

**Project Study Report-Project Development Support
(PSR-PDS)
to
Request Programming for Capital Support
(Project Approval
and Environmental Document Phase)
in the 2014 STIP
and
Request Approval of a Locally Funded Project
to Proceed to PA & ED Phase**

On Route Interstate 405
between Interstate 5 (PM 0.2)
and State Route 55 (PM 8.7)

APPROVAL RECOMMENDED:

 10/17/2013

Ed Alegre, PTP, OCTA PROJECT MANAGER, PROJECT SPONSOR,
Accepts Risks Identified in This PSR-PDS and Attached Risk Register

 10/29/2013

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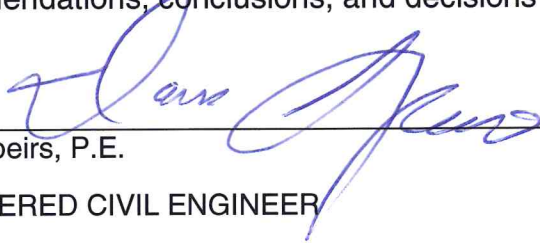
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Project Vicinity Map



This Project Study Report-Project Development Support 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.



10-17-2013

David Speirs, P.E.

DATE

REGISTERED CIVIL ENGINEER



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ATTACHMENTS

- A Project Location Map
- B Schematic Maps of Study Area and Alternatives (bound separately)
- C Preliminary Environmental Assessment Report (bound separately)
- D Transportation Planning Scoping Information Sheet
- E Conceptual Cost Estimate – Right-of-Way Component
- F Capital Outlay Project Estimate
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ACRONYMS AND ABBREVIATIONS

| | |
|------------|---|
| ADA | Americans with Disability Act |
| ADT | Average Daily Traffic |
| AM | Morning |
| BMP | Best Management Practice |
| Caltrans | California Department of Transportation |
| CMAQ | Congestion Mitigation and Air Quality Improvement Program |
| CMIA | Corridor Mobility Improvement Account |
| CSS | Context Sensitive Solutions |
| CTC | California Transportation Commission |
| CWA | Clean Water Act |
| d/c | Demand-to-Capacity |
| EA | Environmental Assessment |
| EB | Eastbound |
| ED | Environmental Document |
| FHWA | Federal Highway Administration |
| FONSI | Finding of No Significant Impact |
| GP | General Purpose |
| HOV | High-Occupancy Vehicle |
| HPP | High Profile Project |
| I-405 | Interstate 405 |
| I-5 | Interstate 5 |
| IBC | Irvine Business Complex |
| IMSC | Irvine Medical and Science Complex |
| IQA | Independent Quality Assurance |
| ITS | Intelligent Transportation Systems |
| JSOA | Joint Stewardship Oversight Agreement |
| LOS | Level of Service |
| LPS | Locally Preferred Strategy |
| Measure M2 | Renewed Measure M Transportation Investment Plan |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| MIS | Major Investment Study |
| MOE | Measure of Effectiveness |
| MOU | Memorandum of understanding |
| MVP | Maintenance Vehicle Pullouts |
| NB | Northbound |

| | |
|-------|---|
| ND | Negative Declaration |
| NEPA | National Environmental Policy Act |
| NHS | National Highway System |
| NITM | North Irvine Transportation Mitigation |
| NPDES | National Pollutant Discharge Elimination System |
| OCTA | Orange County Transportation Authority |
| PA | Project Approval |
| PDS | Project Development Support |
| PEAR | Preliminary Environmental Assessment Report |
| PeMS | Performance Measurement System |
| PM | Post Mile OR Afternoon/Evening |
| PRMP | Project Risk Management Plan |
| PS&E | Plans, Specifications, and Estimate |
| PSR | Project Study Report |
| PST | Project Study Team |
| ROW | Right-of-Way |
| SB | Southbound |
| SHOPP | State Highway Operations and Protection Program |
| SR-55 | State Route 55 |
| STIP | State Transportation Improvement Program |
| SWDR | Stormwater Data Report |
| SWPPP | Stormwater Pollution Prevention Plan |
| TBD | To Be Determined |
| TDM | Transportation Demand Management |
| TSM | Transportation System Management |
| USACE | U.S. Army Corps of Engineers (USACE) |
| USC | <i>United States Code</i> |
| v/c | Volume-to-Capacity |
| VPH | Vehicles per Hour |

1. INTRODUCTION

The Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation (Caltrans) – District 12, proposes to improve the mainline freeway on Interstate 405 (I-405) in Orange County. The proposed improvements are identified as Project L in OCTA’s Renewed Measure M (Measure M2) Freeway Plan. The two build alternatives for the proposed project would address congestion and enhance freeway operations by adding one or two general purpose (GP) lanes (Alternative 2 and Alternative 3, respectively) and auxiliary lanes to various sections of I-405 between Interstate 5 (I-5), post miles (PM) 0.2, and State Route 55 (SR-55), PM 8.7, as shown in the Project Vicinity Map in Attachment A. The additional lanes would increase capacity, relieve congestion, and enhance lane continuity through the corridor. A no build alternative (Alternative 1) also is considered. The approximately 8.5-mile-long project corridor crosses the City of Irvine and abuts the southern city limit of Costa Mesa. Conceptual plans for the build alternatives are provided in Attachment B. Table 1 summarizes the proposed project.

Table 1. Project Information

| | |
|--|--|
| Project limits | 12-ORA-405 PM 0.2 to PM 8.7 |
| Number of alternatives | Alternative 1: No Build Alternative Alternative 2: Addition of one GP lane and operational improvements Alternative 3: Addition of two GP lanes and operational improvements |
| Capital outlay support for project approval and environmental document (PA/ED) | \$4.5 million to \$7.0 million |
| Capital outlay construction cost range | Alternative 2 – \$110 million to \$140 million Alternative 3 – \$160 million to \$190 million |
| Capital outlay right-of-way cost range | Alternatives 2 and 3 – \$300,000 to \$500,000 |
| Funding source | Measure M2, State Transportation Improvement Program (STIP), federal, and other funding sources |
| Anticipated PA/ED completion | May 2017 |
| Anticipated funding year for construction | 2021 – 2022 |
| Type of facility | Freeway |
| Number of structures | 1 new bridge 1 bridge widening 16 retaining walls |
| Anticipated environmental determination or document | Initial study or focused initial study with negative declaration (ND) or Mitigated ND / environmental assessment (EA) with finding of no significant impact (FONSI) |
| Project development category | 4A |

A project report will serve as the Caltrans approval document for this project. In addition, Federal Highway Administration (FHWA) and California Transportation Commission (CTC) approvals may be required for the project. FHWA approval may be required for the modification of the existing interchange configuration at SR-133 and Sand Canyon Road and the abandonment of the Irvine Center Drive direct on-ramp to SB I-405. CTC approval may be required for allocation of funding on this project. The funding sources will be determined during the PA/ED phase. The state and regulatory agency permits and approvals that are anticipated for the project are identified in Attachment C, Preliminary Environmental Assessment Report (PEAR).

2. BACKGROUND

This section describes the historical background of I-405, including the activities leading up to the proposed project improvements and the existing lane configuration along I-405.

Facility Description

I-405, also known as the San Diego Freeway, has 24 miles in Orange County and 48 miles in Los Angeles County. It is a bypass route to I-5. Within the proposed project limits, I-405 is a controlled-access freeway with 8 to 10 mixed-flow GP lanes, 2 high-occupancy vehicle (HOV) lanes, 6 local interchanges, and 3 freeway-to-freeway interchanges at SR-55, SR-133, and I-5.

I-405 is the part of the National Highway System (NHS) that provides access between cities in Orange and Los Angeles counties. I-405 was added to the state highway system in 1933 and to the California Freeway and Expressway System in 1959. Construction of the freeway within the limits of the proposed project was completed in 1969. The original construction provided four GP lanes in each direction. HOV lanes were added in 1991.

The freeway serves the communities of southern Orange County, including the City of Irvine within the project study area. It is used for commuting and intraregional travel along with direct and indirect access to employment centers, recreational attractions, shopping malls, medical centers, universities, airports, and other land uses.

In the northbound (NB) direction, there are three distinct mainline segments. Proceeding in the direction of travel:

- The first segment is from I-5 to SR-133 (PM 0.2 to 1.8). It consists of five GP lanes, one HOV lane, and an auxiliary lane between the Irvine Center Drive and SR-133 interchanges.
- The second segment is from SR-133 to Culver Drive (PM 1.8 to 5.6). It consists of four GP lanes, one HOV lane, and auxiliary lanes between the SR-133, Sand Canyon Avenue, and Jeffrey Road/University Drive interchanges.
- The third segment is from Culver Drive to SR-55 (PM 5.6 to 8.7). It consists of five GP lanes, one HOV lane, and auxiliary lanes ahead of the Jamboree Road exit ramp and between the Jamboree Road, MacArthur Boulevard, and SR-55 interchanges.

In the southbound (SB) direction, there are two distinct mainline segments.

- The first segment is from SR-55 to Culver Drive (PM 8.7 to 5.6). It consists of five GP lanes, one HOV lane, one long auxiliary lane between the MacArthur Boulevard and Culver Drive interchanges, and auxiliary lanes between the SR-55, MacArthur Boulevard, and Jamboree Road interchanges.
- The second segment is from Culver Drive to I-5 (PM 5.6 to 0.2). It consists of four GP lanes, one HOV lane, and auxiliary lanes ahead of the SR-133 diverging branch connector and between the SR-133, Irvine Center Drive, and I-5 interchanges.

Project Sponsor

This project is sponsored by OCTA and is included in the Measure M2 Freeway Plan (Project L). OCTA completed a major investment study (MIS) for south Orange County in 2008. The MIS developed an integrated, multimodal transportation plan that addresses the mobility

needs of motorists, pedestrians, and transit users. The OCTA Board of Directors adopted a resolution supporting the Locally Preferred Strategy (LPS) identified in the MIS, which included the addition of GP lanes and interchange improvements.

Local Agency Involvement

This project study report / project development support (PSR/PDS) was prepared with a project study team (PST) that includes OCTA and the City of Irvine. The PST conducted monthly meetings and additional focus meetings to develop alternatives consistent with the LPS and the purpose and need statement.

Context-Sensitive Solutions and Complete Streets

Section 6 in this report discusses Context-Sensitive Solutions and Complete Streets. The PST will seek to provide complete streets and context-sensitive solutions in the development of projects.

3. PURPOSE AND NEED

This section summarizes the purpose and need for the proposed project.

Need

Currently, this portion of the I-405 corridor within the project limits is experiencing congestion and long traffic delays during morning and evening peak periods due to demand exceeding capacity, resulting from local, regional, and interregional traffic demand. In addition, forecasted local and regional traffic demand is expected to increase, resulting in traffic volumes along the corridor ranging between 245,000 to 371,000 vehicles per day by the year 2045. Improvements are needed within the project limits due to the following conditions:

- High level of congestion during weekdays, especially during peak periods due to the insufficient existing mainline capacity.
- Congestion at interchange on-/off-ramps due to high demand, limited storage capacity, and operational deficiencies.
- Inadequate Intelligent Transportation System (ITS) infrastructure along I-405 and at interchanges.

