 21, respectively.



1. SR 241 SB Ramps/Oso Parkway 40 (430) 20 (165) SR 241 SB Ramps 1,470 (820) 115 (55) Oso Parkway 930 (755) 415 (455)	2. SR 241 NB Ramps/Oso Parkway SR 241 NB Ramps 235 (20) 1,005 (490) Oso Parkway 655 (25) 295 (895) 580 (385) 60 (90)	3. SR 241 SB Ramps/Chiquita Canyon Road SR 241 SB Ramps 295 (200) 215 (575) Chiquita Canyon Road 740 (565) 785 (970)
4. SR 241 NB Ramps/Chiquita Canyon Road SR 241 NB Ramps 840 (205) 740 (565) Chiquita Canyon Road 415 (220) 585 (1,325)	5. SR 241 SB Ramps/I Street SR 241 SB Ramps 130 (90) 320 (890) I Street 425 (655) 85 (85) 660 (500) 215 (80)	6. SR 241 NB Ramps/I Street SR 241 NB Ramps 960 (305) 775 (525) I Street 565 (1,450) 180 (95) 100 (55) 145 (200)
7. SR 241 SB Ramps/Camino Las Ramblas SR 241 SB Ramps 90 (55) 255 (180) Camino Las Ramblas 105 (90) 0 (0) 190 (135) 5 (10)	8. SR 241 NB Ramps/Camino Las Ramblas SR 241 NB Ramps 310 (225) 85 (65) Camino Las Ramblas 80 (35) 365 (280) 20 (25) 0 (0)	

 Travel Direction
 AM (PM) Turning Movement

Figure 7
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 13

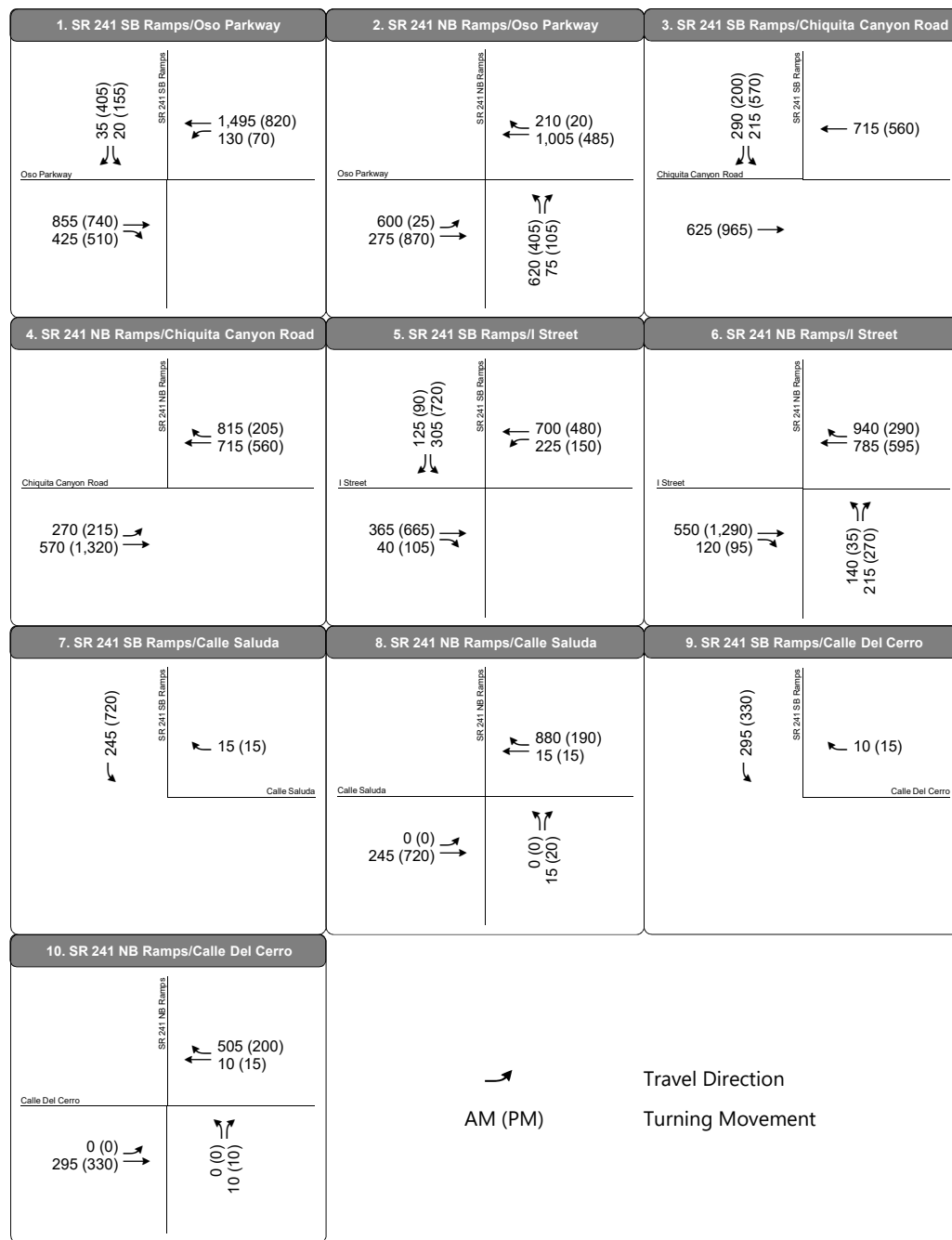
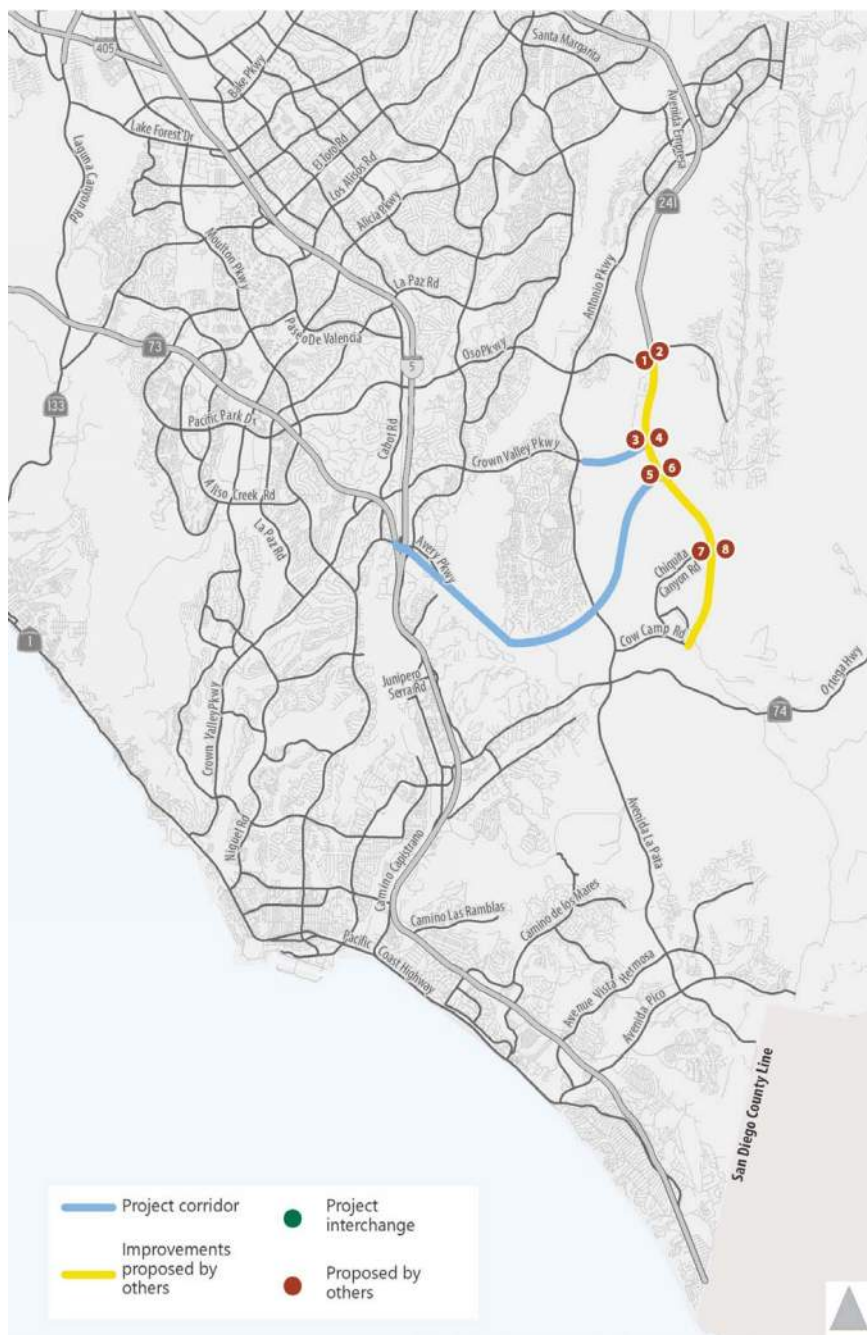


Figure 9
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 14



1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Crown Valley Parkway
SR 241 SB Ramps Oso Parkway 35 (210) 20 (140) 1,035 (590) 375 (180) 535 (555) 290 (485)	SR 241 NB Ramps Oso Parkway 175 (20) 1,005 (530) 300 (20) 255 (675) 405 (240) 135 (325)	SR 241 SB Ramps Crown Valley Parkway 245 (200) 0 (0) 1,200 (500) 0 (0) 290 (190) 430 (810)
4. SR 241 NB Ramps/Crown Valley Parkway	5. SR 241 SB Ramps/SR-73	6. SR 241 NB Ramps/SR-73
SR 241 NB Ramps Crown Valley Parkway 290 (190) 1,200 (500)	SR 241 SB Ramps SR-73 505 (995) 0 (0) 120 (55) 0 (0) 1,270 (380) 55 (95)	SR 241 NB Ramps SR-73 1,270 (380) 120 (55)
7. SR 241 SB Ramps/Chiquita Canyon Road	8. SR 241 NB Ramps/Chiquita Canyon Road	
SR 241 SB Ramps Chiquita Canyon Road 445 (450) 350 (840) 525 (420) 900 (970)	SR 241 NB Ramps Chiquita Canyon Road 1,030 (400) 525 (420) 625 (430) 625 (1,380)	

Travel Direction
 AM (PM) Turning Movement

Figure 10
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 18



1. SR 241 SB Ramps/Oso Parkway	2. SR 241 NB Ramps/Oso Parkway	3. SR 241 SB Ramps/Chiquita Canyon Road
SR 241 SB Ramps 35 (400) 20 (160) 1,615 (1,080) 145 (100) Oso Parkway 820 (695) 710 (830)	SR 241 NB Ramps 230 (20) 965 (490) 575 (20) 265 (835) Oso Parkway 795 (690) 85 (140)	SR 241 SB Ramps 480 (330) 275 (700) 675 (500) Chiquita Canyon Road 765 (980)
4. SR 241 NB Ramps/Chiquita Canyon Road	5. SR 241 SB Ramps/I Street	6. SR 241 NB Ramps/I Street
SR 241 NB Ramps 850 (305) 675 (500) 440 (340) 600 (1,340) Chiquita Canyon Road	SR 241 SB Ramps 210 (145) 515 (840) 720 (575) 380 (280) I Street 430 (645) 130 (200)	SR 241 NB Ramps 965 (595) 925 (695) 750 (1,390) 195 (95) I Street 175 (160) 335 (450)

 Travel Direction
 AM (PM) Turning Movement

Figure 11
Design Year 2050 SR 241 Ramp Intersection Volumes
Alternative 21



Analysis Methodology

Peak hour volumes at each study intersection were first reviewed to determine if further consideration should be given to stop control. The signal warrant analysis was conducted based on the peak hour volume thresholds identified in the California Manual on Uniform Traffic Control Devices. For intersections not meeting the signal warrant, capacity analysis for stop control option was conducted using the methodologies contained in the Highway Capacity Manual (HCM 6th Edition). Those intersections were also evaluated for feasibility of the roundabout control option using the methodology described below.

Capacity analysis for the roundabout control option was completed at a planning level based on guidelines published in the National Cooperative Highway Research Program (NCHRP) Report 672 Second Edition prepared by the Transportation Research Board. Exhibit 3-12 in the NCHRP Report compares Annual Average Daily Traffic (AADT) to the left-turn percentage to determine the capacity at which a roundabout is likely to operate acceptably. Exhibit 3-14 in the NCHRP Report provides volume thresholds for determining the number of entry lanes required. By adding entering volume and the circulating volume and comparing this value to the values shown in Exhibit 3-14 the number of entry lanes required for the proposed intersections was determined. These two exhibits were used to determine the number of lanes needed for a roundabout to operate acceptably based on a planning level analysis.

For traffic signals, capacity analysis was conducted using the HCM 6th Edition methodologies for study intersections that met the signal warrant. The level of service (LOS) was calculated for each study facility to evaluate traffic operations. Table 1 describes the (LOS) thresholds for stop control and traffic signal established in the HCM 6th Edition. LOS is a quantitative measure of traffic operating conditions whereby a letter rating, from A (the best) to F (the worst), is assigned. These ratings represent the perspective of drivers and are an indication of the comfort and convenience associated with driving.



Table 1 – Intersection LOS Thresholds

Level of Service	Description	Signalized Delay (Seconds)	Unsignalized Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0	>10.0 to 15.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20.0 to 35.0	>15.0 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0	>25.0 to 35.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0	>35.0 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0	>50.0

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).

The Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) states "Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" (see Appendix "C-3") on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS".

Also, in the County of Orange General Plan, Chapter IV: Goal 5, Policy 5.5 states, "Require as condition of approval that necessary improvements to arterial highway facilities, to which a project contributes measurable traffic, be constructed and completed within a specified time period or ADT/peak hour milestone to attain a Level of Service "D" at the intersections under the sole control of the County."



Therefore, LOS D is considered as the criteria for acceptable operations for the purpose of the ICE capacity assessment for traffic control options.

Alternative 13 – Connect SR 241 to I-5 at La Novia Avenue

The following intersections were evaluated under Alternative 13 using the Design Year 2050 traffic volumes. The capacity assessment results are summarized in **Table 2**.

1. Southbound SR 241 Ramps/Oso Parkway
2. Northbound SR 241 Ramps/Oso Parkway
3. Southbound SR 241 Ramps/Chiquita Canyon Drive
4. Northbound SR 241 Ramps/Chiquita Canyon Drive
5. Southbound SR 241 Ramps/I Street
6. Northbound SR 241 Ramps/I Street
7. Southbound SR 241 Ramps/Camino Las Ramblas
8. Northbound SR 241 Ramps/Camino Las Ramblas

Under Alternative 13, majority of the study intersections met the signal warrant, with the exception of the northbound and southbound SR 241 Ramps/Camino Las Ramblas intersections due to the relatively low traffic volumes at the two locations. Therefore, stop control was evaluated at the two locations, and the results show all-way stop control would provide acceptable operations at this location.

All eight study intersections would meet the capacity requirements for either single-lane or two-lane roundabouts. Single-lane roundabouts would likely provide acceptable operations at the northbound SR 241/Camino Las Ramblas ramp intersection. A single-lane roundabout may be sufficient at the southbound SR 241/Camino Las Ramblas intersection, and additional analysis will be required at the next stage. Double-lane roundabouts would likely provide acceptable operations at the other six ramp intersections at Oso Parkway, Chiquita Canyon Drive, and I Street.

Six intersections that met the signal warrant were analyzed with signalization, and all of them would operate acceptably at LOS C or better. Although the northbound and southbound SR 241 Ramps/Camino Las Ramblas intersections do not meet the signal warrant based on the relatively low traffic volumes, a traffic signal is anticipated to provide adequate capacity at both intersections if considered.



Table 2 – ICE Capacity Assessment (Alternative 13)

Intersection	Stop Control	Roundabout			Signal
		AADT	Left-Turn Percent	Capacity Needed	
SB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	31,500	5%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	26,310	44%	Double-Lane likely to operate acceptably	LOS C
	×	✓			✓
SB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	24,140	25%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	27,190	16%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
SB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	22,970	42%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	29,750	4%	Double-Lane likely to operate acceptably	LOS A
	×	✓			✓
SB 241 Ramps/ Camino Las Ramblas	LOS B	6,190	40%	Single-Lane may be sufficient-additional analysis needed	Not meet signal warrant, but likely to operate acceptably under signal control
	✓	✓			✓
NB 241 Ramps/ Camino Las Ramblas	LOS B	8,280	12%	Single-Lane likely to operate acceptably	Not meet signal warrant, but likely to operate acceptably under signal control
	✓	✓			✓

Note: **not considered** indicates the control option is not feasible and not recommended.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



As a result, the following traffic control options were recommended for further Step Two evaluation during the PA&ED phase, under Alternative 13:

<i>Intersection</i>	<i>Recommended traffic control</i>
1. Southbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
2. Northbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
3. Southbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
4. Northbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
5. Southbound SR 241 Ramps/I Street	Roundabout or Signal
6. Northbound SR 241 Ramps/I Street	Roundabout or Signal
7. Southbound SR 241 Ramps/Camino Las Ramblas	Stop, Roundabout, or Signal
8. Northbound SR 241 Ramps/Camino Las Ramblas	Stop, Roundabout, or Signal

Alternative 17 – Connect SR 241 to I-5 at Avenida Vaquero

The following intersections were evaluated under Alternative 17 using the Design Year 2050 traffic volumes. The capacity assessment results are summarized in **Table 3**.

1. Southbound SR 241 Ramps/Oso Parkway
2. Northbound SR 241 Ramps/Oso Parkway
3. Southbound SR 241 Ramps/Chiquita Canyon Drive
4. Northbound SR 241 Ramps/Chiquita Canyon Drive
5. Southbound SR 241 Ramps/I Street
6. Northbound SR 241 Ramps/I Street
7. Southbound SR 241 Ramps/Camino De Los Mares
8. Northbound SR 241 Ramps/Camino De Los Mares

Under Alternative 17, all study intersections met the signal warrant, with the exception of the two ramp intersections at Camino De Los Mares at both northbound and southbound SR 241 due to low traffic demand at the two locations. Therefore, stop control was evaluated at the two intersections, and the results show stop control would provide acceptable operations at both locations.



Table 3 – ICE Capacity Assessment (Alternative 17)

Intersection	Stop Control	Roundabout			Signal
		AADT	Left-Turn Percent	Capacity Needed	
SB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	31,310	5%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	26,110	43%	Double-Lane likely to operate acceptably	LOS C
	×	✓			✓
SB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	23,310	25%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	26,280	12%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
SB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	22,530	38%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
NB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	29,890	5%	Double-Lane likely to operate acceptably	LOS B
	×	✓			✓
SB 241 Ramps/ Camino De Los Mares	LOS C	6,440	100%	Single-Lane may be sufficient- additional analysis needed	Not meet signal warrant, but likely to operate acceptably under signal control
	✓	✓			✓
NB 241 Ramps/ Camino De Los Mares	LOS C	13,720	0%	Single-Lane likely to operate acceptably	Not meet signal warrant, but likely to operate acceptably under signal control
	✓	✓			✓

Note: **not considered** indicates the control option is not feasible and not recommended.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



All the eight study intersections would meet the capacity requirements for either single-lane or two-lane roundabouts. A single-lane roundabout would likely provide acceptable operations at the Camino De Los Mares ramp intersection at northbound SR 241. A single-lane roundabout may be sufficient at the southbound SR 241/ Camino De Los Mares intersection, and additional analysis will be required at the next stage. Double-lane roundabouts would likely provide acceptable operations at the other six intersections at Oso Parkway, Chiquita Canyon Drive, and I Street.

Six intersections that met the signal warrant were analyzed with signalization, and all of them would operate acceptably at LOS C or better. Although the two Camino De Los Mares ramp intersections do not meet the signal warrant based on the relatively low traffic volumes, a traffic signal is anticipated to provide adequate capacity at the two intersections if considered.

As a result, the following traffic control options were recommended for further Step Two evaluation during the PA&ED phase, under Alternative 17:

<i>Intersection</i>	<i>Recommended traffic control</i>
1. Southbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
2. Northbound SR 241 Ramps/Osos Parkway	Roundabout or Signal
3. Southbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
4. Northbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
5. Southbound SR 241 Ramps/I Street	Roundabout or Signal
6. Northbound SR 241 Ramps/I Street	Roundabout or Signal
7. Southbound SR 241 Ramps/Camino De Los Mares	Stop, Roundabout, or Signal
8. Northbound SR 241 Ramps/Camino De Los Mares	Stop, Roundabout, or Signal



Alternative 14 – Connect SR 241 to I-5 at Avenida Pico

The following intersections were evaluated under Alternative 14 using the Design Year 2050 traffic volumes. The capacity assessment results are summarized in **Table 4**.

1. Southbound SR 241 Ramps/Oso Parkway
2. Northbound SR 241 Ramps/Oso Parkway
3. Southbound SR 241 Ramps/Chiquita Canyon Drive
4. Northbound SR 241 Ramps/Chiquita Canyon Drive
5. Southbound SR 241 Ramps/I Street
6. Northbound SR 241 Ramps/I Street
7. Southbound SR 241 Ramps/Calle Saluda
8. Northbound SR 241 Ramps/Calle Saluda
9. Southbound SR 241 Ramps/Calle Del Cerro
10. Northbound SR 241 Ramps/Calle Del Cerro

Under Alternative 14, majority of the study intersections met the signal warrant, except for the four locations due to low traffic demand: ramp intersections at Calle Saluda and Calle Del Cerro at both northbound and southbound SR 241. Therefore, stop control was evaluated at these intersections and the results show stop control would provide acceptable operations at the four locations.

All the ten study intersections would meet the capacity requirements for either single-lane or two-lane roundabouts. A single-lane roundabout would likely provide acceptable operations at the following two intersections: Calle Saluda and Calle Del Cerro ramp intersections at northbound SR 241. A single-lane roundabout may be sufficient at the southbound SR 241 ramp intersections at Calle Saluda and Calle Del Cerro, and additional analysis will be required at the next stage. Double-lane roundabouts would likely provide acceptable operations at other six ramp intersections at Oso Parkway, Chiquita Canyon Drive, and I Street.

Six intersections that met the signal warrant were analyzed with signalization, and all of them would operate acceptably at LOS C or better. Although the four ramp intersections at Calle Saluda and Calle Del Cerro do not meet the signal warrant based on the relatively low traffic volumes, a traffic signal is anticipated to provide adequate capacity at these intersections if considered.