This corridor has current and future operational deficiencies, including existing geometric deficiencies on the GP and HOV lanes. Further, the GP and HOV lanes are operating under degraded and congested conditions. This corridor also experiences congestion at the ramps and freeway-to-freeway interchanges due to high traffic volumes and weaving/merging issues.

Purpose

The purpose of the proposed project is to address existing and future traffic demand and provide future mobility while minimizing environmental and economic impacts. Due to right-of-way (ROW) constraints in the study area, the challenge will be to see what improvements can be implemented, generally keeping within the existing ROW. The project would address congestion and enhance freeway operations within the project limits along I-405 as follows:

- Add mainline capacity to reduce corridor congestion and improve mobility/people throughput.

- Improve the capacity of the ramps within the project limits along the I-405 corridor.
- Improve freeway operations within the project limits along the I-405 corridor.
- Enhance safety.

4. TRAFFIC ENGINEERING PERFORMANCE ASSESSMENT

To support the purpose and need statement, a macro-level assessment of the infrastructure, traffic operations, and safety of the I-405 corridor were assessed for the existing freeway facility and proposed improvements. The assessment used existing (year 2011) and future (year 2045) projected traffic conditions. The assessment provides traffic density and level of service (LOS) results for the freeway mainline, ramp junctions, and weaving segments.

Existing (year 2011) peak-hour and average daily traffic (ADT) volumes were collected from several sources, including City of Irvine traffic count data, OCTA traffic count data, September 2011 traffic count data performed for this project, the Caltrans Freeway Performance Measurement System (PeMS) database, and Caltrans' 2010 Traffic Volumes on the California State Highway System. Forecasts of peak-hour and ADT volumes were generated using information from the Orange County Traffic Analysis Model (OCTAM) Year 2035 forecast, existing peak-hour traffic volumes, and Caltrans' PeMS data projected to the year 2045.

Section 5 of this report has a detailed discussion of existing and future deficiencies on the I-405 corridor. Briefly, the freeway has insufficient capacity to accommodate either the existing travel demands or the increased travel demands along the I-405 corridor that will occur by the year 2045. Without significant infrastructure improvement, the increase in travel demand is expected to result in increased travel time, increased delays, and LOS F operating conditions on almost all of the freeway mainline segments, ramp junctions, and weaving segments.

Each of the build alternatives provides improvement in traffic operations resulting in reduced congestion. The proposed GP lanes, auxiliary lanes, and ramp modifications will improve freeway operational efficiency. Section 7 of this report has a detailed discussion of the proposed build alternatives.

An initial review of existing traffic accident data shows that all segments of I-405 in the project area have a lower accident rate than the statewide average for similar facilities. No safety performance concerns are evident within the project limits. More detailed safety analyses will be performed during the PA/ED phase of the project.

Detailed opening-year and design-year traffic model forecasts will be required for each proposed alternative to generate accurate forecasts of traffic volumes and predictions of operations on the freeway mainline and ramp junctions. The following operational and capacity analyses are recommended for the scope of work for future traffic engineering studies to be conducted during the PA/ED phase.

- Mainline segment analysis;
- Ramp merge and diverge analysis;
- Weaving segment analysis;
- Ramp intersection and adjacent intersection analysis;

- Exit ramp storage and queuing analysis;
- Ramp metering system analysis; and
- HOV lane analysis

Other analyses recommended for the next phase of project development include:

- Project and construction staging and traffic management planning;
- Ramp closure study; and
- Freeway signage.

The operational analysis conducted for the North Irvine Transportation Mitigation (NITM) Program identifies several options for improvements at freeway ramp intersections. The configuration and operation of the ramp intersections at local arterials must be investigated to determine if improvements are warranted.

As discussed in Section 5, the I-405 mainline corridor is projected to operate at LOS F under all traffic conditions. For the proposed project, which would increase freeway capacity but would not accommodate all projected future demand, the following measures of effectiveness (MOEs) should be used to quantitatively and qualitatively compare improvement alternatives:

- Peak-hour throughput; and
- Relative speed and vehicle travel time.

During the PA/ED phase, the most recent 3 years of traffic accident data should be analyzed and collision data and trends should be assessed to ensure the proposed project would enhance safety and would not contribute to more accidents.

5. DEFICIENCIES

The I-405 corridor is currently experiencing congestion and long traffic delays during the morning (AM) and afternoon/evening (PM) peak hours because demand, primarily from local, regional, and interregional travel, exceeds capacity. Table 2 summarizes the current and forecasted ADT volumes for the corridor. Travel demand along the corridor is anticipated to increase between 17 and 20 percent by the year 2045, which will increase travel time and delay.

Table 2. I-405 Mainline Average Daily Traffic Volumes

| I-405 Freeway Segments | Existing Condition ADT (Year 2011) | Future Condition ADT (Year 2045) |
|--|---|---|
| Between MacArthur Blvd and SR-55 | 316,000 | 371,000 |
| Between Jamboree Rd and MacArthur Blvd | 310,000 | 367,000 |
| Between Culver Dr and Jamboree Rd | 293,000 | 346,000 |
| Between University Dr/Jeffrey Rd and Culver Dr | 276,000 | 333,000 |
| Between Sand Canyon Ave and University Dr/Jeffrey Rd | 283,000 | 341,000 |
| Between SR-133 and Sand Canyon Ave | 270,000 | 319,000 |
| Between Irvine Center Dr and SR-133 | 232,000 | 273,000 |
| Between I-5 and Irvine Center Dr | 207,000 | 245,000 |

The freeway mainline traffic capacity analyses under existing conditions for the AM and PM peak hours are shown in Tables 3 and 4, respectively. Under existing conditions:

- In the AM peak hour, most of the freeway mainline operates at LOS F in both directions. The area between Jamboree Road and SR-55 operates at LOS D for the NB direction and the area between SR-133 and I-5 operates between C and F for both directions.
- In the PM peak hour, most of the freeway mainline is LOS F for both directions. The area between SR-133 and I-5 operates at LOS B through D for both directions.

Table 3. General Purpose Lane Morning Peak-Hour Traffic Capacity Analysis

| NORTHBOUND AM PEAK HOUR LOS | | | | | | | | |
|---|---------------|-----|----------------------|-----|----------------------|-----|----------------------|-----|
| I-405 Freeway Segment | Existing 2011 | | Alternative 1 (2045) | | Alternative 2 (2045) | | Alternative 3 (2045) | |
| | v/c | LOS | d/c | LOS | d/c | LOS | d/c | LOS |
| <i>Between I-5 and Irvine Center Drive</i> | 0.63 | C | 0.99 | E | 0.99 | E | 0.99 | E |
| <i>Between Irvine Center Drive and SR-133</i> | 0.68 | F | 1.04 | F | 1.04 | F | 1.04 | F |
| <i>Between SR-133 and Sand Canyon Avenue</i> | 0.95 | F | 1.42 | F | 0.98 | E | 0.90 | D |
| <i>Between Sand Canyon Avenue and University Drive/Jeffrey Road</i> | 0.94 | F | 1.39 | F | 1.08 | F | 0.96 | D |
| <i>Between University Drive/Jeffrey Road and Culver Drive</i> | 1.13 | F | 1.63 | F | 1.31 | F | 1.09 | F |
| <i>Between Culver Drive and Jamboree Road</i> | 1.06 | F | 1.41 | F | 1.41 | F | 1.17 | F |
| <i>Between Jamboree Road and MacArthur Boulevard</i> | 0.96 | D | 1.30 | F | 1.30 | F | 1.30 | F |
| <i>Between MacArthur Boulevard and SR-55</i> | 0.83 | D | 1.16 | F | 1.16 | F | 1.16 | F |
| SOUTHBOUND AM PEAK HOUR LOS | | | | | | | | |
| I-405 Freeway Segment | Existing 2011 | | Alternative 1 (2045) | | Alternative 2 (2045) | | Alternative 3 (2045) | |
| | v/c | LOS | d/c | LOS | d/c | LOS | d/c | LOS |
| <i>Between SR-55 and MacArthur Boulevard</i> | 1.09 | F | 1.48 | F | 1.48 | F | 1.48 | F |
| <i>Between MacArthur Boulevard and Jamboree Road</i> | 0.89 | F | 1.24 | F | 1.35 ^a | F | 1.35 ^a | F |
| <i>Between Jamboree Road and Culver Drive</i> | 0.74 | F | 1.11 | F | 1.17 ^b | F | 1.07 | F |
| <i>Between Culver Drive and University Drive/Jeffrey Road</i> | 1.04 | F | 1.28 | F | 1.16 | F | 1.07 | F |
| <i>Between University Drive/Jeffrey Road and Sand Canyon Avenue</i> | 1.12 | F | 1.50 | F | 1.23 | F | 1.04 | F |
| <i>Between Sand Canyon Avenue and SR-133</i> | 1.02 | F | 1.40 | F | 1.14 | F | 1.05 | F |
| <i>Between SR-133 and Irvine Center Drive</i> | 0.87 | D | 1.34 | F | 1.07 | F | 1.07 | F |
| <i>Between Irvine Center Drive and I-5</i> | 0.69 | C | 1.14 | F | 0.92 | D | 0.92 | D |

v/c = volume to capacity ratio, d/c = demand to capacity ratio, LOS = Level of Service, For future conditions, the v/c ratio is the d/c ratio, where the demand volume is used.

^a Capacity is reduced because existing auxiliary lane #1 no longer provides through movement at the Jamboree Road Interchange and existing auxiliary lane #2 between MacArthur Boulevard and Jamboree Road is eliminated as part of the proposed improvements.

^b Capacity is reduced because existing auxiliary lane #1 no longer provides through movement at the Jamboree Road Interchange.