Table 4 – ICE Capacity Assessment (Alternative 14)

Intersection	Stop Control	Roundabout			Signal
		AADT	Left-Turn Percent	Capacity Needed	
SB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	31,440	5%	Double-Lane likely to operate acceptably	LOS B
	x			✓	✓
NB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	26,080	44%	Double-Lane likely to operate acceptably	LOS C
	x			✓	✓
SB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	23,000	25%	Double-Lane likely to operate acceptably	LOS C
	x			✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	25,940	11%	Double-Lane likely to operate acceptably	LOS A
	x			✓	✓
SB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	22,060	39%	Double-Lane likely to operate acceptably	LOS B
	x			✓	✓
NB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	29,580	5%	Double-Lane likely to operate acceptably	LOS B
	x			✓	✓
SB 241 Ramps/ Calle Saluda	LOS D	5,530	98%	Single-Lane may be sufficient- additional analysis needed	Not meet signal warrant, but likely to operate acceptably under signal control
	✓			✓	✓
NB 241 Ramps/ Calle Saluda	LOS B	11,670	0%	Single-Lane likely to operate acceptably	Not meet signal warrant, but likely to operate acceptably under signal control
	✓			✓	✓
SB 241 Ramps/ Calle Del Cerro	LOS A	3,610	96%	Single-Lane may be sufficient- additional analysis needed	Not meet signal warrant, but likely to operate acceptably under signal control
	✓			✓	✓
NB 241 Ramps/ Calle Del Cerro	LOS B	7,640	0%	Single-Lane likely to operate acceptably	Not meet signal warrant, but likely to operate acceptably under signal control
	✓			✓	✓

Note: **Bold with underlined** indicates the control option is not feasible and not recommended.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



As a result, the following traffic control options were recommended for further Step Two evaluation during the PA&ED phase, under Alternative 14:

<i>Intersection</i>	<i>Recommended traffic control</i>
1. Southbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
2. Northbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
3. Southbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
4. Northbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
5. Southbound SR 241 Ramps/I Street	Roundabout or Signal
6. Northbound SR 241 Ramps/I Street	Roundabout or Signal
7. Southbound SR 241 Ramps/Calle Saluda	Stop, Roundabout, or Signal
8. Northbound SR 241 Ramps/Calle Saluda	Stop, Roundabout, or Signal
9. Southbound SR 241 Ramps/Calle Del Cerro	Stop, Roundabout, or Signal
10. Northbound SR 241 Ramps/Calle Del Cerro	Stop, Roundabout, or Signal

Alternative 18 – Extend SR 73 and Crown Valley Parkway to SR 241

The following intersections were evaluated under Alternative 18 using the Design Year 2050 traffic volumes. The capacity assessment results are summarized in **Table 5**.

1. Southbound SR 241 Ramps/Oso Parkway
2. Northbound SR 241 Ramps/Oso Parkway
3. Southbound SR 241 Ramps/Crown Valley Parkway
4. Northbound SR 241 Ramps/Crown Valley Parkway
5. Southbound SR 241 Ramps/SR 73 Extension
6. Northbound SR 241 Ramps/SR 73 Extension
7. Southbound SR 241 Ramps/Chiquita Canyon Drive
8. Northbound SR 241 Ramps/Chiquita Canyon Drive



Table 5 – ICE Capacity Assessment (Alternative 18)

Intersection	Stop Control	Roundabout			Signal
		AADT	Left-Turn Percent	Capacity Needed	
SB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	24,720	17%	Double-Lane likely to operate acceptably	LOS B
	×			✓	✓
NB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	22,690	31%	Double-Lane likely to operate acceptably	LOS C
	×			✓	✓
SB 241 Ramps/ Crown Valley Pkwy	Met signal warrant, Stop control <u>not considered</u>	21,470	0%	Double-Lane likely to operate acceptably	LOS B
	×			✓	✓
NB 241 Ramps/ Crown Valley Pkwy	Met signal warrant, Stop control <u>not considered</u>	12,110	100%	Double-Lane likely to operate acceptably	LOS D
	×			✓	✓
SB 241 Ramps/ SR 73	Met signal warrant, Stop control <u>not considered</u>	19,310	0%	Single-Lane may be sufficient- additional analysis needed	LOS B
	×			✓	✓
NB 241 Ramps/ SR 73	Met signal warrant, Stop control <u>not considered</u>	10,140	100%	Single-Lane likely to operate acceptably	LOS A
	×			✓	✓
SB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	27,220	31%	Double-Lane may be sufficient- additional analysis needed	LOS C
	×			✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	30,190	22%	Double-Lane may be sufficient- additional analysis needed	LOS C
	×			✓	✓

Note: **Bold with underlined** indicates the control option is not feasible and not recommended.
Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



Under Alternative 18, all the study intersections met the signal warrant, therefore, stop control was not considered at these intersections.

All the eight study intersections would meet the capacity requirements for either single-lane or two-lane roundabouts. A single-lane roundabout would likely provide acceptable operations at the northbound SR 241/SR 73 ramp intersection. A single-lane roundabout may be sufficient at the southbound SR 241 ramp intersections at SR 73, and additional analysis will be required at the next stage. Double-lane roundabouts would likely provide acceptable operations at the four ramp intersections at Oso Parkway and Crown Valley Parkway on both northbound and southbound SR 241. Double-lane roundabouts may be sufficient at the two ramp intersections at Chiquita Canyon Drive on both northbound and southbound SR 241, and additional analysis will be required at the next stage.

All the intersections were also analyzed with signalization, and all of them would operate acceptably at LOS D or better.

As a result, the following traffic control options were recommended for further Step Two evaluation during the PA&ED phase, under Alternative 18:

<i>Intersection</i>	<i>Recommended traffic control</i>
1. Southbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
2. Northbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
3. Southbound SR 241 Ramps/Crown Valley Parkway	Roundabout, or Signal
4. Northbound SR 241 Ramps/ Crown Valley Parkway	Roundabout, or Signal
5. Southbound SR 241 Ramps/SR 73	Roundabout, or Signal
6. Northbound SR 241 Ramps/SR 73	Roundabout, or Signal
7. Southbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
8. Northbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal



Alternative 21 – Los Patrones Parkway Extension and I-5 HOT Lanes

The following intersections were evaluated under Alternative 21 using the Design Year 2050 traffic volumes. The capacity assessment results are summarized in **Table 6**.

1. Southbound SR 241 Ramps/Oso Parkway
2. Northbound SR 241 Ramps/Oso Parkway
3. Southbound SR 241 Ramps/Chiquita Canyon Drive
4. Northbound SR 241 Ramps/Chiquita Canyon Drive
5. Southbound SR 241 Ramps/I Street
6. Northbound SR 241 Ramps/I Street

Under Alternative 21, all of the study intersections met the signal warrant; therefore, stop control was not considered at these intersections.

All six study intersections would meet the capacity requirements for two-lane roundabouts. Double-lane roundabouts would likely provide acceptable operations at the northbound SR 241/Chiquita Canyon Drive intersection. Double-lane roundabouts may be sufficient at the other five ramp intersections, and additional analysis will be required at the next stage.

As all study intersections met the signal warrant all intersections were analyzed with signalization, and all of them would operate acceptably at LOS D or better.



Table 6 – ICE Capacity Assessment (Alternative 21)

Intersection	Stop Control	Roundabout			Signal
		AADT	Left-Turn Percent	Capacity Needed	
SB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	37,000	5%	Double-Lane may be sufficient-additional analysis needed	LOS D
	×	✓			✓
NB 241 Ramps/ Oso Pkwy	Met signal warrant, Stop control <u>not considered</u>	28,500	47%	Double-Lane may be sufficient-additional analysis needed	LOS B
	×	✓			✓
SB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	26,140	28%	Double-Lane may be sufficient-additional analysis needed	LOS B
	×	✓			✓
NB 241 Ramps/ Chiquita Canyon Dr	Met signal warrant, Stop control <u>not considered</u>	28,100	17%	Double-Lane likely to operate acceptably	LOS A
	×	✓			✓
SB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	28,200	42%	Double-Lane may be sufficient-additional analysis needed	LOS B
	×	✓			✓
NB 241 Ramps/ I St	Met signal warrant, Stop control <u>not considered</u>	37,400	5%	Double-Lane may be sufficient-additional analysis needed	LOS A
	×	✓			✓

Note: **Bold with underlined** indicates the control option is not feasible and not recommended.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



As a result, the following traffic control options were recommended for further Step Two evaluation during the PA&ED phase, under Alternative 21:

<i>Intersection</i>	<i>Recommended traffic control</i>
1. Southbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
2. Northbound SR 241 Ramps/Oso Parkway	Roundabout or Signal
3. Southbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
4. Northbound SR 241 Ramps/Chiquita Canyon Drive	Roundabout or Signal
5. Southbound SR 241 Ramps/I Street	Roundabout or Signal
6. Northbound SR 241 Ramps/I Street	Roundabout or Signal

Summary and Conclusions

Results and recommendations based on the analysis for each alternative are summarized below in **Table 7** for Alternative 13, **Table 8** for Alternative 17, **Table 9** for Alternative 14, **Table 10** for Alternative 18, and **Table 11** for Alternative 21.

Alternative 13 – Connect SR 241 to I-5 at La Novia Avenue

Table 7 – Recommended Traffic Control Options (Alternative 13)

Intersection	Stop Control	Roundabout ¹	Signal
SB 241 Ramps/Oso Pkwy	×	✓	✓
NB 241 Ramps/Oso Pkwy	×	✓	✓
SB 241 Ramps/Chiquita Canyon Dr	×	✓	✓
NB 241 Ramps/Chiquita Canyon Dr	×	✓	✓
SB 241 Ramps/I St	×	✓	✓
NB 241 Ramps/I St	×	✓	✓
SB 241 Ramps/Camino Las Ramblas	✓	✓	✓
NB 241 Ramps/Camino Las Ramblas	✓	✓	✓

Note: **Bold with underlined** indicates the control option is not feasible and not recommended.

¹ indicates single-lane or double-lane roundabouts.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).



- Stop control would provide acceptable operations at the ramp intersections at Camino Las Ramblas on northbound and southbound SR 241.
- Single-lane or double-lane roundabouts could be considered for all intersections.
- Signal control is a viable option for all intersections evaluated for this assessment.
- Based on the results presented above, it is recommended that signal, roundabout, and/or stop control be evaluated in further detail in the Step Two ICE analysis during the PA&ED Phase.

Alternative 17 – Connect SR 241 to I-5 at Avenida Vaquero

Table 8 – Recommended Traffic Control Options (Alternative 17)

Intersection	Stop Control	Roundabout ¹	Signal
SB 241 Ramps/Oso Pkwy	×	✓	✓
NB 241 Ramps/Oso Pkwy	×	✓	✓
SB 241 Ramps/Chiquita Canyon Dr	×	✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
SB 241 Ramps/I St	×	✓	✓
NB 241 Ramps/I St	×	✓	✓
SB 241 Ramps/Camino De Los Mares	✓	✓	✓
NB 241 Ramps/ Camino De Los Mares	✓	✓	✓

Note: **Stop Control** indicates the control option is not feasible and not recommended.

¹ indicates single-lane or double-lane roundabouts.

Source: Highway Capacity Manual (Transportation Research Board, 6th Edition).

- Stop control would provide acceptable operations at Camino De Los Mares ramp intersections at both southbound and northbound SR 241.
- Single-lane or double-lane roundabouts could be considered for all intersections.
- Signal control is a viable option for all intersections evaluated for this assessment.
- Based on the results presented above, it is recommended that signal, roundabout, and/or stop control be evaluated in further detail in the Step Two ICE analysis during the PA&ED Phase.



Alternative 14 – Connect SR 241 to I-5 at Avenida Pico

Table 9 – Recommended Traffic Control Options (Alternative 14)

Intersection	Stop Control	Roundabout ¹	Signal
SB 241 Ramps/Oso Pkwy	×	✓	✓
NB 241 Ramps/Oso Pkwy	×	✓	✓
SB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
SB 241 Ramps/I St	×	✓	✓
NB 241 Ramps/I St	×	✓	✓
SB 241 Ramps/Calle Saluda	✓	✓	✓
NB 241 Ramps/ Calle Saluda	✓	✓	✓
SB 241 Ramps/ Calle Del Cerro	✓	✓	✓
NB 241 Ramps/ Calle Del Cerro	✓	✓	✓

Note: **Bold with underlined** indicates the control option is not feasible and not recommended.

¹ indicates single-lane or double-lane roundabouts.

Source: Highway Capacity Manual (Transportation Research Board, 2010).

- Stop control would provide acceptable operations at Calle Saluda and Calle Del Cerra ramp intersections at both southbound and northbound SR 241.
- Single-lane or double-lane roundabouts could be considered for all intersections.
- Signal control is a viable option for all intersections evaluated for this assessment.
- Based on the results presented above, it is recommended that signal, roundabout, and/or stop control be evaluated in further detail in the Step Two ICE analysis during the PA&ED Phase.



Alternative 18 – Connect SR 73 and Crown Valley Parkway to SR 241

Table 10 – Recommended Traffic Control Options (Alternative 18)

Intersection	Stop Control	Roundabout ¹	Signal
SB 241 Ramps/Oso Pkwy	×	✓	✓
NB 241 Ramps/Oso Pkwy	×	✓	✓
SB 241 Ramps/Crown Valley Pkwy	×	✓	✓
NB 241 Ramps/Crown Valley Pkwy	×	✓	✓
SB 241 Ramps/SR 73	×	✓	✓
NB 241 Ramps/SR 73	×	✓	✓
SB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓

Note: **Stop Control** indicates the control option is not feasible and not recommended.

¹ indicates single-lane or double-lane roundabouts.

Source: Highway Capacity Manual (Transportation Research Board, 2010).

- Stop control would not be a viable traffic control option given traffic signal warrant is met at all study intersections.
- Single-lane or double-lane roundabouts could be considered for all intersections.
- Signal control is a viable option for all intersections evaluated for this assessment.
- Based on the results presented above, it is recommended that signal or roundabout control be evaluated in further detail in the Step Two ICE analysis during the PA&ED Phase.



Alternative 21 – Los Patrones Parkway Extension and I-5 HOT Lanes

Table 11 – Recommended Traffic Control Options (Alternative 21)

Intersection	Stop Control	Roundabout ¹	Signal
SB 241 Ramps/Oso Pkwy	×	✓	✓
NB 241 Ramps/Oso Pkwy	×	✓	✓
SB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
NB 241 Ramps/ Chiquita Canyon Dr	×	✓	✓
SB 241 Ramps/I St	×	✓	✓
NB 241 Ramps/I St	×	✓	✓

Note: Bold with underlined indicates the control option is not feasible and not recommended.

¹ indicates single-lane or double-lane roundabouts.

Source: Highway Capacity Manual (Transportation Research Board, 2010).

- Stop control would not be a viable traffic control option given traffic signal warrant is met at all study intersections.
- Double-lane roundabouts could be considered at all intersections.
- Signal control is a viable option for all intersections evaluated for this assessment.
- Based on the results presented above, it is recommended that signal or roundabout control be evaluated in further detail in the Step Two ICE analysis during the PA&ED Phase.



List of Appendix

Appendix 1

NCHRP Report 672: Roundabouts: An Informational Guide,
Exhibits 3-12 & 3-13

Appendix 2

Intersection LOS Reports

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Appendix 1

NCHRP Report 672: Roundabouts: An Informational Guide,
Exhibits 3-12 & 3-13

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NCHRP REPORT 672

Roundabouts: An Informational Guide

Second Edition

**Lee Rodegerdts, Justin Bansen, Christopher Tiesler,
Julia Knudsen, and Edward Myers**
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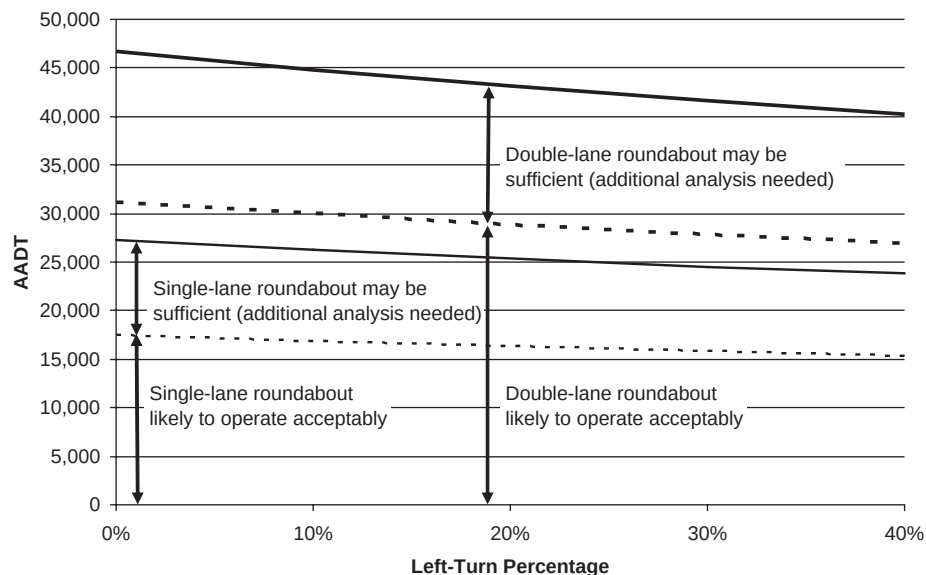
Subscriber Categories
Highways • Design

Research sponsored by the American Association of State Highway and Transportation Officials
in cooperation with the Federal Highway Administration

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2010
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Exhibit 3-12
Planning-Level Daily
Intersection Volumes

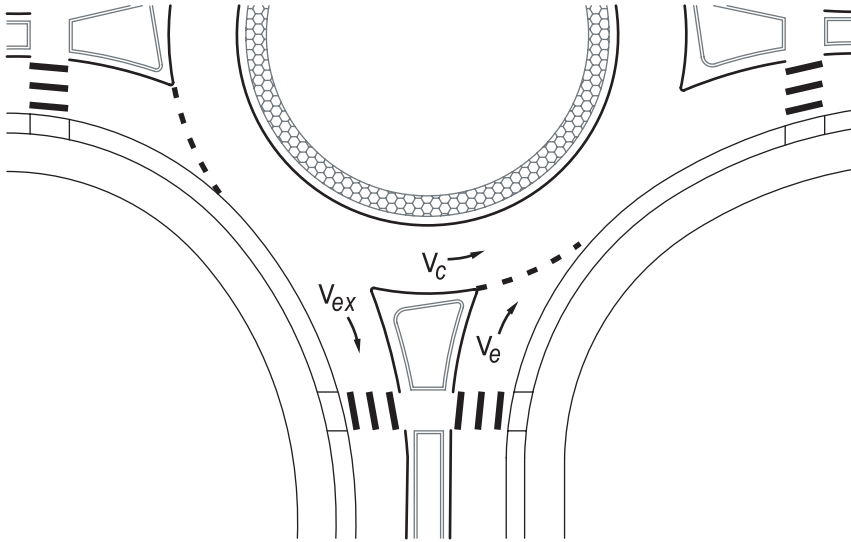


If the volumes fall within the ranges identified in Exhibit 3-12 where “additional analysis is needed,” a single-lane or two-lane roundabout may still function quite well, but a closer look at the actual turning-movement volumes during the design hour is required. The procedure for such analysis is presented in Chapter 4.

Where existing and/or projected turning-movement data is available at the planning level, an improved estimate of the required lane configurations can be identified. Even if future projections of turning movements are not available, estimating future turning movements using existing turning movements and a reasonable annual growth rate may provide a sufficient level of accuracy for this planning exercise. The procedure provided within this section is a simplification of the capacity estimates presented in Chapter 4.

The capacity of a roundabout is generally driven by the amount of conflicting traffic (vehicles traveling along the circulatory roadway) that is present at each roundabout entry. High conflicting volumes reduce the number of opportunities for vehicles to enter the roundabout and therefore reduce the capacity of a particular approach leg. Conversely, where low conflicting traffic volumes are present, the approach leg will have a higher capacity and allow for a higher number of vehicles to enter the roundabout. Each approach leg of the roundabout is evaluated individually to determine the number of entering lanes that are required based upon the conflicting flow rates. The number of lanes within the circulatory roadway is then the number of lanes needed to provide lane continuity

through the intersection. More detailed lane assignments and refinements to the lane configurations can be determined later through a more formal operations analysis.

**Exhibit 3-13**

Traffic Flows at a Roundabout Entry

Rule of Thumb: If the sum of the entering and circulating volumes for each approach is less than 1,000 veh/h, then a single-lane roundabout is likely to operate acceptably.

The sum of the entering (v_e) and conflicting (v_c) traffic volumes, as illustrated in Exhibit 3-13, can be used to evaluate the number of lanes required on the entry (1). If the sum of the entering and conflicting volumes is less than 1,000 vehicles per hour (veh/h), then a single-lane entry can be reasonably assumed to operate within its capacity. Exhibit 3-14 provides additional planning-level lane requirements for various combinations of entering and circulating volumes, and Exhibit 3-15 gives an example of planning-level calculations.

Volume Range (sum of entering and conflicting volumes)	Number of Lanes Required
0 to 1,000 veh/h	Single-lane entry likely to be sufficient
1,000 to 1,300 veh/h	- Two-lane entry may be needed - Single-lane may be sufficient based upon more detailed analysis.
1,300 to 1,800 veh/h	Two-lane entry likely to be sufficient
Above 1,800 veh/h	- More than two entering lanes may be required - A more detailed capacity evaluation should be conducted to verify lane numbers and arrangements.