Table 4. General Purpose Lane Evening Peak-Hour Traffic Capacity Analysis

| NORTHBOUND PM PEAK HOUR LOS | | | | | | | | |
|---|---------------|-----|----------------------|-----|----------------------|-----|----------------------|-----|
| I-405 Freeway Segment | Existing 2011 | | Alternative 1 (2045) | | Alternative 2 (2045) | | Alternative 3 (2045) | |
| | v/c | LOS | d/c | LOS | d/c | LOS | d/c | LOS |
| <i>Between I-5 and Irvine Center Drive</i> | 0.50 | B | 0.95 | D | 0.95 | D | 0.95 | D |
| <i>Between Irvine Center Drive and SR-133</i> | 0.66 | C | 1.14 | F | 1.14 | F | 1.14 | F |
| <i>Between SR-133 and Sand Canyon Avenue</i> | 0.93 | F | 1.57 | F | 1.10 | F | 1.01 | F |
| <i>Between Sand Canyon Avenue and University Drive/Jeffrey Road</i> | 0.93 | F | 1.51 | F | 1.18 | F | 1.05 | F |
| <i>Between University Drive/Jeffrey Road and Culver Drive</i> | 1.01 | F | 1.61 | F | 1.29 | F | 1.08 | F |
| <i>Between Culver Drive and Jamboree Road</i> | 0.84 | F | 1.33 | F | 1.33 | F | 1.11 | F |
| <i>Between Jamboree Road and MacArthur Boulevard</i> | 0.88 | F | 1.31 | F | 1.31 | F | 1.31 | F |
| <i>Between MacArthur Boulevard and SR-55</i> | 0.91 | F | 1.32 | F | 1.32 | F | 1.32 | F |
| SOUTHBOUND PM PEAK HOUR LOS | | | | | | | | |
| I-405 Freeway Segment | Existing 2011 | | Alternative 1 (2045) | | Alternative 2 (2045) | | Alternative 3 (2045) | |
| | v/c | LOS | d/c | LOS | d/c | LOS | d/c | LOS |
| <i>Between SR-55 and MacArthur Boulevard</i> | 0.91 | F | 1.28 | F | 1.28 | F | 1.28 | F |
| <i>Between MacArthur Boulevard and Jamboree Road</i> | 0.79 | F | 1.11 | F | 1.21 ^c | F | 1.21 ^c | F |
| <i>Between Jamboree Road and Culver Drive</i> | 0.76 | F | 1.08 | F | 1.13 ^d | F | 1.04 | F |
| <i>Between Culver Drive and University Drive/Jeffrey Road</i> | 0.98 | F | 1.18 | F | 1.07 | F | 0.98 | E |
| <i>Between University Drive/Jeffrey Road and Sand Canyon Avenue</i> | 1.08 | F | 1.38 | F | 1.13 | F | 0.96 | D |
| <i>Between Sand Canyon Avenue and SR-133</i> | 1.07 | F | 1.32 | F | 1.08 | F | 0.99 | E |
| <i>Between SR-133 and Irvine Center Drive</i> | 0.96 | D | 1.39 | F | 1.11 | F | 1.11 | F |
| <i>Between Irvine Center Drive and I-5</i> | 0.84 | D | 1.27 | F | 1.02 | F | 1.02 | F |

v/c = volume to capacity ratio, d/c = demand to capacity ratio, LOS = Level of Service, For future conditions, the v/c ratio is the d/c ratio, where the demand volume is used.

^c Capacity is reduced because existing auxiliary lane #1 no longer provides through movement at the Jamboree Road Interchange and existing auxiliary lane #2 between MacArthur Boulevard and Jamboree Road is eliminated as part of the proposed improvements.

^d Capacity is reduced because existing auxiliary lane #1 no longer provides through movement at the Jamboree Road Interchange.

Under Year 2045 conditions for the no build Alternative 1, the freeway mainline is expected to operate at LOS F during the AM and PM peak hours in both the NB and SB directions. The

demand will exceed capacity ($d/c > 1.0$) for almost all freeway segments. The NB segment between I-5 and Irvine Center Drive is the only segment expected to operate at a d/c ratio of less than 1.0 during the peak hours. This segment is expected to operate at LOS E and D during the AM and PM peak hours, respectively.

The ramp junctions and weaving segments are also expected to operate at LOS F except that the NB off-ramps at Fortune Drive and Irvine Center Drive operate at LOS B through D during the peak hours and the SB mainline weaving segments between SR-133 and the Bake Parkway off-ramp operate at LOS C through D.

In some areas, the HOV lanes for the NB and SB directions during both peak hours are expected to operate at d/c ratios of less than 1.0. The NB HOV lane from Sand Canyon Avenue to MacArthur Boulevard is expected to operate at LOS F with d/c ratios ranging from 1.02 to 1.18 during the PM peak hour.

The current configuration of the I-405 corridor has several geometric and infrastructure deficiencies on the mainline and ramps. The I-405 mainline has congestion at choke points where GP lanes are dropped and capacity is reduced. The lack of lane continuity can be found at two locations on the I-405 corridor:

- In the NB direction, the fifth GP lane is dropped along the mainline after the SB SR-133 diverging loop-connector. This reduction in mainline capacity coupled with the high volume of merging traffic from SR-133 causes congestion along the mainline.
- In the SB direction, the long auxiliary lane originating at the MacArthur Boulevard entrance ramp and a GP lane originating at the SR-55 connector are both dropped at the Culver Drive exit ramp, causing a bottleneck along the mainline.

Other mainline geometric deficiencies on the I-405 corridor are insufficient weave length and interchange spacing at the following locations.

- The SB SR-133 merging branch connector auxiliary lane is too short, resulting in insufficient weave length.
- The weaving movements in the 2-mile stretch on the SB direction between SR-55 and Jamboree Road hinder mainline operations. Drivers originating from I-405 north of SR-55 who want to exit at the Jamboree Road interchange must make two lane changes in a relatively short distance and merge with the high volume of vehicles merging onto I-405 from the SR-55 branch connectors and MacArthur Boulevard entrance ramp as well as the high volume of vehicles exiting at the MacArthur Boulevard exit ramp.
- The MacArthur Boulevard entrance ramp adds two lanes, prompting the need for a second lane change for drivers originating north of SR-55 who wish to exit at the Jamboree Road interchange.

Besides mainline deficiencies, some exit ramps are approaching capacity. The single-lane exit ramps in the NB direction at the Sand Canyon Avenue and MacArthur Boulevard interchanges have existing AM and PM peak-hour volumes nearing the capacity of about 1,500 vehicles per hour (VPH) and may warrant a two-lane exit ramp. In the SB direction, the single-lane exit at the Sand Canyon Avenue interchange has an existing AM peak-hour volume that is nearing the threshold for a two-lane exit ramp.

Auxiliary lanes are warranted at two locations.

- In the SB direction, an auxiliary lane between the Jeffrey Road / University Drive diamond entrance ramp and the Sand Canyon Avenue exit ramp is needed because of the high volume of vehicles using the ramps.
- A SB auxiliary lane is warranted between the Sand Canyon Avenue loop entrance ramp and the SR-133 exit ramp because of the close proximity of the two ramps.

Design Variation

A design variation is proposed for the SB I-405 ramps between SR-133 and Irvine Center Drive. The design variation proposes to grade-separate the SB I-405 Irvine Center Drive off-ramp and the SR-133 merging branch connector. This design variation would eliminate the mainline weaving occurring between the closely spaced SR-133 and Irvine Center Drive. This design variation is compatible with Alternatives 2 and 3.

For this design variation, freeway analyses were conducted along SB I-405:

- The SB I-405 mainline segment between the SR-133 off-ramp and the Irvine Center Drive off-ramp is expected to operate at LOS F during the AM and PM peak hours due to demand exceeding capacity.
- The two segments of SB I-405 from the Irvine Center Drive off-ramp to the SR-133 Branch Connector on-ramp and the SR-133 Branch Connector on-ramp to the Irvine Center Drive on-ramp are expected to operate at LOS D during the AM and PM peak hours.
- The SB I-405 on-ramp from the SR-133 branch connector is expected to operate at LOS C and D during the AM and PM peak hours, respectively.

Secondary Deficiencies

The proposed project may have secondary deficiencies that must be evaluated during the PA/ED phase. The local arterials and ramp intersections at Irvine Center Drive and Sand Canyon Road may need to be built out to their ultimate configurations so the ramp operations are efficient. The other local road and interchange intersections appear to be built out and provide sufficient capacity.

6. CORRIDOR AND SYSTEM COORDINATION

The proposed project is consistent with the I-405 Route Concept Report prepared in 1999 and the South Orange County MIS prepared in 2008. The project is part of the OCTA Measure M2 freeway program (Project L). During the PA/ED phase, coordination with statewide, regional, and local planning projects should continue (see Attachment D, Transportation Planning Scoping Information Sheet).

Caltrans is responsible for monitoring the performance of HOV/managed lanes system. Project alternatives will be revisited during the PA/ED phase and may include consideration of changes in management of HOV/managed lanes. The following projects are currently planned in the project area:

Caltrans Projects

- I-405/HOV Lane Buffer Removal and Continuous Access from I-5 to SR-73
- I-405/Extend SB Lane from Culver Drive to University Drive
- I-405/NB Culver Drive Two-lane Exit and 1,300-foot Deceleration Lane
- I-405 SB from University Drive to Sand Canyon Avenue Auxiliary Lane
- I-405 SB from Sand Canyon Avenue to SR-133 Auxiliary Lane
- I-405 SB from SR-133 to Irvine Center Drive Auxiliary Lane
- I-405/Jamboree Interchange Landscaping Project
- I-405/SB Jeffrey/University Drive Two-lane exit

City of Irvine Transportation Projects

- Jamboree Road/I-405 SB Ramp Improvements
- Laguna Canyon/I-405 Overcrossing Widening
- Jamboree Road/Main Street Intersection
- Signal Synchronization Projects along Jamboree Road, Culver Drive, and Jeffrey Road
- Traffic Light Synchronization Program along Irvine Center Drive

City of Irvine Development Projects – Proposed and Recently Approved Development

- Spectrum Residential – 1,339 Apartments (Planning Area 33)
- Los Olivos – 1,750 Apartments (Planning Area 39)
- Laguna Altura – 597 Single-Family / Detached Condominiums (Planning Area 18)
- Former Vista Verde School – 55 Single-Family Dwellings (Planning Area 20)
- Park Place – 987 Apartments and 45,960-square-foot LA Fitness (Planning Area 23)
- Metropolis – 457 Condominiums (Planning Area 36)
- Former Alderwood School - 48 single-family dwellings (Planning Area 15)
- Alton-Milikan Phase 1 - 190 Apartment Dwellings (Planning Area 36)
- Irvine Technology Center - 1,800 Apartments and 17,000 square feet of retail (Planning Area 36)
- 2801 Kelvin - 384 Apartments (Planning Area 36)
- 2012 Great Park - 9,500 Dwellings, 1,318,000 square feet of Multi-Use, 3,364,000 square feet of Medical and Science, and 220,000 square feet of Community Commercial (Planning Area 51)

It is anticipated that the corridor has existing traffic incident detection and management plans. The proposed project would include a full review of the Transportation System Management (TSM), Transportation Demand Management (TDM), and Intelligent Transportation Systems (ITS) elements within the project area. Some of the ITS elements that could be affected by or proposed as part of this project include fiber-optic communication systems; dynamic message signs; detection; ramp meter systems, wide adaptive ramp meters, and ramp metering of HOV bypass lanes; HOV access; and camera systems. ITS elements would be identified during the PA/ED phase.

Maintenance vehicle pullouts (MVP) would be included in the proposed project. The locations of MVPs will be determined during the PA/ED phase.

Complete Streets

The PST will seek to provide complete streets in the development of the project so the planning, design, construction, maintenance, and operation of the regional transportation systems are integrated. Below are some of the city and county systems that may affect the scope of this project. These should be evaluated during the PA/ED phase of this I-405 project.

The City of Irvine general plan has an extensive network of existing and planned on- and off-street bike and pedestrian facilities that include the following:

- A bike and pedestrian trail exists on the north side of the freeway between the San Diego Creek and Jeffrey Road with at-grade crossings at the Culver Drive and Jeffrey Road interchanges.
- Bike and pedestrian facilities exist or are planned on both sides on the freeway between Jeffrey Road and Sand Canyon.
- Exclusive bike and pedestrian bridges across I-405 exist at Yale Avenue and just south of Jeffrey Road.
- Von Karman Avenue, Harvard Avenue, Culver Drive, Jeffrey Road, Laguna Canyon Road, and Irvine Center Drive are designated bikeways.

The Irvine Shuttle is a city-operated transit system that provides two separate transit services:

- Shuttle transportation between the Orange County Airport, Irvine Business Complex (IBC), and Tustin Metrolink Station. The current route for this system crosses I-405 via Von Karman Avenue and Harvard Avenue.
- Shuttle transportation between the Irvine Medical and Science Complex (IMSC), Irvine Spectrum, Irvine Technology Center, Irvine Transportation Center and Irvine Metrolink Station. This system does not cross I-405.

The Orange County Transportation Authority has a bus system with at least two intra-county express lines that use I-405 and an extensive network of bus lines using the local road crossings. However, there are no bus stations or stops adjacent to or near the freeway system.

Context-Sensitive Solutions

Context sensitive solutions will be sought in the development of the project so it is balanced with the aesthetic, historical, and environmental values of the community. Within the City of Irvine,

the I-405 corridor is in an urban setting with distinct residential, commercial, conservation open space, and urban/ industrial land uses abutting the freeway. The two major business/industrial areas along the area of proposed improvements include the IBC and IMSC. The IBC is on both sides of the freeway from MacArthur Boulevard to the San Diego Creek channel south of Jamboree Road. The IMSC is on the east side of the freeway between Sand Canyon Avenue and SR-133. In addition, a major commercial area, the Irvine Spectrum, is on the east side of the freeway between SR-133 and I-5. These areas provide highly visible views to and from the highway and contribute to the area's economic vitality. The city plans to enhance the freeway landscaping and develop gateways and landmarks for these areas.

The proposed improvements abut approximately 3.7 miles of conservation and open space area from Laguna Canyon Road to the San Diego Creek. Within this area, several systems are linearly linked to form a corridor of open and natural views. The systems include the San Diego Creek, Culverdale Wilderness Park, Quail Hill Preserve, Edison easement, Freeway Green Belt Trail, and drainage channels. Landscaping, trails, noise walls, property walls, water quality features, and drainage basins installed by the City of Irvine and Caltrans along the corridor complement the natural views.

Early coordination with the City of Irvine and public outreach during the PA/ED phase of the project will ensure the project is consistent with the community's values.

7. ALTERNATIVES

The proposed project adds GP lanes in each direction to sections of I-405 between PM 0.2 and PM 8.7. Three alternatives are considered for the proposed project. Alternative 1 is the no build alternative, and Alternatives 2 and 3 are build alternatives. Each alternative is illustrated in Figures 1 and 2. The horizon year established for this project is 2045, with an anticipated open-to-traffic year ranging from the middle of 2023 to early 2025.

Alternative 1 – No Build Alternative

Alternative 1 is the no build alternative and includes the completion of five projects that are currently programmed by Caltrans. Alternative 1 does not comprehensively address the I-405 deficiencies and fails to satisfy this project's purpose and need. Existing and forecasted LOS F conditions in the corridor would get worse. Bottlenecks that are caused by poor lane continuity and high-volume on-ramp merges would persist.

The projects that are currently programmed by Caltrans in the State Highway Operations and Protection Program (SHOPP), STIP, or Corridor Mobility Improvement Account (CMIA) are shown in Table 5. These programmed improvements are included in both the no build and the build alternatives.

Table 5. Programmed Improvements

| EA | Funding | Construction | Project Description |
|--------|---------|--------------|---|
| 0J4401 | STIP | 2015-2016 | HOV Lane Buffer Removal and Continuous Access Project from I-5 to SR-73, which will provide continuous HOV ingress and egress on I-405. |
| 0M350K | SHOPP | 2013 | Median Paving and SB I-405 Auxiliary Lane Project, which will replace an obsolete, temporary barrier with a permanent, Type 60, concrete barrier along the centerline of I-405 from the SB off-ramp to the Sand Canyon Avenue NB off-ramp. This project will also extend the second SB auxiliary lane from the Culver Drive off-ramp to the Jeffrey Road / University Drive off-ramp. |
| 0M1304 | CMIA | 2012-2013 | NB I-405 at the Off-Ramp to Culver Drive Project, which will add a 1,300-foot-long deceleration lane in advance of the NB Culver Drive off-ramp and provide a two-lane exit at the ramp. |
| 0H045K | STIP | 2016-2017 | University Drive to Sand Canyon Avenue Auxiliary Lane Project, which will provide a SB auxiliary lane from the Jeffrey Road / University Drive direct on-ramp to the Sand Canyon Avenue off-ramp. |
| 0H320K | STIP* | TBD | Sand Canyon Avenue to SR-133 Auxiliary Lane Project, which will provide a SB auxiliary lane from the Sand Canyon Avenue on-ramp to the SR-133 off-ramp. |
| 0H770 | STIP | TBD | SB I-405, provide a two lane off-ramp to Jeffrey/University Drive interchange. |

*Anticipated approval on March 2014

Alternative 2 – Add One General Purpose Lane (Measure M2 Project)

The Measure M2 Freeway Plan identifies Project L to include the addition of new lanes to the freeway mainline from SR-55 to I-5 and improve chokepoints at interchanges. Alternative 2 consists of the improvements specified in the Measure M2 Freeway Plan, which would add one GP lane in the NB direction of I-405 from SR-133 to Culver Drive and one GP lane in the SB direction from Irvine Center Drive to University Drive / Jeffrey Road. This would provide a fifth continuous GP lane from I-5 to SR-55 in the NB direction and from SR-55 to Bake Parkway in the SB direction. The proposed mainline travel lanes in Alternative 2 would generally be 12 feet wide. The inside (left) and outside (right) shoulders would generally be 10 feet wide. A schematic of Alternative 2 is provided in Figures 1 and 2. A set of conceptual layout plans and cross-sections for Alternative 2, is in Attachment B.

Alternative 2 would add a new auxiliary lane in the NB direction between the SR-133 merging branch connector and the Sand Canyon Avenue off-ramp (L-6)[†]. In the SB direction, new auxiliary lanes are proposed between the Jeffrey Road off-ramp and the Culver Drive direct on-ramp (L-9 to L-12). One of the two existing auxiliary lanes added to the mainline at the MacArthur Boulevard on-ramp would be removed in the SB direction, leaving a single auxiliary lane that ends at the Jamboree Road off-ramp (L-15, L-16). Dropping the auxiliary lane at the

[†] (L-X) is reference to the layout sheet in Attachment B that shows the feature discussed.

Jamboree Road off-ramp, rather than extending the auxiliary lane through the interchange, allows the downstream Jamboree Road direct on-ramp to add an auxiliary lane that extends to the Culver Drive off-ramp (L-12 to L-14).

In addition to GP and auxiliary lanes, Alternative 2 would provide the following geometric and operational improvements:

- Subject to detailed traffic studies during the PA/ED phase and warrant, the Irvine Center Drive direct on-ramp to SB I-405 would be removed and a left-hand turn lane would be installed on Irvine Center Drive to provide eastbound (EB) traffic access to SB I-405 through the loop-ramp (L-3).
- The SR-133 merging connector to SB I-405 would be split into two junctions with the mainline, including one junction for the SB SR-133 traffic and one junction for the NB SR-133 traffic, to improve mainline operations (L-4, L-5).
- The SB I-405 diverging connector to SR-133 would provide a two-lane exit to accommodate a peak-hour exit volume greater than 1,500 VPH and improve mainline operations (L-6).
- The NB I-405 off-ramp to Sand Canyon Avenue and the SR-133 merging branch connector would be grade-separated (braided) to improve mainline operations by minimizing weaving (L-5 to L-7).
- The NB and SB I-405 off-ramps to Sand Canyon Avenue would each provide a two-lane exit to accommodate a peak-hour volume greater than 1,500 VPH (L-6, L-7).
- The University Drive direct on-ramp to SB I-405 would provide a third metered lane to give additional storage capacity (L-9).