Source: New York State Department of Transportation

Exhibit 3-14

Volume Thresholds for Determining the Number of Entry Lanes Required

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Appendix 2

Intersection LOS Reports

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Appendix – SR 241/LPP Ramp Intersection LOS
2050 Alternative 13 Conditions

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HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 2 AM - Idea 13
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	930	415	115	1470	0	0	0	0	20	0	40
Future Volume (veh/h)	0	930	415	115	1470	0	0	0	0	20	0	40
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	979	376	121	1547	0				31	0	18
Adj No. of Lanes	0	3	1	1	3	0				2	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	3594	1119	172	4345	0				193	0	86
Arrive On Green	0.00	0.70	0.70	0.19	1.00	0.00				0.05	0.00	0.05
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599
Grp Volume(v), veh/h	0	979	376	121	1547	0				31	0	18
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	5.7	7.4	5.0	0.0	0.0				0.7	0.0	0.9
Cycle Q Clear(g_c), s	0.0	5.7	7.4	5.0	0.0	0.0				0.7	0.0	0.9
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	3594	1119	172	4345	0				193	0	86
V/C Ratio(X)	0.00	0.27	0.34	0.70	0.36	0.00				0.16	0.00	0.21
Avail Cap(c_a), veh/h	0	3594	1119	336	4345	0				806	0	360
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.41	0.41	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	4.5	4.7	31.2	0.0	0.0				36.1	0.0	36.2
Incr Delay (d2), s/veh	0.0	0.2	0.8	2.2	0.1	0.0				0.4	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.7	3.5	2.6	0.0	0.0				0.3	0.0	0.4
LnGrp Delay(d),s/veh	0.0	4.6	5.5	33.4	0.1	0.0				36.5	0.0	37.4
LnGrp LOS		A	A	C	A					D		D
Approach Vol, veh/h		1355			1668						49	
Approach Delay, s/veh		4.9			2.5						36.8	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		71.7			11.7	60.0		8.3				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		53.0			14.0	34.0		17.0				
Max Q Clear Time (g_c+I1), s		2.0			7.0	9.4		2.9				
Green Ext Time (p_c), s		14.1			0.1	7.9		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			4.1									
HCM 2010 LOS			A									
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

Alt 2 AM - Idea 13

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	655	295	0	0	1005	235	580	0	60	0	0	0
Future Volume (veh/h)	655	295	0	0	1005	235	580	0	60	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	689	311	0	0	1058	172	625	0	29			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	729	3535	0	0	1188	370	759	0	339			
Arrive On Green	0.68	1.00	0.00	0.00	0.23	0.23	0.21	0.00	0.21			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	689	311	0	0	1058	172	625	0	29			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	27.5	0.0	0.0	0.0	16.0	7.4	13.3	0.0	1.2			
Cycle Q Clear(g_c), s	27.5	0.0	0.0	0.0	16.0	7.4	13.3	0.0	1.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	729	3535	0	0	1188	370	759	0	339			
V/C Ratio(X)	0.94	0.09	0.00	0.00	0.89	0.47	0.82	0.00	0.09			
Avail Cap(c_a), veh/h	729	3535	0	0	1188	370	829	0	370			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.97	0.97	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	12.0	0.0	0.0	0.0	29.8	26.5	30.1	0.0	25.3			
Incr Delay (d2), s/veh	20.5	0.0	0.0	0.0	10.2	4.2	6.3	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	7.2	0.0	0.0	0.0	8.7	3.7	7.3	0.0	0.5			
LnGrp Delay(d),s/veh	32.5	0.0	0.0	0.0	40.0	30.6	36.4	0.0	25.4			
LnGrp LOS	C	A			D	C	D		C			
Approach Vol, veh/h		1000			1230			654				
Approach Delay, s/veh		22.4			38.7			35.9				
Approach LOS		C			D			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	36.6	22.5		20.9		59.1						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	30.0	17.5		17.5		52.5						
Max Q Clear Time (g_c+Q), s	29.5	18.0		15.3		2.0						
Green Ext Time (p_c), s	0.1	0.0		0.6		1.9						
Intersection Summary												
HCM 2010 Ctrl Delay				32.4								
HCM 2010 LOS				C								
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 2 AM - Idea 13

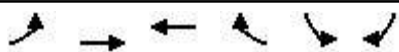
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	785	740	0	215	295		
Future Volume (veh/h)	0	785	740	0	215	295		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	826	779	0	226	217		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	2590	2590	0	314	281		
Arrive On Green	0.00	0.72	0.24	0.00	0.18	0.18		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	826	779	0	226	217		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	6.6	14.3	0.0	9.5	10.4		
Cycle Q Clear(g_c), s	0.0	6.6	14.3	0.0	9.5	10.4		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	2590	2590	0	314	281		
V/C Ratio(X)	0.00	0.32	0.30	0.00	0.72	0.77		
Avail Cap(c_a), veh/h	0	2590	2590	0	414	370		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.69	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	3.9	13.8	0.0	31.1	31.5		
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.0	4.1	7.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	3.2	7.2	0.0	5.1	5.1		
LnGrp Delay(d),s/veh	0.0	4.0	14.0	0.0	35.2	38.7		
LnGrp LOS		A	B		D	D		
Approach Vol, veh/h		826	779		443			
Approach Delay, s/veh		4.0	14.0		36.9			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		62.0				62.0		18.0
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		23.5				24.0		17.5
Max Q Clear Time (g_c+I1), s		16.3				8.6		12.4
Green Ext Time (p_c), s		2.8				4.6		0.7
Intersection Summary								
HCM 2010 Ctrl Delay			14.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary 4: Chiquita Canyon Rd & 241 NB On Ramp

Alt 2 AM - Idea 13
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	415	585	740	840	0	0		
Future Volume (veh/h)	415	585	740	840	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	437	616	779	665				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	494	1787	1175	998				
Arrive On Green	0.28	0.95	0.62	0.62				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	437	616	779	665				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	18.7	1.9	21.2	21.4				
Cycle Q Clear(g_c), s	18.7	1.9	21.2	21.4				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	494	1787	1175	998				
V/C Ratio(X)	0.88	0.34	0.66	0.67				
Avail Cap(c_a), veh/h	537	1787	1175	998				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(l)	0.57	0.57	1.00	1.00				
Uniform Delay (d), s/veh	27.8	0.1	9.6	9.7				
Incr Delay (d2), s/veh	9.6	0.3	3.0	3.5				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	0.5	1.0	11.8	10.2				
LnGrp Delay(d),s/veh	37.3	0.5	12.6	13.2				
LnGrp LOS	D	A	B	B				
Approach Vol, veh/h		1053	1444					
Approach Delay, s/veh		15.8	12.9					
Approach LOS		B	B					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	36.1	53.9				80.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	23.0	47.0				75.0		
Max Q Clear Time (g_c+20), s	20.7	23.4				3.9		
Green Ext Time (p_c), s	0.4	8.5				4.2		
Intersection Summary								
HCM 2010 Ctrl Delay			14.1					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

Alt 2 AM - Idea 13

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↙↙	↘	
Traffic Volume (veh/h)	0	425	85	215	660	0	0	0	0	320	0	130
Future Volume (veh/h)	0	425	85	215	660	0	0	0	0	320	0	130
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	447	62	226	695	0				337	0	96
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2652	1186	535	1593	0				463	0	213
Arrive On Green	0.00	0.74	0.74	0.74	0.74	0.00				0.13	0.00	0.13
Sat Flow, veh/h	0	3668	1599	626	2233	0				3476	0	1599
Grp Volume(v), veh/h	0	447	62	397	524	0				337	0	96
Grp Sat Flow(s),veh/h/ln	0	1787	1599	1147	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	3.0	0.8	8.6	9.8	0.0				7.4	0.0	4.4
Cycle Q Clear(g_c), s	0.0	3.0	0.8	11.5	9.8	0.0				7.4	0.0	4.4
Prop In Lane	0.00		1.00	0.57		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2652	1186	921	1207	0				463	0	213
V/C Ratio(X)	0.00	0.17	0.05	0.43	0.43	0.00				0.73	0.00	0.45
Avail Cap(c_a), veh/h	0	2652	1186	921	1207	0				825	0	380
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.96	0.96	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	3.0	2.8	4.2	3.9	0.0				33.3	0.0	32.0
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.4	1.1	0.0				2.2	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.4	3.8	4.7	0.0				3.7	0.0	2.0
LnGrp Delay(d),s/veh	0.0	3.2	2.9	5.6	5.0	0.0				35.5	0.0	33.5
LnGrp LOS		A	A	A	A					D		C
Approach Vol, veh/h		509			921						433	
Approach Delay, s/veh		3.1			5.3						35.1	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		64.4		15.6		64.4						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		51.0		19.0		51.0						
Max Q Clear Time (g_c+I1), s		13.5		9.4		5.0						
Green Ext Time (p_c), s		7.2		1.2		3.1						
Intersection Summary												
HCM 2010 Ctrl Delay			11.6									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 2 AM - Idea 13
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑	↑			
Traffic Volume (veh/h)	0	565	180	0	775	960	100	0	145	0	0	0
Future Volume (veh/h)	0	565	180	0	775	960	100	0	145	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	595	0	0	816	0	138	0	71			
Adj No. of Lanes	0	2	1	0	2	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2685	1201	0	2685	1201	444	0	198			
Arrive On Green	0.00	1.00	0.00	0.00	0.75	0.00	0.12	0.00	0.12			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	3583	0	1599			
Grp Volume(v), veh/h	0	595	0	0	816	0	138	0	71			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	5.9	0.0	2.8	0.0	3.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	5.9	0.0	2.8	0.0	3.3			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2685	1201	0	2685	1201	444	0	198			
V/C Ratio(X)	0.00	0.22	0.00	0.00	0.30	0.00	0.31	0.00	0.36			
Avail Cap(c_a), veh/h	0	2685	1201	0	2685	1201	761	0	340			
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.95	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	3.2	0.0	31.9	0.0	32.1			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0	1.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	2.9	0.0	1.4	0.0	1.5			
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	3.5	0.0	32.3	0.0	33.2			
LnGrp LOS		A			A		C		C			
Approach Vol, veh/h		595			816			209				
Approach Delay, s/veh		0.0			3.5			32.6				
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		65.1		14.9		65.1						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		53.0		17.0		53.0						
Max Q Clear Time (g_c+l1), s		7.9		5.3		2.0						
Green Ext Time (p_c), s		6.0		0.5		4.1						
Intersection Summary												
HCM 2010 Ctrl Delay				6.0								
HCM 2010 LOS				A								
Notes												

Intersection

Intersection Delay, s/veh 10.6

Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	190	5	0	105	0	0	0	0	255	0	90
Future Vol, veh/h	0	190	5	0	105	0	0	0	0	255	0	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	200	5	0	111	0	0	0	0	268	0	95
Number of Lanes	0	1	0	1	1	0	0	0	0	1	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	11.2	9.7	10.6
HCM LOS	B	A	B

Lane	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	46%
Vol Thru, %	97%	100%	100%	0%	0%
Vol Right, %	3%	0%	0%	0%	54%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	195	0	105	179	167
LT Vol	0	0	0	179	77
Through Vol	190	0	105	0	0
RT Vol	5	0	0	0	90
Lane Flow Rate	205	0	111	188	175
Geometry Grp	6	7	7	7	7
Degree of Util (X)	0.318	0	0.176	0.307	0.255
Departure Headway (Hd)	5.57	5.721	5.721	5.883	5.23
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	642	0	622	607	682
Service Time	3.635	3.498	3.498	3.652	2.999
HCM Lane V/C Ratio	0.319	0	0.178	0.31	0.257
HCM Control Delay	11.2	8.5	9.7	11.3	9.8
HCM Lane LOS	B	N	A	B	A
HCM 95th-tile Q	1.4	0	0.6	1.3	1

Intersection

Intersection Delay, s/veh 10.7

Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	365	0	0	85	310	20	0	0	0	0	0
Future Vol, veh/h	80	365	0	0	85	310	20	0	0	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	84	384	0	0	89	326	21	0	0	0	0	0
Number of Lanes	1	1	0	0	1	1	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	2
HCM Control Delay	12.1	9.3	9.2
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2
Vol Left, %	100%	100%	0%	0%	0%
Vol Thru, %	0%	0%	100%	100%	0%
Vol Right, %	0%	0%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	80	365	85	310
LT Vol	20	80	0	0	0
Through Vol	0	0	365	85	0
RT Vol	0	0	0	0	310
Lane Flow Rate	21	84	384	89	326
Geometry Grp	2	7	7	7	7
Degree of Util (X)	0.035	0.126	0.52	0.123	0.386
Departure Headway (Hd)	5.902	5.378	4.876	4.965	4.262
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	606	669	742	724	845
Service Time	3.945	3.097	2.595	2.682	1.979
HCM Lane V/C Ratio	0.035	0.126	0.518	0.123	0.386
HCM Control Delay	9.2	8.9	12.8	8.4	9.6
HCM Lane LOS	A	A	B	A	A
HCM 95th-tile Q	0.1	0.4	3	0.4	1.8

HCM 2010 Signalized Intersection Summary
 1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 2 PM - Idea 13
 03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	755	455	55	820	0	0	0	0	165	0	430
Future Volume (veh/h)	0	755	455	55	820	0	0	0	0	165	0	430
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	795	450	58	863	0				116	0	379
Adj No. of Lanes	0	3	1	1	3	0				1	0	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2831	881	122	3524	0				323	0	577
Arrive On Green	0.00	0.55	0.55	0.02	0.23	0.00				0.18	0.00	0.18
Sat Flow, veh/h	0	5305	1599	1792	5305	0				1792	0	3198
Grp Volume(v), veh/h	0	795	450	58	863	0				116	0	379
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	4.9	10.5	1.9	8.3	0.0				3.4	0.0	6.6
Cycle Q Clear(g_c), s	0.0	4.9	10.5	1.9	8.3	0.0				3.4	0.0	6.6
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2831	881	122	3524	0				323	0	577
V/C Ratio(X)	0.00	0.28	0.51	0.47	0.24	0.00				0.36	0.00	0.66
Avail Cap(c_a), veh/h	0	2831	881	179	3524	0				537	0	959
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.1	8.4	28.3	10.5	0.0				21.5	0.0	22.9
Incr Delay (d2), s/veh	0.0	0.2	2.1	2.7	0.2	0.0				0.7	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	5.1	1.0	4.0	0.0				1.7	0.0	3.0
LnGrp Delay(d),s/veh	0.0	7.4	10.5	31.0	10.6	0.0				22.2	0.0	24.1
LnGrp LOS		A	B	C	B					C		C
Approach Vol, veh/h		1245			921						495	
Approach Delay, s/veh		8.5			11.9						23.7	
Approach LOS		A			B						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		45.2			8.1	37.1		14.8				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		33.0			5.0	23.0		17.0				
Max Q Clear Time (g_c+I1), s		10.3			3.9	12.5		8.6				
Green Ext Time (p_c), s		5.3			0.0	4.6		1.2				
Intersection Summary												
HCM 2010 Ctrl Delay				12.5								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary
 2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

Alt 2 PM - Idea 13
 03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	895	0	0	490	20	385	0	90	0	0	0
Future Volume (veh/h)	25	895	0	0	490	20	385	0	90	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	26	942	0	0	516	15	426	0	44			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	765	3510	0	0	975	304	657	0	293			
Arrive On Green	0.14	0.23	0.00	0.00	0.19	0.19	0.18	0.00	0.18			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	26	942	0	0	516	15	426	0	44			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	0.8	9.1	0.0	0.0	5.4	0.5	6.6	0.0	1.4			
Cycle Q Clear(g_c), s	0.8	9.1	0.0	0.0	5.4	0.5	6.6	0.0	1.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	765	3510	0	0	975	304	657	0	293			
V/C Ratio(X)	0.03	0.27	0.00	0.00	0.53	0.05	0.65	0.00	0.15			
Avail Cap(c_a), veh/h	765	3510	0	0	1883	586	1194	0	533			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.95	0.95	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.1	10.9	0.0	0.0	21.9	19.9	22.7	0.0	20.6			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	2.1	0.3	1.1	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	4.3	0.0	0.0	2.8	0.2	3.4	0.0	0.6			
LnGrp Delay(d),s/veh	15.1	10.9	0.0	0.0	23.9	20.2	23.8	0.0	20.8			
LnGrp LOS	B	B			C	C	C		C			
Approach Vol, veh/h		968			531			470				
Approach Delay, s/veh		11.0			23.8			23.5				
Approach LOS		B			C			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	29.6	15.4		15.0		45.0						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	5.0	21.0		19.0		31.0						
Max Q Clear Time (g_c+I), s	12.8	7.4		8.6		11.1						
Green Ext Time (p_c), s	0.0	3.0		1.2		5.6						
Intersection Summary												
HCM 2010 Ctrl Delay				17.5								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 2 PM - Idea 13

03/09/2018



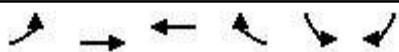
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↘	↗		
Traffic Volume (veh/h)	0	970	565	0	575	200		
Future Volume (veh/h)	0	970	565	0	575	200		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	1021	595	0	605	148		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	1484	1484	0	739	660		
Arrive On Green	0.00	0.42	0.42	0.00	0.41	0.41		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	1021	595	0	605	148		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	10.9	5.4	0.0	13.9	2.8		
Cycle Q Clear(g_c), s	0.0	10.9	5.4	0.0	13.9	2.8		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	1484	1484	0	739	660		
V/C Ratio(X)	0.00	0.69	0.40	0.00	0.82	0.22		
Avail Cap(c_a), veh/h	0	2078	1484	0	1234	1102		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	11.1	9.5	0.0	12.1	8.8		
Incr Delay (d2), s/veh	0.0	0.6	0.2	0.0	2.3	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	5.4	2.7	0.0	7.2	1.2		
LnGrp Delay(d),s/veh	0.0	11.7	9.7	0.0	14.4	9.0		
LnGrp LOS		B	A		B	A		
Approach Vol, veh/h		1021	595		753			
Approach Delay, s/veh		11.7	9.7		13.3			
Approach LOS		B	A		B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		23.3				23.3		23.2
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		18.0				26.0		31.0
Max Q Clear Time (g_c+I1), s		7.4				12.9		15.9
Green Ext Time (p_c), s		2.7				5.4		2.2
Intersection Summary								
HCM 2010 Ctrl Delay			11.7					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

Alt 2 PM - Idea 13

03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	220	1325	565	205	0	0		
Future Volume (veh/h)	220	1325	565	205	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	232	1395	595	151				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	343	1689	1137	967				
Arrive On Green	0.19	0.90	0.60	0.60				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	232	1395	595	151				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	4.7	11.5	7.2	1.6				
Cycle Q Clear(g_c), s	4.7	11.5	7.2	1.6				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	343	1689	1137	967				
V/C Ratio(X)	0.68	0.83	0.52	0.16				
Avail Cap(c_a), veh/h	685	2686	1775	1508				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	1.00	1.00	1.00	1.00				
Uniform Delay (d), s/veh	14.7	0.8	4.5	3.4				
Incr Delay (d2), s/veh	2.3	1.2	0.4	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	2.5	5.2	3.8	0.7				
LnGrp Delay(d),s/veh	17.1	2.0	4.9	3.5				
LnGrp LOS	B	A	A	A				
Approach Vol, veh/h		1627	746					
Approach Delay, s/veh		4.2	4.6					
Approach LOS		A	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	1.5	27.7				39.2		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	1.0	36.0				55.0		
Max Q Clear Time (g_c+I), s	1.0	9.2				13.5		
Green Ext Time (p_c), s	0.4	4.3				20.7		
Intersection Summary								
HCM 2010 Ctrl Delay			4.3					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

Alt 2 PM - Idea 13
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↖↖	↗	
Traffic Volume (veh/h)	0	655	85	80	500	0	0	0	0	890	0	90
Future Volume (veh/h)	0	655	85	80	500	0	0	0	0	890	0	90
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	689	62	84	526	0				937	0	67
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	1811	810	222	1327	0				1135	0	522
Arrive On Green	0.00	0.51	0.51	1.00	1.00	0.00				0.33	0.00	0.33
Sat Flow, veh/h	0	3668	1599	286	2704	0				3476	0	1599
Grp Volume(v), veh/h	0	689	62	288	322	0				937	0	67
Grp Sat Flow(s),veh/h/ln	0	1787	1599	1277	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	7.1	1.2	1.8	0.0	0.0				14.9	0.0	1.8
Cycle Q Clear(g_c), s	0.0	7.1	1.2	8.9	0.0	0.0				14.9	0.0	1.8
Prop In Lane	0.00		1.00	0.29		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1811	810	725	824	0				1135	0	522
V/C Ratio(X)	0.00	0.38	0.08	0.40	0.39	0.00				0.83	0.00	0.13
Avail Cap(c_a), veh/h	0	1811	810	725	824	0				1448	0	666
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.99	0.99	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	9.0	7.6	0.1	0.0	0.0				18.6	0.0	14.2
Incr Delay (d2), s/veh	0.0	0.6	0.2	1.6	1.4	0.0				3.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	0.6	0.6	0.3	0.0				7.7	0.0	0.8
LnGrp Delay(d),s/veh	0.0	9.7	7.8	1.8	1.4	0.0				21.8	0.0	14.3
LnGrp LOS		A	A	A	A					C		B
Approach Vol, veh/h		751			610						1004	
Approach Delay, s/veh		9.5			1.6						21.3	
Approach LOS		A			A						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		35.4		24.6		35.4						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		25.0		25.0		25.0						
Max Q Clear Time (g_c+I1), s		10.9		16.9		9.1						
Green Ext Time (p_c), s		3.2		2.7		4.0						
Intersection Summary												
HCM 2010 Ctrl Delay				12.5								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 2 PM - Idea 13
03/09/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑	↑			
Traffic Volume (veh/h)	0	1450	95	0	525	305	55	0	200	0	0	0
Future Volume (veh/h)	0	1450	95	0	525	305	55	0	200	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	1526	0	0	553	0	39	0	169			
Adj No. of Lanes	0	2	1	0	2	1	1	0	2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2401	1074	0	2401	1074	289	0	516			
Arrive On Green	0.00	1.00	0.00	0.00	0.67	0.00	0.16	0.00	0.16			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	1792	0	3198			
Grp Volume(v), veh/h	0	1526	0	0	553	0	39	0	169			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	3.6	0.0	1.1	0.0	2.8			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	3.6	0.0	1.1	0.0	2.8			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2401	1074	0	2401	1074	289	0	516			
V/C Ratio(X)	0.00	0.64	0.00	0.00	0.23	0.00	0.13	0.00	0.33			
Avail Cap(c_a), veh/h	0	2401	1074	0	2401	1074	508	0	906			
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.78	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	3.8	0.0	21.6	0.0	22.3			
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.2	0.0	0.2	0.0	0.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	1.8	0.0	0.6	0.0	1.3			
LnGrp Delay(d),s/veh	0.0	0.4	0.0	0.0	4.0	0.0	21.8	0.0	22.6			
LnGrp LOS		A			A		C		C			
Approach Vol, veh/h		1526			553			208				
Approach Delay, s/veh		0.4			4.0			22.5				
Approach LOS		A			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		45.3		14.7		45.3						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		33.0		17.0		33.0						
Max Q Clear Time (g_c+l1), s		5.6		4.8		2.0						
Green Ext Time (p_c), s		3.5		0.5		13.6						
Intersection Summary												
HCM 2010 Ctrl Delay			3.3									
HCM 2010 LOS			A									
Notes												

Intersection

Intersection Delay, s/veh 9.4

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	135	10	0	90	0	0	0	0	180	0	55
Future Vol, veh/h	0	135	10	0	90	0	0	0	0	180	0	55
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	142	11	0	95	0	0	0	0	189	0	58
Number of Lanes	0	1	0	1	1	0	0	0	0	1	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	9.8	8.9	9.4
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	52%
Vol Thru, %	93%	100%	100%	0%	0%
Vol Right, %	7%	0%	0%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	145	0	90	121	114
LT Vol	0	0	0	121	59
Through Vol	135	0	90	0	0
RT Vol	10	0	0	0	55
Lane Flow Rate	153	0	95	127	120
Geometry Grp	6	7	7	7	7
Degree of Util (X)	0.222	0	0.14	0.2	0.17
Departure Headway (Hd)	5.239	5.336	5.336	5.672	5.092
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	685	0	672	632	703
Service Time	3.272	3.073	3.073	3.409	2.829
HCM Lane V/C Ratio	0.223	0	0.141	0.201	0.171
HCM Control Delay	9.8	8.1	8.9	9.8	8.9
HCM Lane LOS	A	N	A	A	A
HCM 95th-tile Q	0.8	0	0.5	0.7	0.6

Intersection

Intersection Delay, s/veh 9.3

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	280	0	0	65	225	25	0	0	0	0	0
Future Vol, veh/h	35	280	0	0	65	225	25	0	0	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	37	295	0	0	68	237	26	0	0	0	0	0
Number of Lanes	1	1	0	0	1	1	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	2
HCM Control Delay	10.3	8.3	8.7
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2
Vol Left, %	100%	100%	0%	0%	0%
Vol Thru, %	0%	0%	100%	100%	0%
Vol Right, %	0%	0%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	25	35	280	65	225
LT Vol	25	35	0	0	0
Through Vol	0	0	280	65	0
RT Vol	0	0	0	0	225
Lane Flow Rate	26	37	295	68	237
Geometry Grp	2	7	7	7	7
Degree of Util (X)	0.04	0.053	0.386	0.092	0.273
Departure Headway (Hd)	5.464	5.219	4.718	4.845	4.143
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	658	678	752	743	872
Service Time	3.478	3.015	2.514	2.552	1.849
HCM Lane V/C Ratio	0.04	0.055	0.392	0.092	0.272
HCM Control Delay	8.7	8.3	10.5	8	8.4
HCM Lane LOS	A	A	B	A	A
HCM 95th-tile Q	0.1	0.2	1.8	0.3	1.1



Appendix – SR 241/LPP Ramp Intersection LOS
2050 Alternative 17 Conditions

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HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 3 AM - Idea 17

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↗	↖	↑↑↑↑					↖	↕	↗
Traffic Volume (veh/h)	0	875	425	125	1480	0	0	0	0	20	0	35
Future Volume (veh/h)	0	875	425	125	1480	0	0	0	0	20	0	35
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	921	381	132	1558	0				30	0	16
Adj No. of Lanes	0	3	1	1	3	0				2	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	3567	1111	184	4352	0				188	0	84
Arrive On Green	0.00	0.69	0.69	0.21	1.00	0.00				0.05	0.00	0.05
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599
Grp Volume(v), veh/h	0	921	381	132	1558	0				30	0	16
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	5.3	7.6	5.5	0.0	0.0				0.6	0.0	0.8
Cycle Q Clear(g_c), s	0.0	5.3	7.6	5.5	0.0	0.0				0.6	0.0	0.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	3567	1111	184	4352	0				188	0	84
V/C Ratio(X)	0.00	0.26	0.34	0.72	0.36	0.00				0.16	0.00	0.19
Avail Cap(c_a), veh/h	0	3567	1111	336	4352	0				806	0	360
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.46	0.46	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	4.5	4.9	30.7	0.0	0.0				36.2	0.0	36.3
Incr Delay (d2), s/veh	0.0	0.2	0.8	2.4	0.1	0.0				0.4	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	3.5	2.8	0.0	0.0				0.3	0.0	0.4
LnGrp Delay(d),s/veh	0.0	4.7	5.7	33.1	0.1	0.0				36.6	0.0	37.4
LnGrp LOS		A	A	C	A					D		D
Approach Vol, veh/h		1302			1690						46	
Approach Delay, s/veh		5.0			2.7						36.9	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		71.8			12.2	59.6		8.2				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		53.0			14.0	34.0		17.0				
Max Q Clear Time (g_c+I1), s		2.0			7.5	9.6		2.8				
Green Ext Time (p_c), s		31.2			0.1	18.7		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			4.2									
HCM 2010 LOS			A									
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

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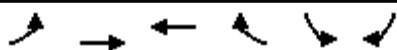
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	615	280	0	0	1005	220	600	0	75	0	0	0
Future Volume (veh/h)	615	280	0	0	1005	220	600	0	75	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	647	295	0	0	1058	163	649	0	37			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	702	3508	0	0	1239	386	778	0	347			
Arrive On Green	0.65	1.00	0.00	0.00	0.24	0.24	0.22	0.00	0.22			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	647	295	0	0	1058	163	649	0	37			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	25.2	0.0	0.0	0.0	15.8	6.9	13.9	0.0	1.5			
Cycle Q Clear(g_c), s	25.2	0.0	0.0	0.0	15.8	6.9	13.9	0.0	1.5			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	702	3508	0	0	1239	386	778	0	347			
V/C Ratio(X)	0.92	0.08	0.00	0.00	0.85	0.42	0.83	0.00	0.11			
Avail Cap(c_a), veh/h	702	3508	0	0	1252	390	829	0	370			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.97	0.97	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	12.8	0.0	0.0	0.0	29.0	25.6	29.9	0.0	25.1			
Incr Delay (d2), s/veh	17.3	0.0	0.0	0.0	7.6	3.4	7.0	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	15.3	0.0	0.0	0.0	8.3	3.4	7.6	0.0	0.7			
LnGrp Delay(d),s/veh	30.0	0.0	0.0	0.0	36.6	29.0	37.0	0.0	25.2			
LnGrp LOS	C	A			D	C	D		C			
Approach Vol, veh/h		942			1221			686				
Approach Delay, s/veh		20.6			35.6			36.4				
Approach LOS		C			D			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	35.3	23.3		21.4		58.6						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	29.0	18.5		17.5		52.5						
Max Q Clear Time (g_c+0.25), s	27.2	17.8		15.9		2.0						
Green Ext Time (p_c), s	0.8	0.5		0.5		4.1						
Intersection Summary												
HCM 2010 Ctrl Delay				30.8								
HCM 2010 LOS				C								
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

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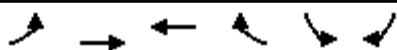
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	660	730	0	215	290		
Future Volume (veh/h)	0	660	730	0	215	290		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	695	768	0	226	213		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	2596	2596	0	311	278		
Arrive On Green	0.00	0.73	0.24	0.00	0.17	0.17		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	695	768	0	226	213		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	5.3	14.1	0.0	9.5	10.2		
Cycle Q Clear(g_c), s	0.0	5.3	14.1	0.0	9.5	10.2		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	2596	2596	0	311	278		
V/C Ratio(X)	0.00	0.27	0.30	0.00	0.73	0.77		
Avail Cap(c_a), veh/h	0	2596	2596	0	426	380		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.76	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	3.7	13.7	0.0	31.3	31.5		
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.0	3.9	6.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	2.5	7.0	0.0	5.0	5.0		
LnGrp Delay(d),s/veh	0.0	3.8	13.9	0.0	35.2	37.8		
LnGrp LOS		A	B		D	D		
Approach Vol, veh/h		695	768		439			
Approach Delay, s/veh		3.8	13.9		36.4			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		62.1				62.1		17.9
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		25.0				22.0		18.0
Max Q Clear Time (g_c+I1), s		16.1				7.3		12.2
Green Ext Time (p_c), s		5.6				7.9		0.7
Intersection Summary								
HCM 2010 Ctrl Delay		15.4						
HCM 2010 LOS		B						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

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Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	300	575	730	820	0	0		
Future Volume (veh/h)	300	575	730	820	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	316	605	768	705				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	377	1787	1297	1103				
Arrive On Green	0.21	0.95	0.69	0.69				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	316	605	768	705				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	13.5	1.9	17.1	19.6				
Cycle Q Clear(g_c), s	13.5	1.9	17.1	19.6				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	377	1787	1297	1103				
V/C Ratio(X)	0.84	0.34	0.59	0.64				
Avail Cap(c_a), veh/h	448	1787	1297	1103				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	0.63	0.63	1.00	1.00				
Uniform Delay (d), s/veh	30.3	0.1	6.5	6.9				
Incr Delay (d2), s/veh	7.6	0.3	2.0	2.8				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	7.5	1.0	9.5	9.3				
LnGrp Delay(d),s/veh	37.9	0.5	8.5	9.7				
LnGrp LOS	D	A	A	A				
Approach Vol, veh/h		921	1473					
Approach Delay, s/veh		13.3	9.1					
Approach LOS		B	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	20.8	59.2				80.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	19.0	51.0				75.0		
Max Q Clear Time (g_c+1.5), s	15.5	21.6				3.9		
Green Ext Time (p_c), s	0.3	14.8				19.6		
Intersection Summary								
HCM 2010 Ctrl Delay			10.7					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

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03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	375	75	250	685	0	0	0	0	310	0	130
Future Volume (veh/h)	0	375	75	250	685	0	0	0	0	310	0	130
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	395	55	263	721	0				326	0	96
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2663	1191	588	1543	0				451	0	208
Arrive On Green	0.00	0.75	0.75	1.00	1.00	0.00				0.13	0.00	0.13
Sat Flow, veh/h	0	3668	1599	692	2156	0				3476	0	1599
Grp Volume(v), veh/h	0	395	55	425	559	0				326	0	96
Grp Sat Flow(s),veh/h/ln	0	1787	1599	1136	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	2.5	0.7	1.8	0.0	0.0				7.2	0.0	4.4
Cycle Q Clear(g_c), s	0.0	2.5	0.7	4.4	0.0	0.0				7.2	0.0	4.4
Prop In Lane	0.00		1.00	0.62		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2663	1191	920	1212	0				451	0	208
V/C Ratio(X)	0.00	0.15	0.05	0.46	0.46	0.00				0.72	0.00	0.46
Avail Cap(c_a), veh/h	0	2663	1191	920	1212	0				825	0	380
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.85	0.85	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	2.9	2.7	0.1	0.0	0.0				33.4	0.0	32.2
Incr Delay (d2), s/veh	0.0	0.1	0.1	1.4	1.1	0.0				2.2	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.3	0.3	0.5	0.4	0.0				3.6	0.0	2.1
LnGrp Delay(d),s/veh	0.0	3.0	2.8	1.5	1.1	0.0				35.6	0.0	33.8
LnGrp LOS		A	A	A	A					D		C
Approach Vol, veh/h		450			984						422	
Approach Delay, s/veh		3.0			1.2						35.2	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		64.6		15.4		64.6						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		51.0		19.0		51.0						
Max Q Clear Time (g_c+I1), s		6.4		9.2		4.5						
Green Ext Time (p_c), s		12.3		1.2		12.4						
Intersection Summary												
HCM 2010 Ctrl Delay			9.4									
HCM 2010 LOS			A									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

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03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑	↑			
Traffic Volume (veh/h)	0	555	130	0	810	940	125	0	185	0	0	0
Future Volume (veh/h)	0	555	130	0	810	940	125	0	185	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	584	0	0	853	0	175	0	90			
Adj No. of Lanes	0	2	1	0	2	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2682	1200	0	2682	1200	447	0	199			
Arrive On Green	0.00	0.25	0.00	0.00	0.75	0.00	0.12	0.00	0.12			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	3583	0	1599			
Grp Volume(v), veh/h	0	584	0	0	853	0	175	0	90			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	10.4	0.0	0.0	6.3	0.0	3.6	0.0	4.2			
Cycle Q Clear(g_c), s	0.0	10.4	0.0	0.0	6.3	0.0	3.6	0.0	4.2			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2682	1200	0	2682	1200	447	0	199			
V/C Ratio(X)	0.00	0.22	0.00	0.00	0.32	0.00	0.39	0.00	0.45			
Avail Cap(c_a), veh/h	0	2682	1200	0	2682	1200	761	0	340			
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.95	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	11.4	0.0	0.0	3.3	0.0	32.2	0.0	32.5			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.3	0.0	0.6	0.0	1.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	5.2	0.0	0.0	3.1	0.0	1.8	0.0	1.9			
LnGrp Delay(d),s/veh	0.0	11.5	0.0	0.0	3.6	0.0	32.8	0.0	34.1			
LnGrp LOS		B			A		C		C			
Approach Vol, veh/h		584			853			265				
Approach Delay, s/veh		11.5			3.6			33.2				
Approach LOS		B			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		65.0		15.0		65.0						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		31.0		17.0		17.0						
Max Q Clear Time (g_c+1), s		8.3		6.2		12.4						
Green Ext Time (p_c), s		9.8		0.6		3.2						
Intersection Summary												
HCM 2010 Ctrl Delay				10.9								
HCM 2010 LOS				B								
Notes												

Intersection

Intersection Delay, s/veh16.1

Intersection LOS C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	0	0	435	0
Future Vol, veh/h	5	0	0	0	435	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	5	0	0	0	458	0
Number of Lanes	1	0	0	0	1	1

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	2	0
HCM Control Delay	8.4	16.2
HCM LOS	A	C

Lane	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	100%	0%
Vol Thru, %	0%	0%	100%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	435	0
LT Vol	5	435	0
Through Vol	0	0	0
RT Vol	0	0	0
Lane Flow Rate	5	458	0
Geometry Grp	2	7	7
Degree of Util (X)	0.008	0.639	0
Departure Headway (Hd)	5.375	5.027	4.527
Convergence, Y/N	Yes	Yes	Yes
Cap	670	723	0
Service Time	3.375	2.733	2.233
HCM Lane V/C Ratio	0.007	0.633	0
HCM Control Delay	8.4	16.2	7.2
HCM Lane LOS	A	C	N
HCM 95th-tile Q	0	4.6	0

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	435	0	0	5	940	0	0	5	0	0	0
Future Vol, veh/h	0	435	0	0	5	940	0	0	5	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	458	0	0	5	989	0	0	5	0	0	0

Major/Minor	Major1	Minor2	Minor1
Conflicting Flow All	0	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	-	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0		
HCM LOS		-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBTWBLn1WBLn2
Capacity (veh/h)	-	-	501
HCM Lane V/C Ratio	-	-	0.011
HCM Control Delay (s)	-	0	12.3
HCM Lane LOS	-	A	B
HCM 95th %tile Q(veh)	-	-	0

HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↗	↖	↑↑↑↑					↖	↕	↗
Traffic Volume (veh/h)	0	745	480	65	815	0	0	0	0	160	0	410
Future Volume (veh/h)	0	745	480	65	815	0	0	0	0	160	0	410
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	784	470	68	858	0				112	0	363
Adj No. of Lanes	0	3	1	1	3	0				1	0	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2833	882	131	3551	0				314	0	561
Arrive On Green	0.00	0.55	0.55	0.02	0.23	0.00				0.18	0.00	0.18
Sat Flow, veh/h	0	5305	1599	1792	5305	0				1792	0	3198
Grp Volume(v), veh/h	0	784	470	68	858	0				112	0	363
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	4.8	11.2	2.3	8.2	0.0				3.3	0.0	6.3
Cycle Q Clear(g_c), s	0.0	4.8	11.2	2.3	8.2	0.0				3.3	0.0	6.3
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2833	882	131	3551	0				314	0	561
V/C Ratio(X)	0.00	0.28	0.53	0.52	0.24	0.00				0.36	0.00	0.65
Avail Cap(c_a), veh/h	0	2833	882	179	3551	0				537	0	959
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.1	8.5	28.2	10.3	0.0				21.8	0.0	23.0
Incr Delay (d2), s/veh	0.0	0.2	2.3	3.1	0.2	0.0				0.7	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	5.4	1.2	3.9	0.0				1.7	0.0	2.9
LnGrp Delay(d),s/veh	0.0	7.4	10.8	31.3	10.5	0.0				22.5	0.0	24.3
LnGrp LOS		A	B	C	B					C		C
Approach Vol, veh/h		1254			926						475	
Approach Delay, s/veh		8.7			12.0						23.9	
Approach LOS		A			B						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		45.5			8.4	37.1		14.5				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		33.0			5.0	23.0		17.0				
Max Q Clear Time (g_c+I1), s		10.2			4.3	13.2		8.3				
Green Ext Time (p_c), s		12.9			0.0	7.1		1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			12.5									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

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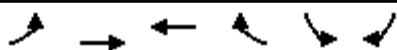
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	880	0	0	480	20	400	0	100	0	0	0
Future Volume (veh/h)	25	880	0	0	480	20	400	0	100	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	26	926	0	0	505	15	444	0	49			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	766	3489	0	0	952	296	671	0	299			
Arrive On Green	0.14	0.22	0.00	0.00	0.19	0.19	0.19	0.00	0.19			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	26	926	0	0	505	15	444	0	49			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	0.8	8.9	0.0	0.0	5.3	0.5	6.9	0.0	1.5			
Cycle Q Clear(g_c), s	0.8	8.9	0.0	0.0	5.3	0.5	6.9	0.0	1.5			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	766	3489	0	0	952	296	671	0	299			
V/C Ratio(X)	0.03	0.27	0.00	0.00	0.53	0.05	0.66	0.00	0.16			
Avail Cap(c_a), veh/h	766	3489	0	0	1797	560	1254	0	560			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.95	0.95	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.1	10.9	0.0	0.0	22.1	20.1	22.6	0.0	20.4			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	2.1	0.3	1.1	0.0	0.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	4.3	0.0	0.0	2.7	0.2	3.5	0.0	0.7			
LnGrp Delay(d),s/veh	15.1	11.0	0.0	0.0	24.2	20.4	23.7	0.0	20.7			
LnGrp LOS	B	B			C	C	C		C			
Approach Vol, veh/h		952			520			493				
Approach Delay, s/veh		11.1			24.1			23.4				
Approach LOS		B			C			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	29.6	15.1		15.2		44.8						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	5.0	20.0		20.0		30.0						
Max Q Clear Time (g_c+I), s	12.8	7.3		8.9		10.9						
Green Ext Time (p_c), s	1.2	2.8		1.3		5.5						
Intersection Summary												
HCM 2010 Ctrl Delay				17.6								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

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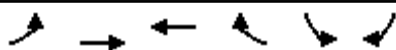
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	970	555	0	575	200		
Future Volume (veh/h)	0	970	555	0	575	200		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	1021	584	0	605	148		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	1531	1531	0	731	653		
Arrive On Green	0.00	0.43	0.43	0.00	0.41	0.41		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	1021	584	0	605	148		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	11.2	5.5	0.0	14.8	3.0		
Cycle Q Clear(g_c), s	0.0	11.2	5.5	0.0	14.8	3.0		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	1531	1531	0	731	653		
V/C Ratio(X)	0.00	0.67	0.38	0.00	0.83	0.23		
Avail Cap(c_a), veh/h	0	1972	1531	0	1171	1045		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	11.2	9.6	0.0	12.9	9.4		
Incr Delay (d2), s/veh	0.0	0.6	0.2	0.0	2.8	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	5.5	2.7	0.0	7.8	1.3		
LnGrp Delay(d),s/veh	0.0	11.8	9.7	0.0	15.7	9.6		
LnGrp LOS		B	A		B	A		
Approach Vol, veh/h		1021	584		753			
Approach Delay, s/veh		11.8	9.7		14.5			
Approach LOS		B	A		B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		25.0				25.0		24.0
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		18.0				26.0		31.0
Max Q Clear Time (g_c+I1), s		7.5				13.2		16.8
Green Ext Time (p_c), s		6.8				6.8		2.2
Intersection Summary								
HCM 2010 Ctrl Delay		12.1						
HCM 2010 LOS		B						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

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Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	220	1325	555	205	0	0		
Future Volume (veh/h)	220	1325	555	205	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	232	1395	584	151				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	329	1722	1217	1034				
Arrive On Green	0.18	0.92	0.65	0.65				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	232	1395	584	151				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	5.7	11.5	7.5	1.7				
Cycle Q Clear(g_c), s	5.7	11.5	7.5	1.7				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	329	1722	1217	1034				
V/C Ratio(X)	0.70	0.81	0.48	0.15				
Avail Cap(c_a), veh/h	569	2232	1475	1254				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	1.00	1.00	1.00	1.00				
Uniform Delay (d), s/veh	18.1	0.7	4.3	3.3				
Incr Delay (d2), s/veh	2.8	1.8	0.3	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	3.1	5.5	3.8	0.8				
LnGrp Delay(d),s/veh	20.8	2.5	4.6	3.3				
LnGrp LOS	C	A	A	A				
Approach Vol, veh/h		1627	735					
Approach Delay, s/veh		5.1	4.3					
Approach LOS		A	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	12.7	34.5				47.2		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	14.0	36.0				55.0		
Max Q Clear Time (g_c+I), s	17.5	9.5				13.5		
Green Ext Time (p_c), s	0.3	20.0				27.7		
Intersection Summary								
HCM 2010 Ctrl Delay			4.8					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	665	115	130	505	0	0	0	0	725	0	90
Future Volume (veh/h)	0	665	115	130	505	0	0	0	0	725	0	90
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	700	84	137	532	0				763	0	67
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2010	899	316	1223	0				942	0	433
Arrive On Green	0.00	0.56	0.56	1.00	1.00	0.00				0.27	0.00	0.27
Sat Flow, veh/h	0	3668	1599	404	2260	0				3476	0	1599
Grp Volume(v), veh/h	0	700	84	283	386	0				763	0	67
Grp Sat Flow(s),veh/h/ln	0	1787	1599	952	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	6.4	1.5	4.1	0.0	0.0				12.3	0.0	1.9
Cycle Q Clear(g_c), s	0.0	6.4	1.5	10.5	0.0	0.0				12.3	0.0	1.9
Prop In Lane	0.00		1.00	0.48		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2010	899	625	915	0				942	0	433
V/C Ratio(X)	0.00	0.35	0.09	0.45	0.42	0.00				0.81	0.00	0.15
Avail Cap(c_a), veh/h	0	2010	899	625	915	0				1217	0	560
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.98	0.98	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.1	6.1	0.5	0.0	0.0				20.4	0.0	16.6
Incr Delay (d2), s/veh	0.0	0.5	0.2	2.3	1.4	0.0				3.3	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	0.7	1.2	0.4	0.0				6.3	0.0	0.9
LnGrp Delay(d),s/veh	0.0	7.6	6.3	2.8	1.4	0.0				23.7	0.0	16.8
LnGrp LOS		A	A	A	A					C		B
Approach Vol, veh/h		784			669						830	
Approach Delay, s/veh		7.5			2.0						23.1	
Approach LOS		A			A						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		38.7		21.3		38.7						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		29.0		21.0		29.0						
Max Q Clear Time (g_c+l1), s		12.5		14.3		8.4						
Green Ext Time (p_c), s		8.4		1.9		9.5						
Intersection Summary												
HCM 2010 Ctrl Delay			11.6									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1295	95	0	575	300	60	0	310	0	0	0
Future Volume (veh/h)	0	1295	95	0	575	300	60	0	310	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	1363	0	0	605	0	42	0	251			
Adj No. of Lanes	0	2	1	0	2	1	1	0	2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2387	1068	0	2387	1068	296	0	529			
Arrive On Green	0.00	1.00	0.00	0.00	0.67	0.00	0.17	0.00	0.17			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	1792	0	3198			
Grp Volume(v), veh/h	0	1363	0	0	605	0	42	0	251			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	4.1	0.0	1.2	0.0	4.3			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	4.1	0.0	1.2	0.0	4.3			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2387	1068	0	2387	1068	296	0	529			
V/C Ratio(X)	0.00	0.57	0.00	0.00	0.25	0.00	0.14	0.00	0.47			
Avail Cap(c_a), veh/h	0	2387	1068	0	2387	1068	508	0	906			
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.82	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	4.0	0.0	21.4	0.0	22.7			
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.3	0.0	0.2	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.0	2.0	0.0	0.6	0.0	1.9			
LnGrp Delay(d),s/veh	0.0	0.3	0.0	0.0	4.2	0.0	21.6	0.0	23.3			
LnGrp LOS		A			A		C		C			
Approach Vol, veh/h	1363			605			293					
Approach Delay, s/veh	0.3			4.2			23.1					
Approach LOS	A			A			C					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6							
Phs Duration (G+Y+Rc), s	45.1		14.9		45.1							
Change Period (Y+Rc), s	5.0		5.0		5.0							
Max Green Setting (Gmax), s	33.0		17.0		33.0							
Max Q Clear Time (g_c+I1), s	6.1		6.3		2.0							
Green Ext Time (p_c), s	15.8		0.8		17.2							
Intersection Summary												
HCM 2010 Ctrl Delay			4.3									
HCM 2010 LOS			A									
Notes												