Figure 1. I-405 Lane Chart –SR-55 to I-5 Northbound

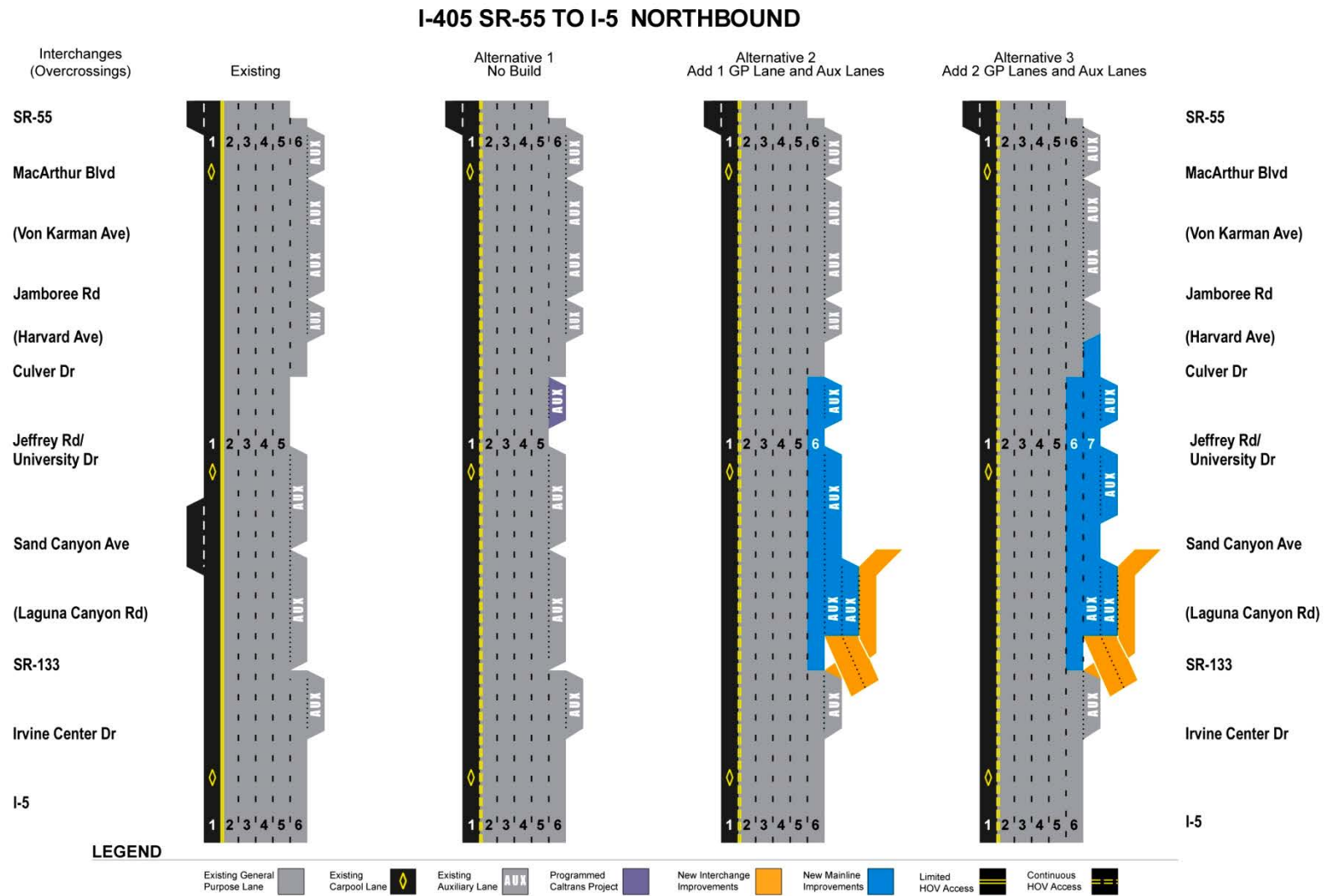
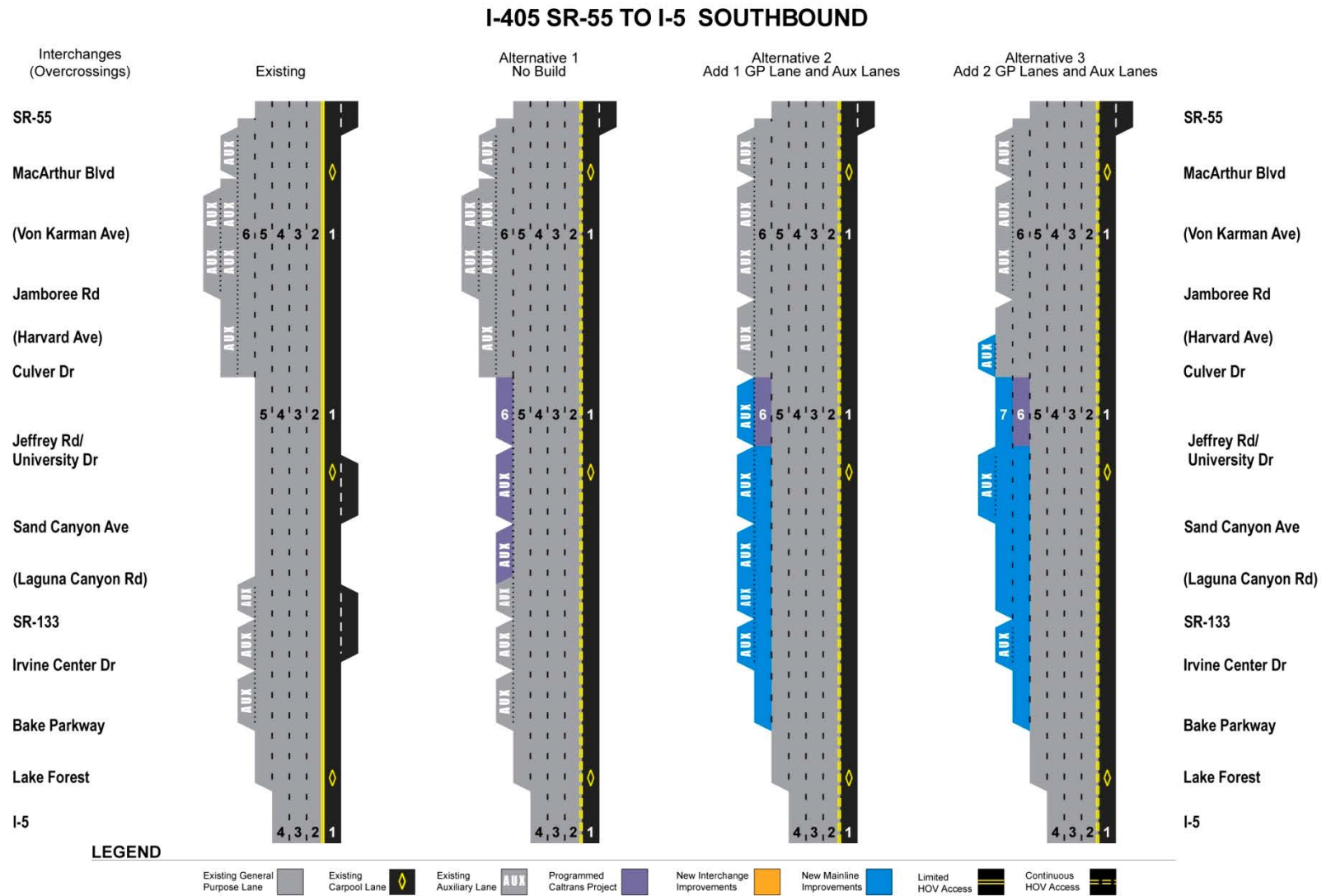


Figure 2. I-405 Lane Chart –SR-55 to I-5 Southbound



- The SB auxiliary lane added at the Jamboree Road direct on-ramp would accommodate the high volume of entering vehicles (L-14).
- The SB I-405 lanes would be restriped to provide the standard 12-foot-wide lanes between Jamboree Road and MacArthur Boulevard (L-14 to L-16).
- The removal of one of the two existing auxiliary lanes at the MacArthur Boulevard on-ramp would improve the mainline lane balance. This would eliminate the need for vehicles, originating from north of SR-55 and exiting at Jamboree Road, to make two lane changes (L-14 to L-16).
- The NB I-405 off-ramp to MacArthur Boulevard would provide a two-lane exit to accommodate a peak-hour exit volume greater than 1,500 VPH (L-16).

The estimated construction cost for this alternative is \$110 million to \$140 million. See Section 11 for additional detail.

The Alternative 2 GP lanes, auxiliary lanes, and ramp modifications address the need and purpose of the project that were identified in Section 3 and provide capacity enhancements as discussed in Section 5. The benefits of the proposed improvements are as follows:

- Alternative 2 improves the continuity of the mainline GP lanes by eliminating the existing lane drop of the fifth GP lane in the NB direction of I-405 just after the SB SR-133 diverging loop connector. The fifth GP lane will be extended from SR-133 to Culver Drive where it will join the existing fifth GP lane, making a continuous fifth GP lane from I-5 to SR-55. It will also eliminate the existing lane drop of the fifth GP lane in the SB direction of I-405 at the SB Culver Drive off-ramp. The fifth GP lane will be extended from Culver Drive to the Bake Parkway off-ramp to provide a continuous fifth GP lane from SR-55 to Bake Parkway. These actions will increase capacity for I-405 traffic.
- Alternative 2 will eliminate weaving deficiencies by braiding the NB SR-133 merging branch connector with the Sand Canyon off-ramp to significantly reduce the mainline turbulence caused by the short weaving distance between SR-133 and Sand Canyon Avenue. It will also maintain the existing auxiliary lane between the NB SR-133 ramps and Jeffrey Road NB off-ramp to facilitate the high volume of traffic from the SR-133 merging connector. In addition, it will enhance the weaving operations between the SB MacArthur Boulevard on-ramp and the Jamboree Road off-ramp by reducing the existing two auxiliary lane configuration to one auxiliary lane, which will eliminate the multiple lane changes drivers have to make to join the mainline in a relatively short distance.
- Alternative 2 improves operations at the ramp exits. This includes improving the ramp and mainline operations at the NB and SB Sand Canyon Avenue off-ramps and the NB MacArthur Boulevard off-ramp by converting the existing single-lane exit ramps to two-lane exit ramps to accommodate their high volumes of peak-hour traffic.

Alternative 3 – Add Two General Purpose Lanes

Alternative 3 includes the GP lane included in Alternative 2 and adds several improvements beyond those identified in the Measure M2 Freeway Plan. In the PA/ED phase, these additional improvements should be explored as a phased project in addition to Project L. Further, federal

and State funding sources should be explored for Alternative 3, as these improvements are beyond the Measure M2 Freeway Plan.

Alternative 3 adds a second GP lane in the NB direction of I-405 from SR-133 to Jamboree Road and in the SB direction from Culver Drive to SR-133. This would provide a sixth continuous GP lane in each direction from SR-133 to Jamboree Road. The proposed mainline travel lanes in Alternative 3 would generally be 12 feet wide. The inside (left) and outside (right) shoulders would generally be 10 feet wide. A schematic of Alternative 3 is provided in Figures 1 and 2. A set of conceptual layout plans, including cross sections for Alternative 3, is provided in Attachment B of this report.

In addition to the auxiliary lanes included in the no build Alternative 1, Alternative 3 proposes to add a new auxiliary lane between the SR-133 merging branch connector and the Sand Canyon Avenue off-ramp (L-6) in the NB direction. In the SB direction, a new auxiliary deceleration lane is proposed in advance of the Culver Drive off-ramp (L-12, L-13). Similar to Alternative 2, one of the two existing auxiliary lanes added to the mainline at the MacArthur Boulevard on-ramp would be removed in the SB direction, leaving a single auxiliary lane that ends at the Jamboree Road off-ramp (L-15, L-16). Dropping the auxiliary lane at the Jamboree Road off-ramp, rather than extending the auxiliary lane through the interchange, allows the downstream Jamboree Road direct on-ramp to add an auxiliary lane that extends to the Culver Drive off-ramp (L-12 to L-14).

In addition to GP and auxiliary lanes, Alternative 3 would provide the following geometric and operational improvements beyond the No Build Alternative 1:

- Subject to detailed traffic studies during the PA/ED phase and warrant, the Irvine Center Drive direct on-ramp to SB I-405 would be removed and a left-hand turn lane would be installed on Irvine Center Drive to provide EB traffic access to SB I-405 through the loop-ramp (L-3).
- The SR-133 merging connector to SB I-405 would be split into two junctions with the mainline, including one junction for the SB SR-133 traffic and one junction for the NB SR-133 traffic, to improve mainline operations (L-4, L-5).
- The SB I-405 diverging connector to SR-133 would provide a two-lane exit to accommodate a peak-hour exit volume greater than 1,500 VPH and improve mainline operations (L-6).
- The NB I-405 off-ramp to Sand Canyon Avenue and the SR-133 merging branch connector would be grade-separated (braided) to improve mainline operations by minimizing weaving (L-5 to L-7).
- The NB and SB I-405 off-ramps to Sand Canyon Avenue would each provide a two-lane exit to accommodate a peak-hour volume greater than 1,500 VPH (L-6 to L-7).
- The University Drive direct on-ramp to SB I-405 would provide a third metered lane to give additional storage capacity (L-9).
- The SB auxiliary lane added at the Jamboree Road direct on-ramp would accommodate the high volume of entering vehicles (L-14).

- The SB I-405 lanes would be restriped to provide the standard 12-foot-wide lane between Jamboree Road and MacArthur Boulevard (L-14 to L-16).
- The single SB auxiliary lane added at the MacArthur Boulevard on-ramp would improve the mainline lane balance. For vehicles originating north of SR-55 that are exiting at Jamboree Road, it would eliminate having to make two lane changes against a high volume of traffic (L-14 to L-16).
- The NB I-405 off-ramp to MacArthur Boulevard would provide a two-lane exit to accommodate a peak-hour exit volume greater than 1,500 VPH (L-16).

The estimated construction cost for this alternative is \$160 million to \$190 million. See Section 11 for additional detail.

The Alternative 3 GP lanes, auxiliary lanes, and ramp modifications address the need and purpose of the project as discussed in Section 3 and provide capacity enhancements as discussed in Section 5. The benefits of the proposed improvements are as follows:

- Alternative 3 improves the capacity and continuity of the mainline GP lanes. Similar to Alternative 2, this alternative will eliminate the existing lane drop of the fifth GP lane in the NB direction of I-405 just after the SB SR-133 diverging loop connector. The fifth GP lane will be extended from SR-133 to Culver Drive where it will join the existing fifth GP lane to provide more capacity on a continuous fifth GP lane on NB I-405 from I-5 to SR-55. This alternative will also eliminate the existing lane drop of the fifth GP lane in the SB direction of I-405 at the SB Culver Drive off-ramp. The fifth GP lane will be extended from Culver Drive to the Bake Parkway off-ramp and will provide a continuous fifth GP lane, and more capacity, from SR-55 to Bake Parkway. Alternative 3 also will provide a sixth GP lane in NB and SB I-405 between the SR-133 branch connector and the Jamboree Road interchange. The Jamboree Road interchange is the primary gateway to the high volume of peak-hour traffic coming from and going to the IBC. The sixth lane will provide additional capacity to accommodate this heavy volume of traffic to and from SR-133.
- Alternative 3 will braid the NB SR-133 merging branch connector with the Sand Canyon off-ramp to reduce the mainline turbulence caused by the short weaving distance between SR-133 and Sand Canyon Avenue. It will also maintain the existing auxiliary lane between the NB SR-133 ramps and Jeffrey Road NB off-ramp to facilitate the high volume of traffic from the SR-133 merging connector. In addition, it will enhance the weaving operations between the SB MacArthur Boulevard on-ramp and the Jamboree Road off-ramp by reducing the existing configuration of two auxiliary lanes to one auxiliary lane. This will eliminate the multiple lane changes drivers have to make to join the mainline in a relatively short distance.
- Alternative 3 improves operations at the ramp exits. This alternative will improve the ramp and mainline operations at the NB and SB Sand Canyon Avenue off-ramps and the NB MacArthur Boulevard off-ramp by converting the existing, single-lane ramps to two-lane ramps.

Design Standards Risk Assessment

The potential nonstandard design features are the same for Alternative 2 and 3. Table 6 shows the results of the mandatory design standards risk assessment for the project. The advisory design standard risk assessment for Alternative 2 and 3 is provided in Table 7.

The engineering analysis performed during the PSR/PDS phase is preliminary and based on a low level of design detail. 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.

There are potential exceptions related to an existing condition where the opportunity for correction is best evaluated during the PA/ED phase. Additionally, reduced shoulder widths along the mainline at several overcrossings, such as the Culver Drive overcrossing and the SR-133 separators, have been proposed to maintain the existing structure, thereby avoiding significant impacts and delays to local arterial and freeway traffic during construction. Maintaining the existing structures will allow them to be used for the full duration of their respective service lives.

Table 6. Mandatory Design Standard Risk Assessment for Alternative 2 and 3

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|---|---|---|---|--|
| 1 | (201.1 – Sight Distance) Table 201.1 shows the minimum standards for stopping sight distance related to design speed for motorists. | Potential exception for SR-133 along the existing directional NB SR-133 to NB I-405 connector from STA 90+00 to STA 105+00 | Medium | Existing conditions have changed (increased traffic volumes) since the existing exceptions were approved. The existing condition needs to be justified on current design criteria and operational conditions. The magnitude of the non-standard feature cannot be evaluated with the current project information provided. |
| 2 | (202.2 – Superelevation) Based on an emax selected by the designer for one of the conditions, superelevation rates from Table 202.2 shall be used within the given range of curve radii. If less than standard superelevation rates are approved (see Index 82.1), Figure 202.2 shall be used to determine superelevation based on the curve radius and maximum comfortable speed. | SB Irvine Center Drive on- and off-ramp NB and SB Sand Canyon Road on- and off-ramps NB and SB Jeffrey Road loop on-ramps SB Culver Drive loop on-ramp SB Culver Drive off-ramp NB Culver Drive loop on-ramp | Medium | The magnitude of the non-standard feature cannot be evaluated at the multiple locations with the current project information provided. |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|---|---|--|---|--|
| 3 | (203.1 – Horizontal Alignment and Stopping Sight Distance) Horizontal alignment shall provide at least the minimum stopping sight distance for the chosen design speed at all points on the highway, as given in Table 201.1 and explained in Index 201.3. | Potential exception for SR-133 along the existing directional NB SR-133 to NB I-405 connector from STA 90+00 to STA 105+00 | Low | Existing conditions have changed (increased traffic volumes) since the existing exceptions were approved. The existing condition needs to be justified on current design criteria and operational conditions. The magnitude of the non-standard feature cannot be evaluated with the current project information provided. |
| 4 | (203.2 – Standards for Curvature – Minimum Radius) Table 203.2 shall be the minimum radius of curve for specific design speeds on highways. | SR-133 loop connectors from STA 90+00 to STA 102+00 | Medium | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. |
| 5 | (203.2 – Standards for Curvature – Lateral Clearance) If the minimum radii indicated in Table 203.2 does not provide the desired lateral clearance to an obstruction, Figure 201.6 shall govern. | Potential exception for SR-133 along the existing directional NB SR-133 to NB I-405 connector from STA 90+00 to STA 105+00 | Medium | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|---|---|---|---|---|
| 6 | (208.1 – Bridge Width) The clear width of all bridges, including grade separation structures, shall equal the full width of the traveled way and paved shoulders on the approaches | Existing NB I-405 bridge over San Diego Creek at STA 80+00 | Medium | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. |
| 7 | (208.4 – Bridge Sidewalk Width) The minimum width of a bridge sidewalk shall be 6 feet. | Existing sidewalks at the following overcrossings: MacArthur Boulevard, Jamboree Road, Harvard Avenue, Culver Drive, Jeffrey Road, Laguna Canyon Road, and Irvine Center Drive. | Medium | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. |
| 8 | (208.10 – Barriers on Structures with Sidewalks) Any use of railings and barriers with sidewalks on structures with posted speeds greater than 45 miles per hour shall have a barrier separation between the roadway and the sidewalk. | Existing overcrossings at MacArthur Boulevard, Jamboree Road, Harvard Avenue, Culver Drive, Jeffrey Road, Laguna Canyon Road, and Irvine Center Drive. | Low | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. This is a pedestrian safety issue. All safety issues have a high priority. |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|----|--|--|---|---|
| 9 | (301.1 – Lane Width) The minimum lane width on two-lane and multilane highways, ramps, collector roads, and other appurtenant roadways shall be 12 feet, except as (see HDM.) | Existing SB I-405 HOV lane width between MacArthur Boulevard and SR-55 from STA 425+00 to 434+00 | Low | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. Restrictive conditions will need to be compelling. |
| 10 | (302.1 – Shoulder Width) Provide in accordance with Table 302.1 | Multiple locations for inside shoulder width reductions at overhead signs and bridge columns located in the median NB I-405 right shoulder at San Diego Creek bridge at STA 80+00 | Medium | The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. Restrictive conditions will need to be demonstrated and compelling. Mitigation measures will be needed for restrictive conditions. |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|----|--|---|---|--|
| 11 | (305.1 - Median Width – Freeways and Expressways) In areas where restrictive conditions prevail the minimum median width shall be 22 feet. | I-405 STA 23+50 to STA 45+40, STA 84+15 to STA 104+90, and STA 419+90 to STA 442+00 | High | The magnitude of the non-standard feature cannot be evaluated at the multiple locations with the current project information provided. The more important design feature here is shoulder and lane width. |
| 12 | (309.1 – Horizontal Clearances) Minimum Clearances. The following minimum horizontal clearances shall apply to all objects that are closer to the edge of traveled way than the clear recovery zone distances listed above (See HDM). | Existing NB I-405 bridge over San Diego Creek at STA 80+00 | Medium | The level of evaluation depends on the objects in question for this project and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. Restrictive conditions will need to be demonstrated and compelling. Mitigation measures will be needed for restrictive conditions. |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|----|---|---|--|---|
| 13 | <p>(501.3 – Interchange Spacing)</p> <p>The minimum interchange spacing shall be one mile in urban areas, two miles in rural areas, and two miles between freeway-to-freeway inter-changes and other interchanges. The minimum interchange spacing on Interstates outside of a Transportation Management Area shall be three miles.</p> | <p>Interchange spacing between:</p> <p>SR-55 and MacArthur Boulevard</p> <p>MacArthur Boulevard and Jamboree Road</p> <p>Sand Canyon Avenue and SR-133</p> <p>Irvine Center Drive and I-5</p> | High | <p>The impacts to the operation of the roadway resulting from the non-standard feature cannot be evaluated at the multiple locations with the current project information provided. Even though the risk level for approval is high, mitigation measures will be needed to improve operations and safety in between intersections, weaving, merging, etc.</p> |
| 14 | <p>(504.3 – Distance Between Ramp Intersection and Local Road Intersection)</p> <p>The minimum distance (curb return to curb return) between ramp intersections and local road intersections shall be 400 feet.</p> | <p>Distance between:</p> <p>NB MacArthur Boulevard off-ramp and Main Street</p> <p>NB Culver Drive on-ramp and Ferris Street</p> <p>SB Culver Drive on-ramp and Seton Road</p> | High | <p>The magnitude of the non-standard feature cannot be evaluated at the multiple locations with the current project information provided. After the full scope of work is provided a more definitive risk level can be provided. Mitigation between ramp intersections and local road intersections may be needed to improve operations and safety.</p> |

| | Mandatory Design Standard from Highway Design Manual Table 82.1A | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|----|---|---|--|---|
| 15 | <p>(504.7 – Weaving Length)</p> <p>The minimum weaving length, measured as shown on Figures 504.2A and 504.2B shall be 2,000 feet in urban areas, 5,000 feet in rural areas, and 5,000 feet between freeway-to-freeway interchanges and other interchanges.</p> | <p>Potential exception for weaving length less than 5,000 feet:</p> <p>Between the NB and SB SR-133 connectors to SB I-405 (STA 81+00) and the Irvine Center Drive exit ramp (STA 62+00)</p> <p>Between the NB and SB SR-133 connector to NB I-405 (STA 121+00) and the Sand Canyon Avenue exit ramp (STA 134+00)</p> <p>Between the NB and SB SR-55 branch connectors to I-405 (STA 441+00) and the MacArthur Boulevard ramps (STA 417+00)</p> | Low | <p>The level of evaluation depends on the scope of work and the magnitude of the non-standard feature. The less than standard design feature cannot be evaluated with the current project information provided. Restrictive conditions will need to be compelling. More inventive solutions may be needed to resolve the non-standard feature. Mitigation measures will likely be needed to improve operations and safety in between intersections where minimum standards cannot be met.</p> |