Intersection

Intersection Delay, s/veh 13.2

Intersection LOS B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	0	0	715	0
Future Vol, veh/h	5	0	0	0	715	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	5	0	0	0	753	0
Number of Lanes	1	0	0	0	1	1

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	2	0
HCM Control Delay	8.7	13.2
HCM LOS	A	B

Lane	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	100%	100%
Vol Thru, %	0%	0%	0%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	358	358
LT Vol	5	358	358
Through Vol	0	0	0
RT Vol	0	0	0
Lane Flow Rate	5	376	376
Geometry Grp	2	7	7
Degree of Util (X)	0.008	0.525	0.525
Departure Headway (Hd)	5.622	5.027	5.027
Convergence, Y/N	Yes	Yes	Yes
Cap	640	723	723
Service Time	3.622	2.733	2.733
HCM Lane V/C Ratio	0.008	0.52	0.52
HCM Control Delay	8.7	13.2	13.2
HCM Lane LOS	A	B	B
HCM 95th-tile Q	0	3.1	3.1

Intersection

Int Delay, s/veh 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	715	0	0	5	360	0	0	5	0	0	0
Future Vol, veh/h	0	715	0	0	5	360	0	0	5	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	753	0	0	5	379	0	0	5	0	0	0

Major/Minor	Major1	Minor2	Minor1
Conflicting Flow All	0	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	-	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0		
HCM LOS		-	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBTWBLn1WBLn2
Capacity (veh/h)	-	-	340
HCM Lane V/C Ratio	-	-	0.015
HCM Control Delay (s)	-	0	15.8
HCM Lane LOS	-	A	C
HCM 95th %tile Q(veh)	-	-	0



Appendix – SR 241/LPP Ramp Intersection LOS
2050 Alternative 14 Conditions

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HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 4 AM - Idea 14

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	855	425	130	1495	0	0	0	0	20	0	35
Future Volume (veh/h)	0	855	425	130	1495	0	0	0	0	20	0	35
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	900	379	137	1574	0				30	0	16
Adj No. of Lanes	0	3	1	1	3	0				2	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	3551	1106	190	4352	0				188	0	84
Arrive On Green	0.00	0.69	0.69	0.21	1.00	0.00				0.05	0.00	0.05
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599
Grp Volume(v), veh/h	0	900	379	137	1574	0				30	0	16
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	5.2	7.7	5.7	0.0	0.0				0.6	0.0	0.8
Cycle Q Clear(g_c), s	0.0	5.2	7.7	5.7	0.0	0.0				0.6	0.0	0.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	3551	1106	190	4352	0				188	0	84
V/C Ratio(X)	0.00	0.25	0.34	0.72	0.36	0.00				0.16	0.00	0.19
Avail Cap(c_a), veh/h	0	3551	1106	358	4352	0				806	0	360
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.50	0.50	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	4.6	5.0	30.4	0.0	0.0				36.2	0.0	36.3
Incr Delay (d2), s/veh	0.0	0.2	0.8	2.6	0.1	0.0				0.4	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	3.6	2.9	0.0	0.0				0.3	0.0	0.4
LnGrp Delay(d),s/veh	0.0	4.8	5.8	33.0	0.1	0.0				36.6	0.0	37.4
LnGrp LOS		A	A	C	A					D		D
Approach Vol, veh/h		1279			1711						46	
Approach Delay, s/veh		5.1			2.7						36.9	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		71.8			12.5	59.3		8.2				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		53.0			15.0	33.0		17.0				
Max Q Clear Time (g_c+I1), s		2.0			7.7	9.7		2.8				
Green Ext Time (p_c), s		31.2			0.2	18.1		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			4.3									
HCM 2010 LOS			A									
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

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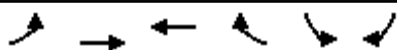
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑			↑↑↑	↰	↰	↰	↰			
Traffic Volume (veh/h)	600	275	0	0	1005	210	620	0	75	0	0	0
Future Volume (veh/h)	600	275	0	0	1005	210	620	0	75	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	632	289	0	0	1058	155	670	0	37			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	680	3485	0	0	1279	398	793	0	354			
Arrive On Green	0.63	1.00	0.00	0.00	0.25	0.25	0.22	0.00	0.22			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	632	289	0	0	1058	155	670	0	37			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	25.1	0.0	0.0	0.0	15.6	6.4	14.3	0.0	1.5			
Cycle Q Clear(g_c), s	25.1	0.0	0.0	0.0	15.6	6.4	14.3	0.0	1.5			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	680	3485	0	0	1279	398	793	0	354			
V/C Ratio(X)	0.93	0.08	0.00	0.00	0.83	0.39	0.84	0.00	0.10			
Avail Cap(c_a), veh/h	680	3485	0	0	1316	410	829	0	370			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.97	0.97	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	13.7	0.0	0.0	0.0	28.4	25.0	29.8	0.0	24.8			
Incr Delay (d2), s/veh	18.8	0.0	0.0	0.0	6.2	2.9	7.8	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	15.5	0.0	0.0	0.0	8.1	3.2	7.9	0.0	0.7			
LnGrp Delay(d),s/veh	32.5	0.0	0.0	0.0	34.7	27.8	37.6	0.0	25.0			
LnGrp LOS	C	A			C	C	D		C			
Approach Vol, veh/h		921			1213			707				
Approach Delay, s/veh		22.3			33.8			36.9				
Approach LOS		C			C			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	34.4	23.9		21.7		58.3						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	28.0	19.5		17.5		52.5						
Max Q Clear Time (g_c+Y), s	27.1	17.6		16.3		2.0						
Green Ext Time (p_c), s	0.4	1.3		0.4		4.0						
Intersection Summary												
HCM 2010 Ctrl Delay				30.9								
HCM 2010 LOS				C								
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 4 AM - Idea 14

03/09/2018



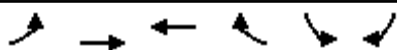
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	625	715	0	215	290		
Future Volume (veh/h)	0	625	715	0	215	290		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	658	753	0	226	213		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	2596	2596	0	311	278		
Arrive On Green	0.00	0.73	0.24	0.00	0.17	0.17		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	658	753	0	226	213		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	4.9	13.8	0.0	9.5	10.2		
Cycle Q Clear(g_c), s	0.0	4.9	13.8	0.0	9.5	10.2		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	2596	2596	0	311	278		
V/C Ratio(X)	0.00	0.25	0.29	0.00	0.73	0.77		
Avail Cap(c_a), veh/h	0	2596	2596	0	426	380		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.78	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	3.7	13.6	0.0	31.3	31.5		
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.0	3.9	6.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	2.4	6.9	0.0	5.0	5.0		
LnGrp Delay(d),s/veh	0.0	3.7	13.8	0.0	35.2	37.8		
LnGrp LOS		A	B		D	D		
Approach Vol, veh/h		658	753		439			
Approach Delay, s/veh		3.7	13.8		36.4			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		62.1				62.1		17.9
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		25.0				22.0		18.0
Max Q Clear Time (g_c+I1), s		15.8				6.9		12.2
Green Ext Time (p_c), s		5.5				7.7		0.7
Intersection Summary								
HCM 2010 Ctrl Delay		15.6						
HCM 2010 LOS		B						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

Alt 4 AM - Idea 14

03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	270	570	715	815	0	0		
Future Volume (veh/h)	270	570	715	815	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	284	600	753	716				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	346	1787	1330	1131				
Arrive On Green	0.19	0.95	0.71	0.71				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	284	600	753	716				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	12.2	1.9	15.6	19.0				
Cycle Q Clear(g_c), s	12.2	1.9	15.6	19.0				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	346	1787	1330	1131				
V/C Ratio(X)	0.82	0.34	0.57	0.63				
Avail Cap(c_a), veh/h	426	1787	1330	1131				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	0.66	0.66	1.00	1.00				
Uniform Delay (d), s/veh	31.0	0.1	5.7	6.2				
Incr Delay (d2), s/veh	6.9	0.3	1.8	2.7				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	6.7	1.0	8.6	9.0				
LnGrp Delay(d),s/veh	37.9	0.5	7.5	8.9				
LnGrp LOS	D	A	A	A				
Approach Vol, veh/h		884	1469					
Approach Delay, s/veh		12.5	8.2					
Approach LOS		B	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	19.4	60.6				80.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	18.0	52.0				75.0		
Max Q Clear Time (g_c+1.2), s	14.2	21.0				3.9		
Green Ext Time (p_c), s	0.3	15.0				19.3		
Intersection Summary								
HCM 2010 Ctrl Delay			9.8					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

5: I Street & 241 SB Off Ramp

Alt 4 AM - Idea 14

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	365	40	225	700	0	0	0	0	305	0	125
Future Volume (veh/h)	0	365	40	225	700	0	0	0	0	305	0	125
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	384	29	237	737	0				321	0	92
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2669	1194	558	1654	0				446	0	205
Arrive On Green	0.00	0.75	0.75	1.00	1.00	0.00				0.13	0.00	0.13
Sat Flow, veh/h	0	3668	1599	654	2300	0				3476	0	1599
Grp Volume(v), veh/h	0	384	29	436	538	0				321	0	92
Grp Sat Flow(s),veh/h/ln	0	1787	1599	1242	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	2.4	0.4	1.0	0.0	0.0				7.1	0.0	4.3
Cycle Q Clear(g_c), s	0.0	2.4	0.4	3.4	0.0	0.0				7.1	0.0	4.3
Prop In Lane	0.00		1.00	0.54		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2669	1194	997	1215	0				446	0	205
V/C Ratio(X)	0.00	0.14	0.02	0.44	0.44	0.00				0.72	0.00	0.45
Avail Cap(c_a), veh/h	0	2669	1194	997	1215	0				825	0	380
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.85	0.85	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	2.9	2.6	0.0	0.0	0.0				33.5	0.0	32.3
Incr Delay (d2), s/veh	0.0	0.1	0.0	1.2	1.0	0.0				2.2	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.2	0.2	0.3	0.3	0.0				3.5	0.0	2.0
LnGrp Delay(d),s/veh	0.0	3.0	2.6	1.2	1.0	0.0				35.7	0.0	33.8
LnGrp LOS		A	A	A	A					D		C
Approach Vol, veh/h		413			974						413	
Approach Delay, s/veh		3.0			1.1						35.3	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		64.7		15.3		64.7						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		51.0		19.0		51.0						
Max Q Clear Time (g_c+I1), s		5.4		9.1		4.4						
Green Ext Time (p_c), s		11.6		1.2		11.7						
Intersection Summary												
HCM 2010 Ctrl Delay			9.4									
HCM 2010 LOS			A									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 4 AM - Idea 14
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑	↑			
Traffic Volume (veh/h)	0	550	120	0	785	940	140	0	215	0	0	0
Future Volume (veh/h)	0	550	120	0	785	940	140	0	215	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	579	0	0	826	0	198	0	103			
Adj No. of Lanes	0	2	1	0	2	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2681	1200	0	2681	1200	447	0	200			
Arrive On Green	0.00	0.25	0.00	0.00	0.75	0.00	0.12	0.00	0.12			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	3583	0	1599			
Grp Volume(v), veh/h	0	579	0	0	826	0	198	0	103			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	10.3	0.0	0.0	6.0	0.0	4.1	0.0	4.8			
Cycle Q Clear(g_c), s	0.0	10.3	0.0	0.0	6.0	0.0	4.1	0.0	4.8			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2681	1200	0	2681	1200	447	0	200			
V/C Ratio(X)	0.00	0.22	0.00	0.00	0.31	0.00	0.44	0.00	0.52			
Avail Cap(c_a), veh/h	0	2681	1200	0	2681	1200	761	0	340			
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.95	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	11.4	0.0	0.0	3.2	0.0	32.4	0.0	32.7			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	2.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	5.1	0.0	0.0	3.0	0.0	2.1	0.0	2.2			
LnGrp Delay(d),s/veh	0.0	11.4	0.0	0.0	3.5	0.0	33.1	0.0	34.8			
LnGrp LOS		B			A		C		C			
Approach Vol, veh/h		579			826			301				
Approach Delay, s/veh		11.4			3.5			33.7				
Approach LOS		B			A			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		65.0		15.0		65.0						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		31.0		17.0		17.0						
Max Q Clear Time (g_c+1), s		8.0		6.8		12.3						
Green Ext Time (p_c), s		9.6		0.7		3.2						
Intersection Summary												
HCM 2010 Ctrl Delay				11.5								
HCM 2010 LOS				B								
Notes												

Intersection

Intersection Delay, s/veh 8.8

Intersection LOS A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	0	0	245	0
Future Vol, veh/h	0	15	0	0	245	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	0	16	0	0	258	0
Number of Lanes	1	0	0	0	1	0

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	7	8.9
HCM LOS	A	A

Lane	WBLn1	SBLn1
Vol Left, %	0%	100%
Vol Thru, %	0%	0%
Vol Right, %	100%	0%
Sign Control	Stop	Stop
Traffic Vol by Lane	15	245
LT Vol	0	245
Through Vol	0	0
RT Vol	15	0
Lane Flow Rate	16	258
Geometry Grp	1	1
Degree of Util (X)	0.017	0.297
Departure Headway (Hd)	3.898	4.145
Convergence, Y/N	Yes	Yes
Cap	924	872
Service Time	1.898	2.15
HCM Lane V/C Ratio	0.017	0.296
HCM Control Delay	7	8.9
HCM Lane LOS	A	A
HCM 95th-tile Q	0.1	1.2

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↗		↔				
Traffic Vol, veh/h	0	245	0	0	15	880	0	0	15	0	0	0
Future Vol, veh/h	0	245	0	0	15	880	0	0	15	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	258	0	0	16	926	0	0	16	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	16	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	1608	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1608	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	783	1608	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-	-
HCM Control Delay (s)	9.7	0	-	-	-
HCM Lane LOS	A	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	10	0	0	295	0
Future Vol, veh/h	0	10	0	0	295	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	0	11	0	0	311	0
Number of Lanes	1	0	0	0	0	1

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	7.1	9.4
HCM LOS	A	A

Lane	WBLn1	SBLn1
Vol Left, %	0%	100%
Vol Thru, %	0%	0%
Vol Right, %	100%	0%
Sign Control	Stop	Stop
Traffic Vol by Lane	10	295
LT Vol	0	295
Through Vol	0	0
RT Vol	10	0
Lane Flow Rate	11	311
Geometry Grp	1	1
Degree of Util (X)	0.012	0.357
Departure Headway (Hd)	4.015	4.135
Convergence, Y/N	Yes	Yes
Cap	897	873
Service Time	2.015	2.141
HCM Lane V/C Ratio	0.012	0.356
HCM Control Delay	7.1	9.4
HCM Lane LOS	A	A
HCM 95th-tile Q	0	1.6

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	295	0	0	10	505	0	0	10	0	0	0
Future Vol, veh/h	0	295	0	0	10	505	0	0	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	311	0	0	11	532	0	0	11	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	542	0	- - - 0 587 853 311
Stage 1	-	-	- - - 311 311 -
Stage 2	-	-	- - - 276 542 -
Critical Hdwy	4.11	-	- - - 6.41 6.51 6.21
Critical Hdwy Stg 1	-	-	- - - 5.41 5.51 -
Critical Hdwy Stg 2	-	-	- - - 5.41 5.51 -
Follow-up Hdwy	2.209	-	- - - 3.509 4.009 3.309
Pot Cap-1 Maneuver	1032	-	0 0 - - 474 297 731
Stage 1	-	-	0 0 - - 745 660 -
Stage 2	-	-	0 0 - - 773 522 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	1032	-	- - - 474 0 731
Mov Cap-2 Maneuver	-	-	- - - 474 0 -
Stage 1	-	-	- - - 745 0 -
Stage 2	-	-	- - - 773 0 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	731	1032	-	-	-
HCM Lane V/C Ratio	0.014	-	-	-	-
HCM Control Delay (s)	10	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-

HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 4 PM - IDea 14

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑	↑	↑
Traffic Volume (veh/h)	0	740	510	70	820	0	0	0	0	155	0	405
Future Volume (veh/h)	0	740	510	70	820	0	0	0	0	155	0	405
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	779	500	74	863	0				109	0	356
Adj No. of Lanes	0	3	1	1	3	0				1	0	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	3334	1038	116	3894	0				274	0	489
Arrive On Green	0.00	0.65	0.65	0.04	0.51	0.00				0.15	0.00	0.15
Sat Flow, veh/h	0	5305	1599	1792	5305	0				1792	0	3198
Grp Volume(v), veh/h	0	779	500	74	863	0				109	0	356
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	5.6	14.4	3.7	8.4	0.0				4.9	0.0	9.6
Cycle Q Clear(g_c), s	0.0	5.6	14.4	3.7	8.4	0.0				4.9	0.0	9.6
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	3334	1038	116	3894	0				274	0	489
V/C Ratio(X)	0.00	0.23	0.48	0.64	0.22	0.00				0.40	0.00	0.73
Avail Cap(c_a), veh/h	0	3334	1038	219	3894	0				438	0	782
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	6.5	8.1	42.0	7.4	0.0				34.4	0.0	36.3
Incr Delay (d2), s/veh	0.0	0.2	1.6	5.6	0.1	0.0				0.9	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.7	6.7	2.0	4.0	0.0				2.5	0.0	4.3
LnGrp Delay(d),s/veh	0.0	6.7	9.7	47.6	7.5	0.0				35.3	0.0	38.4
LnGrp LOS		A	A	D	A					D		D
Approach Vol, veh/h		1279			937						465	
Approach Delay, s/veh		7.8			10.7						37.7	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		72.2			9.8	62.4		17.8				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		59.0			10.0	44.0		21.0				
Max Q Clear Time (g_c+I1), s		10.4			5.7	16.4		11.6				
Green Ext Time (p_c), s		18.3			0.0	14.5		1.2				
Intersection Summary												
HCM 2010 Ctrl Delay				14.0								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

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03/09/2018

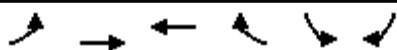
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↷	↷		↷	↷	↰	↷	↷			
Traffic Volume (veh/h)	25	870	0	0	485	20	405	0	105	0	0	0
Future Volume (veh/h)	25	870	0	0	485	20	405	0	105	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	26	916	0	0	511	15	450	0	52			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	953	3801	0	0	841	262	613	0	273			
Arrive On Green	0.36	0.50	0.00	0.00	0.16	0.16	0.17	0.00	0.17			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	26	916	0	0	511	15	450	0	52			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	0.8	9.2	0.0	0.0	8.3	0.7	10.7	0.0	2.5			
Cycle Q Clear(g_c), s	0.8	9.2	0.0	0.0	8.3	0.7	10.7	0.0	2.5			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	953	3801	0	0	841	262	613	0	273			
V/C Ratio(X)	0.03	0.24	0.00	0.00	0.61	0.06	0.73	0.00	0.19			
Avail Cap(c_a), veh/h	953	3801	0	0	1769	551	1393	0	622			
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.96	0.96	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	13.8	8.2	0.0	0.0	34.9	31.8	35.4	0.0	32.0			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	3.2	0.4	1.7	0.0	0.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	4.3	0.0	0.0	4.2	0.3	5.5	0.0	1.1			
LnGrp Delay(d),s/veh	13.8	8.2	0.0	0.0	38.2	32.2	37.1	0.0	32.3			
LnGrp LOS	B	A			D	C	D		C			
Approach Vol, veh/h		942			526			502				
Approach Delay, s/veh		8.4			38.0			36.6				
Approach LOS		A			D			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	51.9	18.7		19.4		70.6						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	11.0	30.0		34.0		46.0						
Max Q Clear Time (g_c+12.8), s	12.8	10.3		12.7		11.2						
Green Ext Time (p_c), s	3.4	3.4		1.7		6.3						
Intersection Summary												
HCM 2010 Ctrl Delay			23.5									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