Table 7. Advisory Design Standard Risk Assessment for Alternative 2 and 3

| | Advisory Design Standard from Highway Design Manual Table 82.1B | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|---|--|---|---|--|
| 1 | (202.5- Superelevation Runoff) Two-thirds of the superelevation runoff should be on the tangent and one-third within the curve. | SB Irvine Center Drive on- and off-ramp NB and SB Sand Canyon Road on- and off-ramps NB and SB Jeffrey Road loop on-ramps SB Culver Drive loop on-ramp SB Culver Drive off-ramp NB Culver Drive loop on-ramp | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 2 | (203.6 – Reversing Curves – Transition Length) When horizontal curves reverse direction the connecting tangents should be long enough to accommodate the standard superelevation runoffs given on Figure 202.5. | SB Irvine Center Drive off-ramp NB and SB Sand Canyon Road off-ramps SB Culver Drive off-ramp NB Jamboree Road off-ramp | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 3 | (301.2 – Class II Bikeway Lane Width) Posted speeds are greater than 40 miles per hour, the minimum bike lane should be 6 feet, | Existing bike lanes at the following overcrossings: Culver Drive, Sand Canyon Road, and Irvine Center Drive. | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 4 | (305.1 - Median Width – Freeways and Expressways) The minimum median width for freeways and expressways in urban areas should be 36 feet. | I-405 STA 45+40 to STA 84+15, STA 104+90 to STA 130+10, and STA 254+40 to 419+90 | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |

| | Advisory Design Standard from Highway Design Manual Table 82.1B | Location | Probability of Design Exception Approval | Justification for Probability Rating |
|---|--|---|---|--|
| 5 | (305.1 – Median Pedestrian Refuge Island) Where pedestrians are allowed to cross 4 or more lanes at a marked or unmarked crosswalk, a pedestrian refuge island should be provided. | SB Jamboree Road off-ramp termini | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 6 | (504.3 – Metered Multi-Lane Entrance Ramps Lane Drop) Depending on approach geometry and speed, the lane drop transition between the limit line and the 6-foot separation point should be accomplished with a taper of between 30:1 and 50:1 (longitudinal to lateral). | NB and SB Sand Canyon Loop on-ramp | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 7 | (504.3 – Free Right Turns at Ramp Terminals) Where a separate right-turn lane is provided at ramp terminals, the turn lane should not continue as a "free" right. | SB Irvine Center Drive off-ramp NB Jamboree Road off-ramp NB and SB Macarthur Boulevard off-ramp | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |
| 8 | (504.3 – Distance Between Ramp Intersection and Local Road Intersection) The preferred minimum distance should be 500 feet. | Distance between: NB MacArthur Boulevard off-ramp and Main Street NB Culver Drive on-ramp and Ferris Street SB Culver Drive on-ramp and Seton Road | Medium | The less than standard design feature cannot be evaluated with the current project information provided. |

Design Variation for PA/ED Phase Consideration

In addition to the concepts proposed for Alternatives 2 and 3, the PA/ED phase should evaluate grade-separating the SB I-405 Irvine Center Drive off-ramp and the SR-133 merging branch connector. This action would eliminate the mainline weaving occurring between the closely spaced SR-133 and Irvine Center Drive interchange. This design variation is compatible with Alternative 2 and 3 and probably could be constructed inside the existing Caltrans ROW. A set of conceptual layout plans, including cross-sections for the design variation is provided in Attachment B.

The design variation would add approximately \$40 million to the construction cost of either Alternative 2 or 3. See Section 11 for additional detail.

The PA/ED phase would include the evaluation of adding a third EB left turn lane to the SB Irvine Center Drive off-ramp. This additional turning lane is an improvement identified in the NITM and should be considered for inclusion in this project.

Complete Streets

The City of Irvine provides the network of pedestrian walkways, bike ways, shared-use trails, and transit systems described in Section 6. The freeway interchanges serve as links for these systems, providing access across the freeway and local arterials.

Several of the existing interchange configurations include free-flow ramps that may need to be modified to enhance pedestrian and cyclist safety. During the PA/ED phase, interchanges should be evaluated in accordance with Caltrans' Deputy Directive 64 and opportunities for enhancements should be identified. Pedestrian warning signs, yield lines, pedestrian-actuated beacons, and high-visibility striping of bike lanes and crosswalks are examples of potential treatments that may enhance safety. Reconfiguring the intersections so that the on-ramps are perpendicular to the local road to eliminate the free-flow turning movements may also enhance safety and should be further studied during the PA/ED phase. Pedestrian facilities must comply with current Americans with Disabilities Act (ADA) requirements.

Context-Sensitive Solutions

In accordance with Caltrans' Director's Policy 22, the PA/ED phase should take a collaborative, interdisciplinary approach that provides context sensitive designs, such as aesthetic treatments, landscaping, noise walls, water quality features, and drainage basins, that preserve or enhance the urban and natural views and resources along the corridor. The preservation of environmentally sensitive areas also will be an important component of the project. Opportunities for context-sensitive solutions that warrant consideration during the PA/ED phase are described in the PEAR (Attachment C).

Constructability

Construction of Alternative 2 or 3 consists of widening the freeway and ramps to the inside, outside, or both. Work items associated with each alternative, such as earthwork, paving, retaining walls, bridges, drainage, and ITS elements, can be accomplished using standard traffic handling practices such as lane shifting, shoulder closures, nighttime lane closures, and nighttime rolling slow-downs. Bridge widening over the San Diego Creek channel can be accomplished in accordance with regulatory permit requirements, including work windows for

foundation and work within the waterway. Constructability reviews shall be performed during the PA/ED and PS&E phase of the project.

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.

8. RIGHT-OF-WAY

The improvements proposed for Alternatives 2 and 3 are generally within the existing ROW, fulfilling the purpose and need statement. However, there may be minimal ROW impacts at three parcels adjacent to the Laguna Canyon Road overcrossing. These acquisitions would be fee partial takes and are needed to accommodate the proposed NB braided ramp configuration between SR-133 and Sand Canyon Avenue. It is anticipated that temporary construction easements would be needed and are accounted for in the right-way-costs. Preliminary exhibits of the potential ROW impacts have been included with the Conceptual Cost Estimate – Right-of-Way Component in Attachment E. During the PA/ED phase, ROW mapping should be prepared using existing Caltrans records to determine the extent of the right-of-way acquisitions. Any discrepancies of concern found in the ROW line should be resolved by delineating the existing ROW through survey.

Utilities

Utility locations were determined from utility owner as-built plans. Existing overhead power and communication utilities near the Laguna Canyon overcrossing may require relocation.

During the PA/ED phase, utility base mapping should be further developed by verifying utility locations in the field when feasible or working with utility owners to confirm that utility locations shown in the base mapping are accurate. Positive location of high-risk utilities should be performed in the PA/ED phase.

Railroad

There are no rail lines in the vicinity of this project.

9. STAKEHOLDER INVOLVEMENT

The PST for the PSR/PDS phase of this project included OCTA as the project sponsor, the City of Irvine, and Caltrans, which provided IQA. The PST defined the scope of this project using concepts originated from the cooperative effort during preparation of the South Orange County MIS. MIS stakeholders included organizations, local agencies, community groups, and interested citizens. During the PA/ED phase, public outreach and local agency coordination should continue so the project is developed and the scope of each alternative is consistent with the aesthetic, historical, and environmental values of the community.

10. ENVIRONMENTAL DETERMINATION AND DOCUMENTATION

The preliminary investigation of the proposed project is focused on potential impacts that may result from the build alternatives within the I-405 project corridor. The preliminary assessment of

resources in the area indicates that there is a potential for impacts within the following resource areas: air quality, biological resources, community, cultural resources, hazardous waste/materials, noise, water quality and stormwater runoff, transportation/traffic, utilities and services, and visual/aesthetics; however, none of the alternatives are anticipated to result in significant impacts and or substantial adverse effects if avoidance, minimization, and/or mitigation measures are implemented.

Specific avoidance, minimization, and/or mitigation measures and related time and costs cannot be estimated at this time because the technical studies have not been initiated; however, for purposes of this PEAR, it is assumed that avoidance, minimization, and/or mitigation would consist of those measures that minimize project-related impacts typically utilized for similar transportation projects. A discussion of notable impacts by alternative is provided below.

Effective October 1, 2012, Caltrans entered into a memorandum of understanding (MOU) with the FHWA, commonly called the NEPA Assignment MOU, pursuant to 23 *United States Code* (USC) 327. Under this MOU, Caltrans continues to assume FHWA responsibilities under the National Environmental Policy Act (NEPA) and other federal environmental laws in the same manner as was assigned under the Pilot Program, with minor changes. The environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being, or has been, carried-out by Caltrans under its assumption of responsibility pursuant to 23 USC 327.

Alternative 2: Alternative 2 would have the smallest footprint and would not require any widening of bridges. By virtue of this alternative having the smallest footprint and reduced scope, it would be reasonable to assume that this alternative would cost the least; be the least publicly controversial; require the least avoidance, minimization, and/or mitigation measures; and have a lower environmental risk compared to Alternative 3.

Alternative 3: Alternative 3 would have the largest footprint and would require bridge widening over San Diego Creek. By virtue of this alternative having the largest footprint, it would be reasonable to assume that this alternative would cost the most; be the most publicly controversial; require the most avoidance, minimization, and/or mitigation measures; and have the highest environmental risk compared to Alternative 2.

Design Variation: Grade separating the SB I-405 Irvine Center Drive off-ramp and the SR-133 merging connector is compatible with either Alternative 2 or 3 and will be studied further during the PA/ED phase. By virtue of this design variation requiring a new bridge structure over the San Diego Creek and being adjacent to a City of Irvine Preservation Area, it is reasonable to assume this design variation would increase cost; public controversy; avoidance, minimization, and/or mitigation measures; and environmental risk incrementally for either Alternative 2 or 3.

Permit Requirements

Both build alternatives would likely require the following permits and approvals.

- California Department of Fish and Wildlife Streambed Alteration Agreement.
- U.S. Army Corps of Engineers Clean Water Act (CWA) Section 404 nationwide permit for impacts to San Joaquin Channel and an individual permit or letter of permission for impact to San Diego Creek. U.S. Army Corps of Engineers Section 408 permit. These

would be associated with widening of both San Diego Creek crossings and the northern crossing of the San Joaquin Channel.

- Santa Ana Regional Water Quality Control Board (SARWQCB) CWA Section 401 Water Quality Certification.
- Dewatering Permit. Any dewatering requires coverage under the latest version of the General Waste Discharge Requirements for Discharges to Surface Waters which Pose an Insignificant (De Minimis) Threat to Water Quality within the San Diego Creek/ Newport Bay under Order No. R8-2009-0045, NPDES No. CAG918002.
- State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) Caltrans Statewide Storm Water Discharge Permit (Order No. 2012-0011-DWQ; NPDES No. CAS 000003) and Construction General Permit (Order No. 2009-0009-DWQ; NPDES No. CAS 000002), as amended by Order No. 2010-0014-DWQ, apply to this project.

The project would also have to comply with the requirements of the State Historic Preservation Officer under Section 106 of the National Historic Preservation Act. In addition, technical studies will need to be completed for each of the resources to accurately identify impacts and to develop feasible avoidance, minimization, and/or mitigation measures.

Based on this document, it is anticipated that a California Environmental Quality Act initial study and mitigated negative declaration and an EA and FONSI for compliance with the NEPA would provide appropriate environmental documentation for this project.

Special considerations for all alternatives that may affect scope, cost, and schedule are the following: ROW, San Diego Creek Watershed Special Area Management Plan requirements, noise/soundwalls, architectural treatments and landscaping, potentially contaminated properties, aerially-deposited lead, asbestos-containing materials, and Native American coordination.

Subject to approval of a Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) between OCTA and federal and State resource agencies, an Environmental Mitigation Program will be implemented to provide for high-value environmental benefits such as habitat protection and/or biological resource preservation in exchange for streamlined permit project approvals for M2 freeway projects. If the NCCP/HCP is approved when the proposed project is implemented, environmental mitigation would be provided through this process. Otherwise, the environmental mitigation would be committed as part of the project-level environmental analysis during the PA/ED phase.

NPDES Stormwater/Water Quality

The stormwater best management practices (BMPs) strategy developed for the PSR/PDS is conceptual. A preliminary review identified where either water quality volume or water quality flow devices could be placed throughout the project limits. During the PA/ED phase, the BMP strategy should be refined. Estimated project costs could vary greatly, depending on what BMPs are proposed and the drainage retrofits or upgrades and maintenance that would be required for stormwater management. For example, biofiltration swales are more cost-effective than Austin vaulted media filters both for construction and maintenance.

The stormwater data report (SWDR) for this project was based on Alternative 3, which is the alternative with the largest footprint. Stormwater treatment BMPs are proposed within the existing Caltrans ROW.

The proposed project is approximately 8.5 miles in length, and this portion of Interstate 405 resides in the East Coastal Plain Hydrologic Sub-Area (801.11). Within this Hydrologic Sub-Area, the project area is within the San Diego Creek Watershed Management Area (WMA). Within this watershed, the project crosses four water bodies, which are the San Diego Creek Reach 1 and Reach 2, San Joaquin Channel, and Lane Channel.

The SARWQCB has adopted the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), which sets forth water quality objectives for constituents that could potentially cause an adverse impact on the beneficial uses of water. A water quality control program has been established for each WMA, as well as a region-wide water quality control program. These programs establish Total Maximum Daily Loads (TMDLs) for each WMA, which are allowable pollutant loading from all contributing sources. These water quality objectives are intended to provide reasonable water quality protection for the beneficial uses listed for each water body.

Several Federal Clean Water Act Section 303(d) listed “impaired water bodies” are found either within or downstream from the project area. These 303(d) listed resources include San Diego Creek and Newport Bay. San Diego Creek and Newport Bay have established TMDLs for the following:

- Newport Bay (Lower): Chlordane, Copper, DDT (Dichlorodiphenyltrichloroethane), Indicator Bacteria, Nutrients, PCBs (Polychlorinated biphenyls), Pesticides, and Sediment Toxicity.
- Newport Bay (Upper, Ecological Reserve): Chlordane, Copper, DDT (Dichlorodiphenyltrichloroethane), Indicator Bacteria, Metals, Nutrients, PCBs (Polychlorinated biphenyls), Pesticides, Sediment Toxicity, and Sediment/Siltation.
- San Diego Creek Reach 1: Fecal Coliform, Selenium, Toxaphene, Nutrients, Pesticides, and Sedimentation/Siltation.
- San Diego Creek Reach 2: Indicator Bacteria, Nutrients, Sedimentation/Siltation, and Unknown Toxicity.

The proposed project corridor also crosses or is adjacent to smaller drainages (e.g., Agua Chinon Channel, Michelson Drain, Culver Storm Channel, F14PO2, and F14P11) and may impact other drainages due to their proximity. Most of these drainages within the study area are concrete-lined and are under the jurisdiction of the Orange County Flood Control District, United States Army Corps of Engineers (USACE), or Santa Ana Regional Water Quality Control Board (SARWQCB).

A risk-level determination was completed and is included as an attachment to the SWDR. This project was found to have a medium sediment risk factor and a high receiving water risk factor, which resulted in a risk level of 2. As a result of this score, it is subject to the requirements in Attachment D of the California Construction General Permit.

A stormwater pollution prevention plan (SWPPP) that identifies construction site BMPs would be prepared and implemented under the State's National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Associated with Construction Activities. The SWPPP would identify BMPs to minimize erosion and ensure the proper handling and storage of materials that may have the potential to impact water quality.

Recommended Environmental Technical Studies

Preparation of the following technical studies is recommended to assess the impacts of the project and develop feasible avoidance, minimization, and mitigation measures. All recommended environmental technical studies must be submitted upon completion to the environmental branch for review and approval.

- Air quality report;
- Archaeological survey report;
- Historic property survey report;
- Historic resource evaluation report;
- Initial site assessment update ;
- Natural environment study;
- Paleontological identification report / paleontological evaluation report;
- Relocation impact memorandum;
- Traffic impact / circulation study;
- Noise study report;
- Visual impact assessment; and
- Water quality assessment report.

Recommended Engineering Technical Studies

Preparation of the following engineering technical studies is recommended to assess the impacts of the project and develop the design.

- Stormwater data report;
- Noise abatement decision report;
- Location hydraulic study;
- Geotechnical study; and
- Traffic management plan and ramp closure study, if warranted.

11. FUNDING

Capital Outlay Project Estimate

The proposed project was identified in the Measure M2 Freeway Program as Project L. Measure M2 was approved by the Orange County voters in November 2006. The extension of the local half-cent sales tax used to fund transportation projects began in 2011 and will sunset in 2041.

This project is a candidate for programming PA/ED capital outlay support in the STIP. After approval of the PSR/PDS document, OCTA will seek STIP funding to support the PA/ED phase. STIP, federal, and other potential funding sources will likely be sought by OCTA to support the plan, specifications, and engineering and the capital construction costs. These funding sources will be identified and explored further during the PA/ED phase. Further, additional federal and State funding sources will be explored for Alternative 3, which includes improvements beyond the Measure M2 Freeway Plan.

Table 8 summarizes the Attachment F Capital Outlay Project Estimate. The construction cost column includes escalated dollar costs for construction. The ROW cost column includes appreciated costs for potential ROW needs and utility relocation costs.

Table 8. Capital Outlay Project Estimate (millions of dollars)

| Alternative | Range of Estimate | |
|-------------------------------------|-------------------|--------------|
| | Construction | Right-Of-Way |
| Alternative 2 | \$110-\$150 | \$0.5-\$0.7 |
| Alternative 3 | \$160-\$200 | \$0.5-\$0.7 |
| Alternative 2 with design variation | \$150-\$200 | \$0.5-\$0.7 |
| Alternative 3 with design variation | \$200-\$250 | \$0.5-\$0.7 |

The level of detail available to develop these capital outlay project estimates is only accurate to within the above ranges and is intended for long-range planning purposes only. The capital outlay project estimates should not be used to program or commit state-programmed capital outlay funds.

Capital Outlay Support Estimate

The capital outlay support estimate for programming PA/ED for this project is \$4.5 million to \$7.0 million. To fully understand the level of funding necessary to complete the PA/ED phase, Caltrans will need to develop a future estimate of its cost to provide IQA services.

12. SCHEDULE

Project milestones are shown in Table 9. The target for starting the PA/ED phase in 2014 assumes that Renewed Measure M2 and STIP funding sources will be available. The PA/ED phase duration is estimated to be 30 months, with completion in mid-2017. The anticipated funding fiscal years for construction are 2021 through 2023.

Table 9. Project Milestones

| Project Milestones | | Scheduled Delivery Date |
|--|------|-------------------------|
| Program project | M015 | March 2014 |
| Begin environmental | M020 | November 2014 |
| Circulate draft project report and draft environmental document externally | M120 | November 2016 |
| PA/ED complete | M200 | May 2017 |

13. RISKS

The PST jointly prepared a project risk register that identifies risks to carry forward to the PA/ED phase. The risk register is in Attachment G. Because of the preliminary nature of the project, key themes identified in the project risk management plan (PRMP) include approval of design exceptions, resource agencies participation in and approval of environmental documentation, and project funding and delivery schedule.

To address these risks, the PRMP developed for the PA/ED phase should include risk management techniques, including avoiding, accepting, and transferring risks. The PA/ED phase offers opportunities to avoid risks through design refinement. As additional information is gained during the PA/ED phase, risks can be accepted, managed by the team, and included as a contingency in the budget in anticipation of the risk occurring. It might also be possible to transfer risks to a third party, such as a utility owner or to the contractor during construction.

14. FEDERAL HIGHWAY ADMINISTRATION COORDINATION

I-405 is part of the NHS and will require FHWA review. Consultation with the FHWA is necessary near the start of the PA/ED phase to determine if this project qualifies as a High Profile Project (HPP) or as an Assigned Project. The Joint Stewardship Oversight Agreement (JSOA) between the FHWA and Caltrans includes the criteria for identifying an HPP. Even though JSOA criteria for an HPP have been met with this project, Caltrans and FHWA will jointly decide if the criteria met are sufficient to warrant selection as an HPP. The proposed project meets two of the criteria for an HPP.

FHWA approval is necessary for design exceptions related to the 13 controlling criteria, which include design speed, lane width, shoulder width, bridge width, horizontal alignment, vertical alignment, grade, stopping sight distance, cross slope, superelevation, horizontal clearance, vertical clearance, and bridge capacity. In addition, projects where the existing access is changed or modified require FHWA approval.

This project will likely be eligible for federal funding support for the PA/ED phase through the highway bill, Moving Ahead for Progress in the 21st Century (MAP-21), which was authorized in July 2012. The Congestion Mitigation and Air Quality Improvement Program (CMAQ) was continued in MAP-21. However, in accordance with the October 2008 CMAQ program guidance, the proposed project is likely ineligible for CMAQ funding on the basis that this project is adding capacity for single-occupancy vehicles through construction of GP lanes rather than adding capacity through constructing HOV or high-occupancy toll lanes.

15. DISTRICT CONTACTS

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16. PROJECT REVIEWS

Project Manager Ahmad Hindiyeh Date October 21, 2013

FHWA Review (not provided at this time) Date N/A

HQ Design Coordinator Karl Dreher Date October 21, 2013

17. ATTACHMENTS

- A Project Location Map
- B Schematic Maps of Study Area and Alternatives (bound separately)
- C Preliminary Environmental Assessment Report (bound separately)
- D Transportation Planning Scoping Information Sheet
- E Conceptual Cost Estimate – Right-of-Way Component
- F Capital Outlay Project Estimate
- G Risk Register
- H Storm Water Data Report (bound separately)