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03/09/2018



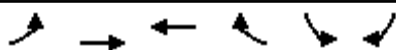
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	965	560	0	570	200		
Future Volume (veh/h)	0	965	560	0	570	200		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	1016	589	0	600	148		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	1986	1986	0	637	569		
Arrive On Green	0.00	0.56	0.18	0.00	0.36	0.36		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	1016	589	0	600	148		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	15.9	12.8	0.0	29.2	5.9		
Cycle Q Clear(g_c), s	0.0	15.9	12.8	0.0	29.2	5.9		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	1986	1986	0	637	569		
V/C Ratio(X)	0.00	0.51	0.30	0.00	0.94	0.26		
Avail Cap(c_a), veh/h	0	1986	1986	0	637	569		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.90	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	12.4	21.6	0.0	28.1	20.6		
Incr Delay (d2), s/veh	0.0	0.2	0.3	0.0	22.4	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	7.8	6.4	0.0	18.3	2.6		
LnGrp Delay(d),s/veh	0.0	12.6	21.9	0.0	50.5	20.8		
LnGrp LOS		B	C		D	C		
Approach Vol, veh/h		1016	589		748			
Approach Delay, s/veh		12.6	21.9		44.6			
Approach LOS		B	C		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		54.0				54.0		36.0
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		18.0				26.0		31.0
Max Q Clear Time (g_c+I1), s		14.8				17.9		31.2
Green Ext Time (p_c), s		2.5				3.6		0.0
Intersection Summary								
HCM 2010 Ctrl Delay		25.1						
HCM 2010 LOS		C						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

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03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	215	1320	560	205	0	0		
Future Volume (veh/h)	215	1320	560	205	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	226	1389	589	151				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	283	1798	1417	1205				
Arrive On Green	0.16	0.96	0.75	0.75				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	226	1389	589	151				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	10.9	11.3	10.1	2.3				
Cycle Q Clear(g_c), s	10.9	11.3	10.1	2.3				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	283	1798	1417	1205				
V/C Ratio(X)	0.80	0.77	0.42	0.13				
Avail Cap(c_a), veh/h	398	1798	1417	1205				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	0.22	0.22	1.00	1.00				
Uniform Delay (d), s/veh	36.5	0.3	4.0	3.0				
Incr Delay (d2), s/veh	1.8	0.8	0.9	0.2				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	5.5	5.0	5.6	1.1				
LnGrp Delay(d),s/veh	38.3	1.1	4.9	3.2				
LnGrp LOS	D	A	A	A				
Approach Vol, veh/h		1615	740					
Approach Delay, s/veh		6.3	4.6					
Approach LOS		A	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	18.2	71.8				90.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	19.0	61.0				85.0		
Max Q Clear Time (g_c+1.2, s)	12.9	12.1				13.3		
Green Ext Time (p_c), s	0.3	30.6				37.7		
Intersection Summary								
HCM 2010 Ctrl Delay			5.8					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

5: I Street & 241 SB Off Ramp

Alt 4 PM - IDea 14

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	665	105	150	480	0	0	0	0	720	0	90
Future Volume (veh/h)	0	665	105	150	480	0	0	0	0	720	0	90
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	700	77	158	505	0				758	0	67
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2255	1009	369	1250	0				896	0	412
Arrive On Green	0.00	0.63	0.63	1.00	1.00	0.00				0.26	0.00	0.26
Sat Flow, veh/h	0	3668	1599	483	2066	0				3476	0	1599
Grp Volume(v), veh/h	0	700	77	260	403	0				758	0	67
Grp Sat Flow(s),veh/h/ln	0	1787	1599	837	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	8.1	1.7	5.4	0.0	0.0				18.6	0.0	2.9
Cycle Q Clear(g_c), s	0.0	8.1	1.7	13.5	0.0	0.0				18.6	0.0	2.9
Prop In Lane	0.00		1.00	0.61		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2255	1009	593	1026	0				896	0	412
V/C Ratio(X)	0.00	0.31	0.08	0.44	0.39	0.00				0.85	0.00	0.16
Avail Cap(c_a), veh/h	0	2255	1009	593	1026	0				1236	0	569
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.78	0.78	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.6	6.4	0.7	0.0	0.0				31.7	0.0	25.9
Incr Delay (d2), s/veh	0.0	0.4	0.1	1.8	0.9	0.0				4.1	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.1	0.8	1.4	0.3	0.0				9.5	0.0	1.3
LnGrp Delay(d),s/veh	0.0	8.0	6.6	2.6	0.9	0.0				35.8	0.0	26.0
LnGrp LOS		A	A	A	A					D		C
Approach Vol, veh/h		777			663						825	
Approach Delay, s/veh		7.8			1.5						35.0	
Approach LOS		A			A						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		61.8		28.2		61.8						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		48.0		32.0		48.0						
Max Q Clear Time (g_c+I1), s		15.5		20.6		10.1						
Green Ext Time (p_c), s		11.5		2.6		12.0						
Intersection Summary												
HCM 2010 Ctrl Delay			15.9									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 4 PM - IDea 14
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗	↗	↕	↗			
Traffic Volume (veh/h)	0	1290	95	0	595	290	35	0	270	0	0	0
Future Volume (veh/h)	0	1290	95	0	595	290	35	0	270	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	1358	0	0	626	0	25	0	229			
Adj No. of Lanes	0	2	1	0	2	1	1	0	2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2781	1244	0	2781	1244	199	0	355			
Arrive On Green	0.00	1.00	0.00	0.00	0.78	0.00	0.11	0.00	0.11			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	1792	0	3198			
Grp Volume(v), veh/h	0	1358	0	0	626	0	25	0	229			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	0.0	0.0	0.0	4.2	0.0	1.1	0.0	6.2			
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	4.2	0.0	1.1	0.0	6.2			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2781	1244	0	2781	1244	199	0	355			
V/C Ratio(X)	0.00	0.49	0.00	0.00	0.23	0.00	0.13	0.00	0.65			
Avail Cap(c_a), veh/h	0	2781	1244	0	2781	1244	338	0	604			
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.82	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	2.7	0.0	36.1	0.0	38.3			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.2	0.0	0.3	0.0	2.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	2.2	0.0	0.6	0.0	2.8			
LnGrp Delay(d),s/veh	0.0	0.1	0.0	0.0	2.9	0.0	36.4	0.0	40.3			
LnGrp LOS		A			A		D		D			
Approach Vol, veh/h	1358			626			254					
Approach Delay, s/veh	0.1			2.9			39.9					
Approach LOS	A			A			D					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6							
Phs Duration (G+Y+Rc), s	75.0		15.0		75.0							
Change Period (Y+Rc), s	5.0		5.0		5.0							
Max Green Setting (Gmax), s	20.0		17.0		38.0							
Max Q Clear Time (g_c+I1), s	6.2		8.2		2.0							
Green Ext Time (p_c), s	10.0		0.6		18.5							
Intersection Summary												
HCM 2010 Ctrl Delay			5.4									
HCM 2010 LOS			A									
Notes												

Intersection

Intersection Delay, s/veh 27.7

Intersection LOS D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	0	0	720	0
Future Vol, veh/h	0	15	0	0	720	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	0	16	0	0	758	0
Number of Lanes	1	0	0	0	1	0

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	8.1	28.1
HCM LOS	A	D

Lane	WBLn1	SBLn1
Vol Left, %	0%	100%
Vol Thru, %	0%	0%
Vol Right, %	100%	0%
Sign Control	Stop	Stop
Traffic Vol by Lane	15	720
LT Vol	0	720
Through Vol	0	0
RT Vol	15	0
Lane Flow Rate	16	758
Geometry Grp	1	1
Degree of Util (X)	0.022	0.873
Departure Headway (Hd)	5.024	4.145
Convergence, Y/N	Yes	Yes
Cap	717	879
Service Time	3.024	2.16
HCM Lane V/C Ratio	0.022	0.862
HCM Control Delay	8.1	28.1
HCM Lane LOS	A	D
HCM 95th-tile Q	0.1	11.3

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑	↗		↔				
Traffic Vol, veh/h	0	720	0	0	15	190	0	0	20	0	0	0
Future Vol, veh/h	0	720	0	0	15	190	0	0	20	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	758	0	0	16	200	0	0	21	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	16	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	1608	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1608	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	409	1608	-	-	-
HCM Lane V/C Ratio	0.051	-	-	-	-
HCM Control Delay (s)	14.3	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

Intersection

Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	0	0	330	0
Future Vol, veh/h	0	15	0	0	330	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	0	16	0	0	347	0
Number of Lanes	1	0	0	0	0	1

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	7.2	9.9
HCM LOS	A	A

Lane	WBLn1	SBLn1
Vol Left, %	0%	100%
Vol Thru, %	0%	0%
Vol Right, %	100%	0%
Sign Control	Stop	Stop
Traffic Vol by Lane	15	330
LT Vol	0	330
Through Vol	0	0
RT Vol	15	0
Lane Flow Rate	16	347
Geometry Grp	1	1
Degree of Util (X)	0.018	0.4
Departure Headway (Hd)	4.099	4.145
Convergence, Y/N	Yes	Yes
Cap	879	872
Service Time	2.099	2.152
HCM Lane V/C Ratio	0.018	0.398
HCM Control Delay	7.2	9.9
HCM Lane LOS	A	A
HCM 95th-tile Q	0.1	1.9

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Traffic Vol, veh/h	0	330	0	0	15	200	0	0	10	0	0	0
Future Vol, veh/h	0	330	0	0	15	200	0	0	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	347	0	0	16	211	0	0	11	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	226	0	- - - 0 468 573 347
Stage 1	-	-	- - - 347 347 -
Stage 2	-	-	- - - 121 226 -
Critical Hdwy	4.11	-	- - - 6.41 6.51 6.21
Critical Hdwy Stg 1	-	-	- - - 5.41 5.51 -
Critical Hdwy Stg 2	-	-	- - - 5.41 5.51 -
Follow-up Hdwy	2.209	-	- - - 3.509 4.009 3.309
Pot Cap-1 Maneuver	1348	-	0 0 - - 555 431 698
Stage 1	-	-	0 0 - - 718 637 -
Stage 2	-	-	0 0 - - 907 719 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	1348	-	- - - 555 0 698
Mov Cap-2 Maneuver	-	-	- - - 555 0 -
Stage 1	-	-	- - - 718 0 -
Stage 2	-	-	- - - 907 0 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	698	1348	-	-	-
HCM Lane V/C Ratio	0.015	-	-	-	-
HCM Control Delay (s)	10.2	0	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-



Appendix – SR 241/LPP Ramp Intersection LOS
2050 Alternative 18 Conditions

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HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 8 AM - Idea 18

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↑	↓	↑↑↑↑					↓	↕	↑
Traffic Volume (veh/h)	0	535	290	375	1035	0	0	0	0	20	0	35
Future Volume (veh/h)	0	535	290	375	1035	0	0	0	0	20	0	35
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	563	213	395	1089	0				30	0	16
Adj No. of Lanes	0	3	1	1	3	0				2	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2940	915	439	4427	0				176	0	78
Arrive On Green	0.00	0.57	0.57	0.49	1.00	0.00				0.05	0.00	0.05
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599
Grp Volume(v), veh/h	0	563	213	395	1089	0				30	0	16
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	4.7	5.9	18.1	0.0	0.0				0.7	0.0	0.9
Cycle Q Clear(g_c), s	0.0	4.7	5.9	18.1	0.0	0.0				0.7	0.0	0.9
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2940	915	439	4427	0				176	0	78
V/C Ratio(X)	0.00	0.19	0.23	0.90	0.25	0.00				0.17	0.00	0.20
Avail Cap(c_a), veh/h	0	2940	915	697	4427	0				717	0	320
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.85	0.85	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	9.2	9.5	21.9	0.0	0.0				41.0	0.0	41.1
Incr Delay (d2), s/veh	0.0	0.1	0.6	8.5	0.1	0.0				0.5	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	2.8	9.8	0.0	0.0				0.4	0.0	0.4
LnGrp Delay(d),s/veh	0.0	9.4	10.1	30.4	0.1	0.0				41.5	0.0	42.4
LnGrp LOS		A	B	C	A					D		D
Approach Vol, veh/h		776			1484						46	
Approach Delay, s/veh		9.6			8.2						41.8	
Approach LOS		A			A						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		81.6			26.1	55.5		8.4				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		63.0			34.0	24.0		17.0				
Max Q Clear Time (g_c+I1), s		2.0			20.1	7.9		2.9				
Green Ext Time (p_c), s		16.6			1.0	9.6		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			9.3									
HCM 2010 LOS			A									
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

Alt 8 AM - Idea 18

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↷	↰		↷	↰	↰	↷	↰			
Traffic Volume (veh/h)	300	255	0	0	1005	175	405	0	135	0	0	0
Future Volume (veh/h)	300	255	0	0	1005	175	405	0	135	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	316	268	0	0	1058	128	457	0	66			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	755	3814	0	0	1421	443	603	0	269			
Arrive On Green	0.70	1.00	0.00	0.00	0.28	0.28	0.17	0.00	0.17			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	316	268	0	0	1058	128	457	0	66			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	6.7	0.0	0.0	0.0	16.9	5.7	10.9	0.0	3.2			
Cycle Q Clear(g_c), s	6.7	0.0	0.0	0.0	16.9	5.7	10.9	0.0	3.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	755	3814	0	0	1421	443	603	0	269			
V/C Ratio(X)	0.42	0.07	0.00	0.00	0.74	0.29	0.76	0.00	0.25			
Avail Cap(c_a), veh/h	755	3814	0	0	1655	515	876	0	391			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.99	0.99	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	8.7	0.0	0.0	0.0	29.6	25.6	35.7	0.0	32.5			
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.0	3.6	1.6	2.3	0.0	0.5			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	8.3	0.0	0.0	0.0	8.4	2.7	5.6	0.0	1.5			
LnGrp Delay(d),s/veh	9.1	0.0	0.0	0.0	33.2	27.2	37.9	0.0	32.9			
LnGrp LOS	A	A			C	C	D		C			
Approach Vol, veh/h		584			1186			523				
Approach Delay, s/veh		4.9			32.6			37.3				
Approach LOS		A			C			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	41.9	28.9		19.2		70.8						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	26.0	28.0		21.0		59.0						
Max Q Clear Time (g_c+1.7), s	19.7	18.9		12.9		2.0						
Green Ext Time (p_c), s	2.2	5.0		1.2		2.5						
Intersection Summary												
HCM 2010 Ctrl Delay			26.6									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary
3: 241 SB On Ramp/241 SB Off Ramp & Crown Palley Pkwy

Alt 8 AM - Idea 18

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↗		↑↑						↕	
Traffic Volume (veh/h)	0	290	430	0	1200	0	0	0	0	0	0	245
Future Volume (veh/h)	0	290	430	0	1200	0	0	0	0	0	0	245
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1900	1881	1900
Adj Flow Rate, veh/h	0	305	317	0	1263	0				0	0	180
Adj No. of Lanes	0	1	1	0	2	0				0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				0	1	0
Cap, veh/h	0	882	750	0	1677	0				0	0	671
Arrive On Green	0.00	0.47	0.47	0.00	0.47	0.00				0.00	0.00	0.42
Sat Flow, veh/h	0	1881	1599	0	3762	0				0	0	1599
Grp Volume(v), veh/h	0	305	317	0	1263	0				0	0	180
Grp Sat Flow(s),veh/h/ln	0	1881	1599	0	1787	0				0	0	1599
Q Serve(g_s), s	0.0	9.2	11.8	0.0	26.1	0.0				0.0	0.0	6.6
Cycle Q Clear(g_c), s	0.0	9.2	11.8	0.0	26.1	0.0				0.0	0.0	6.6
Prop In Lane	0.00		1.00	0.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	882	750	0	1677	0				0	0	671
V/C Ratio(X)	0.00	0.35	0.42	0.00	0.75	0.00				0.00	0.00	0.27
Avail Cap(c_a), veh/h	0	1087	924	0	2065	0				0	0	671
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00				0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	15.1	15.8	0.0	19.6	0.0				0.0	0.0	17.1
Incr Delay (d2), s/veh	0.0	0.2	0.4	0.0	1.3	0.0				0.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.8	5.3	0.0	13.1	0.0				0.0	0.0	3.1
LnGrp Delay(d),s/veh	0.0	15.4	16.2	0.0	20.9	0.0				0.0	0.0	18.1
LnGrp LOS		B	B		C							B
Approach Vol, veh/h		622			1263						180	
Approach Delay, s/veh		15.8			20.9						18.1	
Approach LOS		B			C						B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs				4		6		8				
Phs Duration (G+Y+Rc), s				47.2		42.8		47.2				
Change Period (Y+Rc), s				5.0		5.0		5.0				
Max Green Setting (Gmax), s				52.0		28.0		52.0				
Max Q Clear Time (g_c+I1), s				13.8		8.6		28.1				
Green Ext Time (p_c), s				18.1		1.0		14.1				
Intersection Summary												
HCM 2010 Ctrl Delay			19.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
 4: 241 NB Off Ramp/241 NB On Ramp & Crown Palley Pkwy

Alt 8 AM - Idea 18
 03/09/2018

Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	290	0	1200	0	0	0		
Future Volume (veh/h)	290	0	1200	0	0	0		
Number	5	12	7	4				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00					
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	0	1900	1881				
Adj Flow Rate, veh/h	305	0	1263	0				
Adj No. of Lanes	1	0	0	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	0	1	1				
Cap, veh/h	0	0	1254	0				
Arrive On Green	0.00	0.00	0.70	0.00				
Sat Flow, veh/h	0		1792	0				
Grp Volume(v), veh/h	0.0		1263	0				
Grp Sat Flow(s),veh/h/ln			1792	0				
Q Serve(g_s), s			63.0	0.0				
Cycle Q Clear(g_c), s			63.0	0.0				
Prop In Lane			1.00					
Lane Grp Cap(c), veh/h			1254	0				
V/C Ratio(X)			1.01	0.00				
Avail Cap(c_a), veh/h			1254	0				
HCM Platoon Ratio			1.00	1.00				
Upstream Filter(I)			1.00	0.00				
Uniform Delay (d), s/veh			13.5	0.0				
Incr Delay (d2), s/veh			27.1	0.0				
Initial Q Delay(d3),s/veh			0.0	0.0				
%ile BackOfQ(50%),veh/ln			39.8	0.0				
LnGrp Delay(d),s/veh			40.6	0.0				
LnGrp LOS			F					
Approach Vol, veh/h				1263				
Approach Delay, s/veh				40.6				
Approach LOS				D				
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4				
Phs Duration (G+Y+Rc), s				68.0				
Change Period (Y+Rc), s				5.0				
Max Green Setting (Gmax), s				63.0				
Max Q Clear Time (g_c+I1), s				65.0				
Green Ext Time (p_c), s				0.0				
Intersection Summary								
HCM 2010 Ctrl Delay			40.6					
HCM 2010 LOS			D					

HCM 2010 Signalized Intersection Summary 5: 241 SB On Ramp/241 SB Off Ramp & SR-73

Alt 8 AM - Idea 18
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↖						↕	↗
Traffic Volume (veh/h)	0	1270	55	0	120	0	0	0	0	0	0	505
Future Volume (veh/h)	0	1270	55	0	120	0	0	0	0	0	0	505
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1900	1881	1881
Adj Flow Rate, veh/h	0	1337	40	0	126	0				0	0	372
Adj No. of Lanes	0	2	1	0	1	0				0	1	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	1713	767	0	902	0				0	770	1310
Arrive On Green	0.00	0.48	0.48	0.00	0.48	0.00				0.00	0.00	0.41
Sat Flow, veh/h	0	3668	1599	0	1881	0				0	1881	3198
Grp Volume(v), veh/h	0	1337	40	0	126	0				0	0	372
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1881	0				0	1881	1599
Q Serve(g_s), s	0.0	28.0	1.2	0.0	3.4	0.0				0.0	0.0	7.0
Cycle Q Clear(g_c), s	0.0	28.0	1.2	0.0	3.4	0.0				0.0	0.0	7.0
Prop In Lane	0.00		1.00	0.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	1713	767	0	902	0				0	770	1310
V/C Ratio(X)	0.00	0.78	0.05	0.00	0.14	0.00				0.00	0.00	0.28
Avail Cap(c_a), veh/h	0	2264	1013	0	1191	0				0	770	1310
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00				0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	19.5	12.5	0.0	13.1	0.0				0.0	0.0	17.8
Incr Delay (d2), s/veh	0.0	1.3	0.0	0.0	0.1	0.0				0.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	14.1	0.5	0.0	1.8	0.0				0.0	0.0	3.2
LnGrp Delay(d),s/veh	0.0	20.8	12.5	0.0	13.1	0.0				0.0	0.0	18.3
LnGrp LOS		C	B		B							B
Approach Vol, veh/h		1377			126						372	
Approach Delay, s/veh		20.6			13.1						18.3	
Approach LOS		C			B						B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs				4		6		8				
Phs Duration (G+Y+Rc), s				48.1		41.9		48.1				
Change Period (Y+Rc), s				5.0		5.0		5.0				
Max Green Setting (Gmax), s				57.0		23.0		57.0				
Max Q Clear Time (g_c+I1), s				30.0		9.0		5.4				
Green Ext Time (p_c), s				13.1		1.3		16.8				
Intersection Summary												
HCM 2010 Ctrl Delay			19.6									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & SR-73

Alt 8 AM - Idea 18
03/09/2018



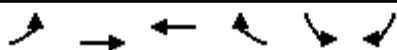
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 							
Traffic Volume (veh/h)	1270	0	120	0	0	0		
Future Volume (veh/h)	1270	0	120	0	0	0		
Number	7	14	5	2				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00					
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	0	1900	1881				
Adj Flow Rate, veh/h	1337	0	126	0				
Adj No. of Lanes	2	0	0	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	0	1	1				
Cap, veh/h	0	0	1692	0				
Arrive On Green	0.00	0.00	0.94	0.00				
Sat Flow, veh/h	0		1792	0				
Grp Volume(v), veh/h	0.0		126	0				
Grp Sat Flow(s),veh/h/ln			1792	0				
Q Serve(g_s), s			0.4	0.0				
Cycle Q Clear(g_c), s			0.4	0.0				
Prop In Lane			1.00					
Lane Grp Cap(c), veh/h			1692	0				
V/C Ratio(X)			0.07	0.00				
Avail Cap(c_a), veh/h			1692	0				
HCM Platoon Ratio			1.00	1.00				
Upstream Filter(I)			1.00	0.00				
Uniform Delay (d), s/veh			0.1	0.0				
Incr Delay (d2), s/veh			0.1	0.0				
Initial Q Delay(d3),s/veh			0.0	0.0				
%ile BackOfQ(50%),veh/ln			0.2	0.0				
LnGrp Delay(d),s/veh			0.2	0.0				
LnGrp LOS			A					
Approach Vol, veh/h				126				
Approach Delay, s/veh				0.2				
Approach LOS				A				
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2						
Phs Duration (G+Y+Rc), s		90.0						
Change Period (Y+Rc), s		5.0						
Max Green Setting (Gmax), s		22.0						
Max Q Clear Time (g_c+I1), s		2.4						
Green Ext Time (p_c), s		0.6						
Intersection Summary								
HCM 2010 Ctrl Delay			0.2					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

7: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 8 AM - Idea 18

03/09/2018



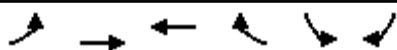
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	900	525	0	350	445		
Future Volume (veh/h)	0	900	525	0	350	445		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	947	553	0	368	327		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	2389	2389	0	435	388		
Arrive On Green	0.00	0.67	0.22	0.00	0.24	0.24		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	947	553	0	368	327		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	10.8	11.4	0.0	17.6	17.5		
Cycle Q Clear(g_c), s	0.0	10.8	11.4	0.0	17.6	17.5		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	2389	2389	0	435	388		
V/C Ratio(X)	0.00	0.40	0.23	0.00	0.85	0.84		
Avail Cap(c_a), veh/h	0	2389	2389	0	518	462		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.86	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	6.7	16.1	0.0	32.5	32.4		
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.0	10.8	11.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	5.3	5.7	0.0	10.0	9.0		
LnGrp Delay(d),s/veh	0.0	6.8	16.3	0.0	43.3	44.0		
LnGrp LOS		A	B		D	D		
Approach Vol, veh/h		947	553		695			
Approach Delay, s/veh		6.8	16.3		43.6			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		64.2				64.2		25.8
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		21.0				29.0		25.0
Max Q Clear Time (g_c+I1), s		13.4				12.8		19.6
Green Ext Time (p_c), s		5.0				8.5		1.2
Intersection Summary								
HCM 2010 Ctrl Delay			20.9					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary

8: Chiquita Canyon Rd & 241 NB On Ramp

Alt 8 AM - Idea 18

03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	625	625	525	1030	0	0		
Future Volume (veh/h)	625	625	525	1030	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	658	658	553	759				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	577	1798	1108	942				
Arrive On Green	0.32	0.96	0.59	0.59				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	658	658	553	759				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	29.0	2.2	15.4	33.4				
Cycle Q Clear(g_c), s	29.0	2.2	15.4	33.4				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	577	1798	1108	942				
V/C Ratio(X)	1.14	0.37	0.50	0.81				
Avail Cap(c_a), veh/h	577	1798	1108	942				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	0.47	0.47	1.00	1.00				
Uniform Delay (d), s/veh	30.5	0.1	10.8	14.5				
Incr Delay (d2), s/veh	73.1	0.3	1.6	7.3				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	26.0	1.0	8.3	16.5				
LnGrp Delay(d),s/veh	103.6	0.4	12.4	21.8				
LnGrp LOS	F	A	B	C				
Approach Vol, veh/h		1316	1312					
Approach Delay, s/veh		52.0	17.8					
Approach LOS		D	B					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	33.0	57.0				90.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	28.0	52.0				85.0		
Max Q Clear Time (g_c+Q), s	41.0	35.4				4.2		
Green Ext Time (p_c), s	0.0	9.8				17.0		
Intersection Summary								
HCM 2010 Ctrl Delay			35.0					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 8 PM - Idea 18

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑	↑	↑
Traffic Volume (veh/h)	0	555	485	180	590	0	0	0	0	140	0	210
Future Volume (veh/h)	0	555	485	180	590	0	0	0	0	140	0	210
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	584	416	189	621	0				196	0	102
Adj No. of Lanes	0	3	1	1	3	0				2	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2757	858	254	3828	0				435	0	194
Arrive On Green	0.00	0.54	0.54	0.28	1.00	0.00				0.12	0.00	0.12
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599
Grp Volume(v), veh/h	0	584	416	189	621	0				196	0	102
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	3.6	9.8	5.7	0.0	0.0				3.1	0.0	3.6
Cycle Q Clear(g_c), s	0.0	3.6	9.8	5.7	0.0	0.0				3.1	0.0	3.6
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2757	858	254	3828	0				435	0	194
V/C Ratio(X)	0.00	0.21	0.48	0.74	0.16	0.00				0.45	0.00	0.53
Avail Cap(c_a), veh/h	0	2757	858	328	3828	0				1075	0	480
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.99	0.99	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.3	8.7	20.5	0.0	0.0				24.5	0.0	24.7
Incr Delay (d2), s/veh	0.0	0.2	2.0	6.4	0.1	0.0				0.7	0.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.7	4.7	3.2	0.0	0.0				1.5	0.0	1.7
LnGrp Delay(d),s/veh	0.0	7.4	10.7	26.9	0.1	0.0				25.2	0.0	26.9
LnGrp LOS		A	B	C	A					C		C
Approach Vol, veh/h		1000			810						298	
Approach Delay, s/veh		8.8			6.3						25.8	
Approach LOS		A			A						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		48.7			12.5	36.2		11.3				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		33.0			10.0	18.0		17.0				
Max Q Clear Time (g_c+I1), s		2.0			7.7	11.8		5.6				
Green Ext Time (p_c), s		10.5			0.1	4.1		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay				10.3								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

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03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	675	0	0	530	20	240	0	325	0	0	0
Future Volume (veh/h)	20	675	0	0	530	20	240	0	325	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	21	711	0	0	558	15	327	0	159			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	746	3510	0	0	1029	320	657	0	293			
Arrive On Green	0.14	0.23	0.00	0.00	0.20	0.20	0.18	0.00	0.18			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	21	711	0	0	558	15	327	0	159			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	0.6	6.7	0.0	0.0	5.8	0.5	4.9	0.0	5.4			
Cycle Q Clear(g_c), s	0.6	6.7	0.0	0.0	5.8	0.5	4.9	0.0	5.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	746	3510	0	0	1029	320	657	0	293			
V/C Ratio(X)	0.03	0.20	0.00	0.00	0.54	0.05	0.50	0.00	0.54			
Avail Cap(c_a), veh/h	746	3510	0	0	1883	586	1194	0	533			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.97	0.97	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.4	10.0	0.0	0.0	21.5	19.4	22.0	0.0	22.2			
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	2.1	0.3	0.6	0.0	1.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.3	3.2	0.0	0.0	2.9	0.2	2.5	0.0	2.5			
LnGrp Delay(d),s/veh	15.4	10.0	0.0	0.0	23.6	19.6	22.6	0.0	23.8			
LnGrp LOS	B	A			C	B	C		C			
Approach Vol, veh/h		732			573			486				
Approach Delay, s/veh		10.1			23.5			23.0				
Approach LOS		B			C			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	29.0	16.0		15.0		45.0						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	5.0	21.0		19.0		31.0						
Max Q Clear Time (g_c+I), s	12.6	7.8		7.4		8.7						
Green Ext Time (p_c), s	1.0	3.2		1.3		4.3						
Intersection Summary												
HCM 2010 Ctrl Delay				17.9								
HCM 2010 LOS				B								
Notes												

HCM 2010 Signalized Intersection Summary

3: 241 SB On Ramp/241 SB Off Ramp & Crown Palley Pkwy

Alt 8 PM - Idea 18

03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	190	810	0	500	0	0	0	0	0	0	200
Future Volume (veh/h)	0	190	810	0	500	0	0	0	0	0	0	200
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1900	1881	1900
Adj Flow Rate, veh/h	0	200	597	0	526	0				0	0	148
Adj No. of Lanes	0	1	1	0	2	0				0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				0	1	0
Cap, veh/h	0	849	722	0	1614	0				0	0	611
Arrive On Green	0.00	0.45	0.45	0.00	0.45	0.00				0.00	0.00	0.38
Sat Flow, veh/h	0	1881	1599	0	3762	0				0	0	1599
Grp Volume(v), veh/h	0	200	597	0	526	0				0	0	148
Grp Sat Flow(s),veh/h/ln	0	1881	1599	0	1787	0				0	0	1599
Q Serve(g_s), s	0.0	3.9	19.6	0.0	5.7	0.0				0.0	0.0	3.8
Cycle Q Clear(g_c), s	0.0	3.9	19.6	0.0	5.7	0.0				0.0	0.0	3.8
Prop In Lane	0.00		1.00	0.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	849	722	0	1614	0				0	0	611
V/C Ratio(X)	0.00	0.24	0.83	0.00	0.33	0.00				0.00	0.00	0.24
Avail Cap(c_a), veh/h	0	1035	879	0	1966	0				0	0	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00				0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	10.1	14.4	0.0	10.6	0.0				0.0	0.0	12.6
Incr Delay (d2), s/veh	0.0	0.1	5.5	0.0	0.1	0.0				0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.0	9.7	0.0	2.8	0.0				0.0	0.0	1.8
LnGrp Delay(d),s/veh	0.0	10.2	19.9	0.0	10.7	0.0				0.0	0.0	13.6
LnGrp LOS		B	B		B							B
Approach Vol, veh/h		797			526						148	
Approach Delay, s/veh		17.5			10.7						13.6	
Approach LOS		B			B						B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs				4		6		8				
Phs Duration (G+Y+Rc), s				32.1		27.9		32.1				
Change Period (Y+Rc), s				5.0		5.0		5.0				
Max Green Setting (Gmax), s				33.0		17.0		33.0				
Max Q Clear Time (g_c+I1), s				21.6		5.8		7.7				
Green Ext Time (p_c), s				5.5		0.6		8.0				
Intersection Summary												
HCM 2010 Ctrl Delay			14.7									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
 4: 241 NB Off Ramp/241 NB On Ramp & Crown Palley Pkwy

Alt 8 PM - Idea 18

03/09/2018



Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	190	0	500	0	0	0		
Future Volume (veh/h)	190	0	500	0	0	0		
Number	5	12	7	4				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00					
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	0	1900	1881				
Adj Flow Rate, veh/h	200	0	526	0				
Adj No. of Lanes	1	0	0	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	0	1	1				
Cap, veh/h	0	0	622	0				
Arrive On Green	0.00	0.00	0.35	0.00				
Sat Flow, veh/h	0		1792	0				
Grp Volume(v), veh/h	0.0		526	0				
Grp Sat Flow(s),veh/h/ln			1792	0				
Q Serve(g_s), s			16.3	0.0				
Cycle Q Clear(g_c), s			16.3	0.0				
Prop In Lane			1.00					
Lane Grp Cap(c), veh/h			622	0				
V/C Ratio(X)			0.85	0.00				
Avail Cap(c_a), veh/h			926	0				
HCM Platoon Ratio			1.00	1.00				
Upstream Filter(l)			1.00	0.00				
Uniform Delay (d), s/veh			18.1	0.0				
Incr Delay (d2), s/veh			4.8	0.0				
Initial Q Delay(d3),s/veh			0.0	0.0				
%ile BackOfQ(50%),veh/ln			8.9	0.0				
LnGrp Delay(d),s/veh			22.9	0.0				
LnGrp LOS			C					
Approach Vol, veh/h				526				
Approach Delay, s/veh				22.9				
Approach LOS				C				
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4				
Phs Duration (G+Y+Rc), s				25.8				
Change Period (Y+Rc), s				5.0				
Max Green Setting (Gmax), s				31.0				
Max Q Clear Time (g_c+l1), s				18.3				
Green Ext Time (p_c), s				2.5				
Intersection Summary								
HCM 2010 Ctrl Delay			22.9					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary 5: 241 SB On Ramp/241 SB Off Ramp & SR-73

Alt 8 PM - Idea 18
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↖						↕	↗
Traffic Volume (veh/h)	0	380	95	0	55	0	0	0	0	0	0	995
Future Volume (veh/h)	0	380	95	0	55	0	0	0	0	0	0	995
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1900	1881	1881
Adj Flow Rate, veh/h	0	400	69	0	58	0				0	0	732
Adj No. of Lanes	0	2	1	0	1	0				0	1	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	643	288	0	338	0				0	1229	2090
Arrive On Green	0.00	0.18	0.18	0.00	0.18	0.00				0.00	0.00	0.65
Sat Flow, veh/h	0	3668	1599	0	1881	0				0	1881	3198
Grp Volume(v), veh/h	0	400	69	0	58	0				0	0	732
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1881	0				0	1881	1599
Q Serve(g_s), s	0.0	6.2	2.2	0.0	1.6	0.0				0.0	0.0	6.2
Cycle Q Clear(g_c), s	0.0	6.2	2.2	0.0	1.6	0.0				0.0	0.0	6.2
Prop In Lane	0.00		1.00	0.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	643	288	0	338	0				0	1229	2090
V/C Ratio(X)	0.00	0.62	0.24	0.00	0.17	0.00				0.00	0.00	0.35
Avail Cap(c_a), veh/h	0	1251	560	0	658	0				0	1229	2090
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00				0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	22.7	21.1	0.0	20.8	0.0				0.0	0.0	4.7
Incr Delay (d2), s/veh	0.0	1.0	0.4	0.0	0.2	0.0				0.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.1	1.0	0.0	0.8	0.0				0.0	0.0	2.8
LnGrp Delay(d),s/veh	0.0	23.7	21.5	0.0	21.1	0.0				0.0	0.0	5.1
LnGrp LOS		C	C		C							A
Approach Vol, veh/h		469			58						732	
Approach Delay, s/veh		23.4			21.1						5.1	
Approach LOS		C			C						A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs				4		6		8				
Phs Duration (G+Y+Rc), s				15.8		44.2		15.8				
Change Period (Y+Rc), s				5.0		5.0		5.0				
Max Green Setting (Gmax), s				21.0		29.0		21.0				
Max Q Clear Time (g_c+I1), s				8.2		8.2		3.6				
Green Ext Time (p_c), s				2.6		3.1		3.0				
Intersection Summary												
HCM 2010 Ctrl Delay			12.7									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & SR-73

Alt 8 PM - Idea 18
03/09/2018



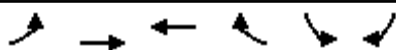
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	380	0	55	0	0	0		
Future Volume (veh/h)	380	0	55	0	0	0		
Number	7	14	5	2				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00					
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	0	1900	1881				
Adj Flow Rate, veh/h	400	0	58	0				
Adj No. of Lanes	2	0	0	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	0	1	1				
Cap, veh/h	0	0	1642	0				
Arrive On Green	0.00	0.00	0.92	0.00				
Sat Flow, veh/h	0		1792	0				
Grp Volume(v), veh/h	0.0		58	0				
Grp Sat Flow(s),veh/h/ln			1792	0				
Q Serve(g_s), s			0.2	0.0				
Cycle Q Clear(g_c), s			0.2	0.0				
Prop In Lane			1.00					
Lane Grp Cap(c), veh/h			1642	0				
V/C Ratio(X)			0.04	0.00				
Avail Cap(c_a), veh/h			1642	0				
HCM Platoon Ratio			1.00	1.00				
Upstream Filter(I)			1.00	0.00				
Uniform Delay (d), s/veh			0.2	0.0				
Incr Delay (d2), s/veh			0.0	0.0				
Initial Q Delay(d3),s/veh			0.0	0.0				
%ile BackOfQ(50%),veh/ln			0.1	0.0				
LnGrp Delay(d),s/veh			0.3	0.0				
LnGrp LOS			A					
Approach Vol, veh/h				58				
Approach Delay, s/veh				0.3				
Approach LOS				A				
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2						
Phs Duration (G+Y+Rc), s		60.0						
Change Period (Y+Rc), s		5.0						
Max Green Setting (Gmax), s		23.0						
Max Q Clear Time (g_c+I1), s		2.2						
Green Ext Time (p_c), s		0.2						
Intersection Summary								
HCM 2010 Ctrl Delay			0.3					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

7: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 8 PM - Idea 18

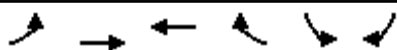
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	970	420	0	840	450		
Future Volume (veh/h)	0	970	420	0	840	450		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	1021	442	0	884	332		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	1295	1295	0	970	866		
Arrive On Green	0.00	0.36	0.36	0.00	0.54	0.54		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	1021	442	0	884	332		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	21.2	7.5	0.0	37.1	10.0		
Cycle Q Clear(g_c), s	0.0	21.2	7.5	0.0	37.1	10.0		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	1295	1295	0	970	866		
V/C Ratio(X)	0.00	0.79	0.34	0.00	0.91	0.38		
Avail Cap(c_a), veh/h	0	1721	1295	0	1488	1328		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	23.7	19.3	0.0	17.2	11.0		
Incr Delay (d2), s/veh	0.0	1.8	0.2	0.0	6.0	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	10.7	3.7	0.0	19.8	4.4		
LnGrp Delay(d),s/veh	0.0	25.5	19.4	0.0	23.2	11.3		
LnGrp LOS		C	B		C	B		
Approach Vol, veh/h		1021	442		1216			
Approach Delay, s/veh		25.5	19.4		20.0			
Approach LOS		C	B		B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		34.1				34.1		49.0
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		18.0				39.0		68.0
Max Q Clear Time (g_c+I1), s		9.5				23.2		39.1
Green Ext Time (p_c), s		5.4				5.9		4.9
Intersection Summary								
HCM 2010 Ctrl Delay			22.0					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary 8: Chiquita Canyon Rd & 241 NB On Ramp

Alt 8 PM - Idea 18
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	430	1380	420	400	0	0		
Future Volume (veh/h)	430	1380	420	400	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	453	1453	442	295				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	565	1726	978	832				
Arrive On Green	0.32	0.92	0.52	0.52				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	453	1453	442	295				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	11.2	13.6	7.2	5.3				
Cycle Q Clear(g_c), s	11.2	13.6	7.2	5.3				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	565	1726	978	832				
V/C Ratio(X)	0.80	0.84	0.45	0.35				
Avail Cap(c_a), veh/h	923	2171	1047	890				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	1.00	1.00	1.00	1.00				
Uniform Delay (d), s/veh	15.2	0.7	7.3	6.9				
Incr Delay (d2), s/veh	2.7	2.6	0.3	0.3				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	6.0	6.9	3.8	2.4				
LnGrp Delay(d),s/veh	17.9	3.3	7.6	7.1				
LnGrp LOS	B	A	A	A				
Approach Vol, veh/h		1906	737					
Approach Delay, s/veh		6.8	7.4					
Approach LOS		A	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	19.3	29.2				48.5		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	24.0	26.0				55.0		
Max Q Clear Time (g_c+1.2), s	13.2	9.2				15.6		
Green Ext Time (p_c), s	1.1	14.2				28.0		
Intersection Summary								
HCM 2010 Ctrl Delay			7.0					
HCM 2010 LOS			A					



Appendix – SR 241/LPP Ramp Intersection LOS
2050 Alternative 21 Conditions

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HCM 2010 Signalized Intersection Summary
1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 9 AM - Idea 21
03/09/2018

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑↑↑	↑	↑	↑↑↑↑					↑	↑↑	↑	
Traffic Volume (veh/h)	0	820	710	145	1615	0	0	0	0	20	0	35	
Future Volume (veh/h)	0	820	710	145	1615	0	0	0	0	20	0	35	
Number	1	6	16	5	2	12				3	8	18	
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881	
Adj Flow Rate, veh/h	0	863	670	153	1700	0				30	0	16	
Adj No. of Lanes	0	3	1	1	3	0				2	0	1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95	
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1	
Cap, veh/h	0	3506	1092	206	4352	0				188	0	84	
Arrive On Green	0.00	0.68	0.68	0.23	1.00	0.00				0.05	0.00	0.05	
Sat Flow, veh/h	0	5305	1599	1792	5305	0				3583	0	1599	
Grp Volume(v), veh/h	0	863	670	153	1700	0				30	0	16	
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599	
Q Serve(g_s), s	0.0	5.1	18.3	6.3	0.0	0.0				0.6	0.0	0.8	
Cycle Q Clear(g_c), s	0.0	5.1	18.3	6.3	0.0	0.0				0.6	0.0	0.8	
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00	
Lane Grp Cap(c), veh/h	0	3506	1092	206	4352	0				188	0	84	
V/C Ratio(X)	0.00	0.25	0.61	0.74	0.39	0.00				0.16	0.00	0.19	
Avail Cap(c_a), veh/h	0	3506	1092	291	4352	0				806	0	360	
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00	
Upstream Filter(I)	0.00	1.00	1.00	0.39	0.39	0.00				1.00	0.00	1.00	
Uniform Delay (d), s/veh	0.0	4.8	6.9	29.7	0.0	0.0				36.2	0.0	36.3	
Incr Delay (d2), s/veh	0.0	0.2	2.6	2.5	0.1	0.0				0.4	0.0	1.1	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.0	2.5	8.6	3.3	0.0	0.0				0.3	0.0	0.4	
LnGrp Delay(d),s/veh	0.0	5.0	9.5	32.2	0.1	0.0				36.6	0.0	37.4	
LnGrp LOS		A	A	C	A					D		D	
Approach Vol, veh/h	1533		1853				46						
Approach Delay, s/veh	7.0		2.8				36.9						
Approach LOS	A		A				D						
Timer	1	2	3	4	5	6	7	8					
Assigned Phs	2		5				6	8					
Phs Duration (G+Y+Rc), s	71.8		13.2				58.6	8.2					
Change Period (Y+Rc), s	5.0		5.0				5.0	5.0					
Max Green Setting (Gmax), s	53.0		12.0				36.0	17.0					
Max Q Clear Time (g_c+I1), s	2.0		8.3				20.3	2.8					
Green Ext Time (p_c), s	35.8		0.1				13.8	0.1					
Intersection Summary													
HCM 2010 Ctrl Delay			5.1										
HCM 2010 LOS			A										
Notes													

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

Alt 9 AM - Idea 21
03/09/2018

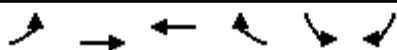
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	575	265	0	0	965	230	795	0	85	0	0	0
Future Volume (veh/h)	575	265	0	0	965	230	795	0	85	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	605	279	0	0	1016	169	856	0	41			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	635	3287	0	0	1211	377	932	0	416			
Arrive On Green	0.59	1.00	0.00	0.00	0.24	0.24	0.26	0.00	0.26			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	605	279	0	0	1016	169	856	0	41			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	25.3	0.0	0.0	0.0	15.1	7.2	18.6	0.0	1.6			
Cycle Q Clear(g_c), s	25.3	0.0	0.0	0.0	15.1	7.2	18.6	0.0	1.6			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	635	3287	0	0	1211	377	932	0	416			
V/C Ratio(X)	0.95	0.08	0.00	0.00	0.84	0.45	0.92	0.00	0.10			
Avail Cap(c_a), veh/h	635	3287	0	0	1233	384	932	0	416			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.97	0.97	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.7	0.0	0.0	0.0	29.1	26.1	28.8	0.0	22.5			
Incr Delay (d2), s/veh	24.3	0.0	0.0	0.0	7.1	3.8	13.8	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	16.3	0.0	0.0	0.0	7.9	3.6	10.9	0.0	0.7			
LnGrp Delay(d),s/veh	40.0	0.0	0.0	0.0	36.2	29.9	42.6	0.0	22.6			
LnGrp LOS	D	A			D	C	D		C			
Approach Vol, veh/h	884				1185				897			
Approach Delay, s/veh	27.4				35.3				41.7			
Approach LOS	C				D				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	4		6							
Phs Duration (G+Y+Rc), s	32.3	22.9	24.8		55.2							
Change Period (Y+Rc), s	5.0	5.0	5.0		5.0							
Max Green Setting (Gmax), s	27.0	18.2	19.8		50.2							
Max Q Clear Time (g_c+Y), s	27.3	17.1	20.6		2.0							
Green Ext Time (p_c), s	0.0	0.8	0.0		3.7							
Intersection Summary												
HCM 2010 Ctrl Delay			34.9									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

Alt 9 AM - Idea 21

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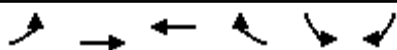


Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	765	675	0	275	480		
Future Volume (veh/h)	0	765	675	0	275	480		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	805	711	0	289	353		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	2313	2313	0	453	404		
Arrive On Green	0.00	0.65	0.21	0.00	0.25	0.25		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	805	711	0	289	353		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	8.2	13.4	0.0	11.5	16.9		
Cycle Q Clear(g_c), s	0.0	8.2	13.4	0.0	11.5	16.9		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	2313	2313	0	453	404		
V/C Ratio(X)	0.00	0.35	0.31	0.00	0.64	0.87		
Avail Cap(c_a), veh/h	0	2313	2313	0	470	420		
HCM Platoon Ratio	1.00	1.00	0.33	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	0.75	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	6.4	16.4	0.0	26.6	28.7		
Incr Delay (d2), s/veh	0.0	0.1	0.3	0.0	2.7	17.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	4.1	6.7	0.0	6.0	9.4		
LnGrp Delay(d),s/veh	0.0	6.5	16.6	0.0	29.3	46.2		
LnGrp LOS		A	B		C	D		
Approach Vol, veh/h		805	711		642			
Approach Delay, s/veh		6.5	16.6		38.6			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		55.8				55.8		24.2
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		22.0				23.0		20.0
Max Q Clear Time (g_c+I1), s		15.4				10.2		18.9
Green Ext Time (p_c), s		4.5				7.4		0.3
Intersection Summary								
HCM 2010 Ctrl Delay		19.4						
HCM 2010 LOS		B						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

Alt 9 AM - Idea 21
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↰	↑	↑	↱				
Traffic Volume (veh/h)	440	600	675	850	0	0		
Future Volume (veh/h)	440	600	675	850	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	463	632	711	663				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	513	1787	1154	981				
Arrive On Green	0.29	0.95	0.61	0.61				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	463	632	711	663				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	19.9	2.0	18.8	21.9				
Cycle Q Clear(g_c), s	19.9	2.0	18.8	21.9				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	513	1787	1154	981				
V/C Ratio(X)	0.90	0.35	0.62	0.68				
Avail Cap(c_a), veh/h	515	1787	1154	981				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	0.55	0.55	1.00	1.00				
Uniform Delay (d), s/veh	27.5	0.2	9.6	10.2				
Incr Delay (d2), s/veh	11.9	0.3	2.5	3.7				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	11.5	1.0	10.5	10.6				
LnGrp Delay(d),s/veh	39.4	0.5	12.1	13.9				
LnGrp LOS	D	A	B	B				
Approach Vol, veh/h		1095	1374					
Approach Delay, s/veh		16.9	13.0					
Approach LOS		B	B					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	26.9	53.1				80.0		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	22.0	48.0				75.0		
Max Q Clear Time (g_c+Q), s	21.9	23.9				4.0		
Green Ext Time (p_c), s	0.0	12.7				18.1		
Intersection Summary								
HCM 2010 Ctrl Delay			14.7					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

Alt 9 AM - Idea 21
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	430	130	380	720	0	0	0	0	515	0	210
Future Volume (veh/h)	0	430	130	380	720	0	0	0	0	515	0	210
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	453	137	400	758	0				542	0	155
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2450	1096	594	1169	0				659	0	303
Arrive On Green	0.00	0.69	0.69	0.23	0.23	0.00				0.19	0.00	0.19
Sat Flow, veh/h	0	3668	1599	741	1791	0				3476	0	1599
Grp Volume(v), veh/h	0	453	137	443	715	0				542	0	155
Grp Sat Flow(s),veh/h/ln	0	1787	1599	820	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	3.7	2.4	38.1	31.9	0.0				12.0	0.0	7.0
Cycle Q Clear(g_c), s	0.0	3.7	2.4	41.8	31.9	0.0				12.0	0.0	7.0
Prop In Lane	0.00		1.00	0.90		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2450	1096	648	1115	0				659	0	303
V/C Ratio(X)	0.00	0.18	0.12	0.68	0.64	0.00				0.82	0.00	0.51
Avail Cap(c_a), veh/h	0	2450	1096	648	1115	0				782	0	360
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.70	0.70	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	4.5	4.3	27.6	22.1	0.0				31.1	0.0	29.1
Incr Delay (d2), s/veh	0.0	0.2	0.2	4.1	2.0	0.0				6.1	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.1	10.0	15.0	0.0				6.3	0.0	3.2
LnGrp Delay(d),s/veh	0.0	4.7	4.6	31.7	24.1	0.0				37.3	0.0	30.4
LnGrp LOS		A	A	C	C					D		C
Approach Vol, veh/h		590			1158						697	
Approach Delay, s/veh		4.7			27.0						35.7	
Approach LOS		A			C						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		59.8		20.2		59.8						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		52.0		18.0		52.0						
Max Q Clear Time (g_c+I1), s		43.8		14.0		5.7						
Green Ext Time (p_c), s		6.1		1.2		18.1						
Intersection Summary												
HCM 2010 Ctrl Delay			24.1									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 9 AM - Idea 21
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑	↑			
Traffic Volume (veh/h)	0	750	195	0	925	965	175	0	335	0	0	0
Future Volume (veh/h)	0	750	195	0	925	965	175	0	335	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	789	0	0	974	0	270	0	154			
Adj No. of Lanes	0	2	1	0	2	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2666	1193	0	2666	1193	462	0	206			
Arrive On Green	0.00	0.25	0.00	0.00	0.75	0.00	0.13	0.00	0.13			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	3583	0	1599			
Grp Volume(v), veh/h	0	789	0	0	974	0	270	0	154			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	14.4	0.0	0.0	7.6	0.0	5.7	0.0	7.4			
Cycle Q Clear(g_c), s	0.0	14.4	0.0	0.0	7.6	0.0	5.7	0.0	7.4			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2666	1193	0	2666	1193	462	0	206			
V/C Ratio(X)	0.00	0.30	0.00	0.00	0.37	0.00	0.58	0.00	0.75			
Avail Cap(c_a), veh/h	0	2666	1193	0	2666	1193	761	0	340			
HCM Platoon Ratio	1.00	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.87	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	13.1	0.0	0.0	3.5	0.0	32.8	0.0	33.6			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.4	0.0	1.2	0.0	5.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	7.1	0.0	0.0	3.8	0.0	2.9	0.0	3.6			
LnGrp Delay(d),s/veh	0.0	13.1	0.0	0.0	3.9	0.0	34.0	0.0	38.9			
LnGrp LOS		B			A		C		D			
Approach Vol, veh/h		789			974			424				
Approach Delay, s/veh		13.1			3.9			35.8				
Approach LOS		B			A			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		64.7		15.3		64.7						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		29.0		17.0		19.0						
Max Q Clear Time (g_c+I1), s		9.6		9.4		16.4						
Green Ext Time (p_c), s		11.3		0.9		2.2						
Intersection Summary												
HCM 2010 Ctrl Delay			13.4									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary
 1: 241 SB On Ramp/241 SB Off Ramp & Oso Parkway

Alt 9 PM - Idea 21
 03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↑	↑	↑↑↑↑					↑	↔	↑
Traffic Volume (veh/h)	0	695	830	100	1080	0	0	0	0	160	0	400
Future Volume (veh/h)	0	695	830	100	1080	0	0	0	0	160	0	400
Number	1	6	16	5	2	12				3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1881	1881	0				1881	1881	1881
Adj Flow Rate, veh/h	0	732	821	105	1137	0				112	0	355
Adj No. of Lanes	0	3	1	1	3	0				1	0	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	2054	640	407	3564	0				309	0	552
Arrive On Green	0.00	0.40	0.40	0.23	0.69	0.00				0.17	0.00	0.17
Sat Flow, veh/h	0	5305	1599	1792	5305	0				1792	0	3198
Grp Volume(v), veh/h	0	732	821	105	1137	0				112	0	355
Grp Sat Flow(s),veh/h/ln	0	1712	1599	1792	1712	0				1792	0	1599
Q Serve(g_s), s	0.0	6.0	24.0	2.9	5.2	0.0				3.3	0.0	6.2
Cycle Q Clear(g_c), s	0.0	6.0	24.0	2.9	5.2	0.0				3.3	0.0	6.2
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2054	640	407	3564	0				309	0	552
V/C Ratio(X)	0.00	0.36	1.28	0.26	0.32	0.00				0.36	0.00	0.64
Avail Cap(c_a), veh/h	0	2054	640	407	3564	0				537	0	959
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.93	0.93	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	12.6	18.0	19.0	3.6	0.0				21.9	0.0	23.1
Incr Delay (d2), s/veh	0.0	0.5	139.3	0.3	0.2	0.0				0.7	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.9	35.2	1.5	2.5	0.0				1.7	0.0	2.8
LnGrp Delay(d),s/veh	0.0	13.1	157.3	19.3	3.8	0.0				22.6	0.0	24.4
LnGrp LOS		B	F	B	A					C		C
Approach Vol, veh/h		1553			1242						467	
Approach Delay, s/veh		89.3			5.1						23.9	
Approach LOS		F			A						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		45.6			17.6	28.0		14.4				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		33.0			5.0	23.0		17.0				
Max Q Clear Time (g_c+I1), s		7.2			4.9	26.0		8.2				
Green Ext Time (p_c), s		8.0			0.1	0.0		1.2				
Intersection Summary												
HCM 2010 Ctrl Delay				47.9								
HCM 2010 LOS				D								
Notes												

HCM 2010 Signalized Intersection Summary

2: 241 NB Off Ramp/241 NB On Ramp & Oso Parkway

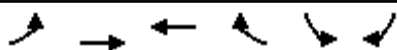
Alt 9 PM - Idea 21
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱↱↱			↱↱↱	↰	↰	↱↱	↰			
Traffic Volume (veh/h)	20	835	0	0	490	20	690	0	140	0	0	0
Future Volume (veh/h)	20	835	0	0	490	20	690	0	140	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1881	1881	0	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	21	879	0	0	516	15	758	0	69			
Adj No. of Lanes	1	3	0	0	3	1	2	0	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	1	1	0	0	1	1	1	1	1			
Cap, veh/h	604	3029	0	0	956	298	992	0	443			
Arrive On Green	0.11	0.19	0.00	0.00	0.19	0.19	0.28	0.00	0.28			
Sat Flow, veh/h	1792	5305	0	0	5305	1599	3583	0	1599			
Grp Volume(v), veh/h	21	879	0	0	516	15	758	0	69			
Grp Sat Flow(s),veh/h/ln	1792	1712	0	0	1712	1599	1792	0	1599			
Q Serve(g_s), s	0.6	8.8	0.0	0.0	5.5	0.5	11.6	0.0	2.0			
Cycle Q Clear(g_c), s	0.6	8.8	0.0	0.0	5.5	0.5	11.6	0.0	2.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	604	3029	0	0	956	298	992	0	443			
V/C Ratio(X)	0.03	0.29	0.00	0.00	0.54	0.05	0.76	0.00	0.16			
Avail Cap(c_a), veh/h	604	3029	0	0	1712	533	1314	0	586			
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.95	0.95	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	18.0	13.4	0.0	0.0	22.1	20.1	19.9	0.0	16.4			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	2.2	0.3	1.9	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.3	4.2	0.0	0.0	2.8	0.2	6.0	0.0	0.9			
LnGrp Delay(d),s/veh	18.0	13.5	0.0	0.0	24.3	20.4	21.8	0.0	16.6			
LnGrp LOS	B	B			C	C	C		B			
Approach Vol, veh/h		900			531			827				
Approach Delay, s/veh		13.6			24.2			21.4				
Approach LOS		B			C			C				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	24.2	15.2		20.6		39.4						
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0						
Max Green Setting (Gmax), s	5.0	19.0		21.0		29.0						
Max Q Clear Time (g_c+I), s	12.6	7.5		13.6		10.8						
Green Ext Time (p_c), s	1.2	2.7		2.0		5.1						
Intersection Summary												
HCM 2010 Ctrl Delay			18.9									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary

3: Chiquita Canyon Rd & 241 SB Off Ramp

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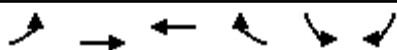


Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		↑↑	↑↑		↖	↗		
Traffic Volume (veh/h)	0	980	500	0	700	330		
Future Volume (veh/h)	0	980	500	0	700	330		
Number	1	6	2	12	3	18		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881		
Adj Flow Rate, veh/h	0	1032	526	0	737	243		
Adj No. of Lanes	0	2	2	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	0	1	1	0	1	1		
Cap, veh/h	0	1391	1391	0	849	757		
Arrive On Green	0.00	0.39	0.39	0.00	0.47	0.47		
Sat Flow, veh/h	0	3762	3762	0	1792	1599		
Grp Volume(v), veh/h	0	1032	526	0	737	243		
Grp Sat Flow(s),veh/h/ln	0	1787	1787	0	1792	1599		
Q Serve(g_s), s	0.0	14.5	6.1	0.0	21.5	5.5		
Cycle Q Clear(g_c), s	0.0	14.5	6.1	0.0	21.5	5.5		
Prop In Lane	0.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	1391	1391	0	849	757		
V/C Ratio(X)	0.00	0.74	0.38	0.00	0.87	0.32		
Avail Cap(c_a), veh/h	0	1740	1391	0	1234	1102		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	15.3	12.8	0.0	13.7	9.5		
Incr Delay (d2), s/veh	0.0	1.3	0.2	0.0	4.8	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	7.3	3.0	0.0	11.6	2.5		
LnGrp Delay(d),s/veh	0.0	16.6	12.9	0.0	18.5	9.8		
LnGrp LOS		B	B		B	A		
Approach Vol, veh/h		1032	526		980			
Approach Delay, s/veh		16.6	12.9		16.3			
Approach LOS		B	B		B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		26.7				26.7		31.6
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		18.4				27.4		39.2
Max Q Clear Time (g_c+I1), s		8.1				16.5		23.5
Green Ext Time (p_c), s		6.5				5.2		3.2
Intersection Summary								
HCM 2010 Ctrl Delay		15.8						
HCM 2010 LOS		B						

HCM 2010 Signalized Intersection Summary

4: Chiquita Canyon Rd & 241 NB On Ramp

Alt 9 PM - Idea 21
03/09/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	340	1340	500	305	0	0		
Future Volume (veh/h)	340	1340	500	305	0	0		
Number	1	6	2	12				
Initial Q (Qb), veh	0	0	0	0				
Ped-Bike Adj(A_pbT)	1.00			1.00				
Parking Bus, Adj	1.00	1.00	1.00	1.00				
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881				
Adj Flow Rate, veh/h	358	1411	526	224				
Adj No. of Lanes	1	1	1	1				
Peak Hour Factor	0.95	0.95	0.95	0.95				
Percent Heavy Veh, %	1	1	1	1				
Cap, veh/h	465	1725	1081	919				
Arrive On Green	0.26	0.92	0.57	0.57				
Sat Flow, veh/h	1792	1881	1881	1599				
Grp Volume(v), veh/h	358	1411	526	224				
Grp Sat Flow(s),veh/h/ln	1792	1881	1881	1599				
Q Serve(g_s), s	8.9	12.0	8.0	3.3				
Cycle Q Clear(g_c), s	8.9	12.0	8.0	3.3				
Prop In Lane	1.00			1.00				
Lane Grp Cap(c), veh/h	465	1725	1081	919				
V/C Ratio(X)	0.77	0.82	0.49	0.24				
Avail Cap(c_a), veh/h	743	2184	1248	1061				
HCM Platoon Ratio	1.00	1.00	1.00	1.00				
Upstream Filter(I)	1.00	1.00	1.00	1.00				
Uniform Delay (d), s/veh	16.5	0.7	6.1	5.1				
Incr Delay (d2), s/veh	2.7	2.0	0.3	0.1				
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0				
%ile BackOfQ(50%),veh/ln	4.7	6.1	4.2	1.5				
LnGrp Delay(d),s/veh	19.3	2.7	6.4	5.2				
LnGrp LOS	B	A	A	A				
Approach Vol, veh/h		1769	750					
Approach Delay, s/veh		6.1	6.0					
Approach LOS		A	A					
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	16.5	31.7				48.2		
Change Period (Y+Rc), s	5.0	5.0				5.0		
Max Green Setting (Gmax), s	19.0	31.0				55.0		
Max Q Clear Time (g_c+10), s	10.0	10.0				14.0		
Green Ext Time (p_c), s	0.7	16.8				27.8		
Intersection Summary								
HCM 2010 Ctrl Delay			6.0					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary
5: 241 SB On Ramp/241 SB Off Ramp & I Street

Alt 9 PM - Idea 21
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑					↘↘	↗	
Traffic Volume (veh/h)	0	645	200	280	575	0	0	0	0	840	0	145
Future Volume (veh/h)	0	645	200	280	575	0	0	0	0	840	0	145
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1881	1900	1881	0				1881	1881	1900
Adj Flow Rate, veh/h	0	679	148	295	605	0				884	0	107
Adj No. of Lanes	0	2	1	0	2	0				2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	1	1	0				1	1	1
Cap, veh/h	0	1914	856	393	900	0				1021	0	470
Arrive On Green	0.00	0.54	0.54	0.54	0.54	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	3668	1599	514	1765	0				3476	0	1599
Grp Volume(v), veh/h	0	679	148	323	577	0				884	0	107
Grp Sat Flow(s),veh/h/ln	0	1787	1599	567	1626	0				1738	0	1599
Q Serve(g_s), s	0.0	6.4	2.8	25.0	15.0	0.0				14.1	0.0	3.0
Cycle Q Clear(g_c), s	0.0	6.4	2.8	31.4	15.0	0.0				14.1	0.0	3.0
Prop In Lane	0.00		1.00	0.91		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1914	856	421	871	0				1021	0	470
V/C Ratio(X)	0.00	0.35	0.17	0.77	0.66	0.00				0.87	0.00	0.23
Avail Cap(c_a), veh/h	0	1914	856	421	871	0				1103	0	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.8	7.0	17.4	9.8	0.0				19.6	0.0	15.7
Incr Delay (d2), s/veh	0.0	0.1	0.1	8.3	1.9	0.0				7.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.1	1.2	6.1	7.0	0.0				7.7	0.0	1.3
LnGrp Delay(d),s/veh	0.0	7.9	7.1	25.7	11.7	0.0				26.6	0.0	15.9
LnGrp LOS		A	A	C	B					C		B
Approach Vol, veh/h		827			900						991	
Approach Delay, s/veh		7.8			16.7						25.4	
Approach LOS		A			B						C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		36.4		22.2		36.4						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		31.4		18.6		31.4						
Max Q Clear Time (g_c+l1), s		33.4		16.1		8.4						
Green Ext Time (p_c), s		0.0		1.1		12.9						
Intersection Summary												
HCM 2010 Ctrl Delay			17.2									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
6: 241 NB Off Ramp/241 NB On Ramp & I Street

Alt 9 PM - Idea 21
03/09/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑	↑	↑↑	↑			
Traffic Volume (veh/h)	0	1390	95	0	695	595	160	0	450	0	0	0
Future Volume (veh/h)	0	1390	95	0	695	595	160	0	450	0	0	0
Number	1	6	16	5	2	12	7	4	14			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	0	1881	1881	0	1881	1881	1881	1881	1881			
Adj Flow Rate, veh/h	0	1463	0	0	732	0	112	0	392			
Adj No. of Lanes	0	2	1	0	2	1	1	0	2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1			
Cap, veh/h	0	2078	930	0	2078	930	375	0	669			
Arrive On Green	0.00	0.58	0.00	0.00	0.58	0.00	0.21	0.00	0.21			
Sat Flow, veh/h	0	3668	1599	0	3668	1599	1792	0	3198			
Grp Volume(v), veh/h	0	1463	0	0	732	0	112	0	392			
Grp Sat Flow(s),veh/h/ln	0	1787	1599	0	1787	1599	1792	0	1599			
Q Serve(g_s), s	0.0	13.9	0.0	0.0	5.1	0.0	2.5	0.0	5.3			
Cycle Q Clear(g_c), s	0.0	13.9	0.0	0.0	5.1	0.0	2.5	0.0	5.3			
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	2078	930	0	2078	930	375	0	669			
V/C Ratio(X)	0.00	0.70	0.00	0.00	0.35	0.00	0.30	0.00	0.59			
Avail Cap(c_a), veh/h	0	2845	1273	0	2078	930	638	0	1139			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	7.1	0.0	0.0	5.3	0.0	15.9	0.0	17.0			
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.1	0.0	0.4	0.0	0.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	6.8	0.0	0.0	2.5	0.0	1.3	0.0	2.4			
LnGrp Delay(d),s/veh	0.0	7.6	0.0	0.0	5.4	0.0	16.4	0.0	17.8			
LnGrp LOS		A			A		B		B			
Approach Vol, veh/h		1463			732			504				
Approach Delay, s/veh		7.6			5.4			17.5				
Approach LOS		A			A			B				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6						
Phs Duration (G+Y+Rc), s		32.8		15.0		32.8						
Change Period (Y+Rc), s		5.0		5.0		5.0						
Max Green Setting (Gmax), s		20.0		17.0		38.0						
Max Q Clear Time (g_c+I1), s		7.1		7.3		15.9						
Green Ext Time (p_c), s		10.1		1.4		11.9						
Intersection Summary												
HCM 2010 Ctrl Delay			8.8									
HCM 2010 LOS			A									
Notes												